P1.122 Abeli, T; Parolo, G*; Bonomi, C; Zubani, L; Varotto, C; Lega, M; Dipartimento di Ecologia del Territorio - University of Pavia, Trento Natural History Museum, Dipartimento di Ecologia del Territorio - University of Pavia, Trento Natural History Museum, Edmund Mach Foundation; *gilberto.parolo@unipv.it*

Absence of differences in fluctuating asymmetry (FA) between small populations of the narrow endemic Aquilegia thalictrifolia (South-Eastern Alps, Italy).

Increased FA of morphological traits occurs under environmental and genomic stress, being linked with heterozigosity, population size and performance, and environmental factors. The aim of this work was to analyse such relationships in Aquilegia thalictrifolia, a narrow endemic plant species, occurring in 15 small populations in the Garda Lake area. We studied differences in FA between all the populations, measuring 1830 leaves and petals of 150 flowers. Relationships between FA and performance, population size, density and degree of isolation were analysed. According to other studies, leaf and flower asymmetry were only slightly correlated. FA did not differ between populations, and also between the core area of distribution and two very far disjunctions. We found no significant relationships between FA and performance of the populations, and between FA and population size and density. The lack of significant results concerning FA variation differs from most of the known literature. This could be explained by considering that environmental conditions and genetic diversity are affecting homogeneously the FA through the whole species range. A further step of our work will be the analysis of the heterozigosity on the same individuals measured for the FA, with the aim of understanding if, despite the lack of significant FA, genetic diversity varies among populations of A. thalictrifolia. This information may provide further insights into the evolutionary history and conservation status of this recent endemism.

P1.19 ABI-SAID, MOUNIR R.*; Abi-Said Marrouche, Diana M.; Leader-Williams, Nigel; American university of Beirut, University of Cambridge; *mabisaid9@gmail.com*

Effect of Zoo-based Educational Programme on Biodiversity Conservation

Slowing the rate of species' extinction is vital for the future wellbeing of humankind. Conservation education programmes (CEPs) can help bring this about especially if young people are targeted. CEPs running outside classrooms have a greater impact than traditional classroom programmes. Nevertheless, evaluations that compare passive, with more active zoo education approaches are uncommon. In this study, we compare the impact of passive self-guided tours with active seminars on the attitudes of zoo visitors using the much reviled striped hyaena Hyaena hyaena syriaca as a case study. We administered questionnaire interviews to students, both before entering the Animal Encounter "Educational Center for Wildlife Conservation", Lebanon, and after they had experienced either a self-guided tour or a 45-minute awareness raising seminar after their tour. Most students (>80%) held negative attitudes towards hyaenas, and these attitudes were particularly influenced by information provided by their parents, However, many (~65%) concurrently accepted that hyaenas played a positive role in the environment, and showed some support for their conservation. The overall zoo-education programme was very effective at changing attitudes, in the immediate short-term at least. Furthermore, the active approach was much more effective overall than the passive approach, a message that has important for implications for other zoo-based conservation programmes.

P2.28 Abilhoa, VA*; Vitule, JRS; Bornatowski, H; Freitas. MO; Grupo Pesquisas Ictiofauna, Museu Historia Natural Capao da Imbuia, Prefeitura de Curitiba; *vabilhoa@uol.com.br*

Conservation of threatened freshwater fishes of the Atlantic Rainforest in Southern Brazil: check list, protection priorities and impacts of human activities

The water demands and human negative impacts on ecological integrity are huge threats to the freshwater fish of the Atlantic Rainforest biome. We studied the most threatened fish (based in IUCN criteria and our experience in the specific local) present in freshwater habitats of the Atlantic Rainforest coastal region into ParanÃ¡ State, Southern Brazil (~ 25ÂºS and 48ÂºW). This region has an extensive process of the expansion of urbanization, which includes littoral cities like ParanaguÃ¡ and Pontal do ParanÃ¡, both near to Curitiba (one of the biggest cities of Brazil). Data on species distribution and microhabitat were recorded. We checked primary threats for each species: habitat loss due to water demands, illegal deforestation and urbanization, introduction of non-native species and pollution. Most threatened species are Mimagoniates lateralis - (VU), Rachoviscus crassiceps - (EN), Scleromystax macropterus - (VU), Spintherobolus ankoseion, all included in the Brazilian Red lists, but unfortunately none appears into IUCN list, a fact that needs to be corrected. Impacts as alien species introduction and pollution might have synergetic effects with climate changes phenomena, an important fact that needs to be considered in management strategies for tropical freshwater fish conservation.

P1.61 Abolaji Mayowa Akinyele*; Adekunle Segun Oke; University Of Ibadan,Nigeria/ Guildhall College London,London., Osun-state College of Education, Nigeria; *abolajiakin2002@yahoo.co.uk*

TOPIC: An Investigation of Environmental Education Knowledge for Sustainable Development in High School Sectors.

There has been an increasingly growing concern in the last decade about the quality of our environment and sustainable development; its relationship with development and our lack of care for the environment. This had devastated the quality of life of living organisms and which eventually led to the worldwide environmental crisis in the last decade. This is heightened by failure to employ effective means of creating and developing in the student's environmental awareness and positive attitude towards the natural environment. Also, there has been growing international concern about issues such as how the earth's resources are being depleted, the consequences of global warming, social inequality, poverty and starvation and growth in the world's population. These environmental problems brought about a number of seminars and conferences at national and international level to create a global awareness of the current campaign for the propagation of environmental protection and conservation for sustainable development. Among the seminars and conferences organised specifically to address this issue of environment and sustainable development are the stckholm conference on human environment held in 1972; the finish National commission for UNESCO at Jaimini in 1974; the Tbilisi conference of 1977, the United Nations Conferences on environmental issues, popularly known as the Earth summit, which was held in Rio de Janeiro, Brazil in 1992 and the most recent world conference on global warming held at Istanbul, Turkey in July,2009.

SY67 Abrams, R.W.*; Anwana, E.D.; Ormsby, A.; Dovie, D.B.K.; Ajagbe, A.; Abrams, A.; Long Island University, University of Greenwich, Eckerd College, University of Ghana, Nigerian Conservation Foundation, University of Cape Town; *ronwoolf@ix.netcom.com*

Integrating Top-Down with Bottom-Up Conservation Policy in Africa

Developed nations intervened in conservation policy across in Africa during the 20th Century to address perceived needs to protect species and biodiversity. By the 21st Century, conservationists in Africa have revised that perception and begun the process of identifying conservation priorities from an African perspective, and in consideration of Africans' priorities. While foreign conservation interveners struggled to identify mechanisms to which local people would respond, African conservationists are now demonstrating how to integrate the continent's unique socio-economic circumstances into efforts to protect biodiversity. In Africa, effective conservation policy must include the generation of wealth, reduction of disease and hunger and support of traditional land use practices.

P2.80 Abril-Pulido, E*; PachÃ³n-Matute, C; BarragÃ¡n-Barrera, D; AsociaciÃ³n Akuaippa; *asociacionakuaippa@gmail.com*

Bird monitoring to conservation el Salitre wetland in Bogota: strengthening local conservation efforts

Bogota Savannah was greatest Lake Humboldt 20000 years ago. Early XX century, there were 50000 ha of wetlands in Bogota, but at time this area has reduced to around 800 ha, due principally human activities like industry, city-planning expansion, and agriculture. Actually, there are 13 wetlands and 2 associated lakes in Bogota. El Salitre wetland is aquatic area that contains migratory and resident bird's species. Around this wetland, there are some urbanization and recreational areas that affect this natural habitat. Due city-planning expansion District Administration wanted to build a greatest area to realize massive events on El Salitre. At date, we have realized bird monitoring and we have registered this region is very important for birds like core habitat, since this site offer them food and protection. Migratory species like Vermivora peregrina, Porzana carolina, Porphyrio Martinica, Actitis macularia, Piranga rubra, Contopus coopei inhabit this area. Birds in El Salitre wetland use primarily the area for feeding and resting, and we have registered presence of eggs and chicks. This way, with these results, we demonstrated this area is very important for migratory and resident birds, and El Salitre wetland was declared like that a few months ago. However, conservation and educational efforts should take in consideration the protection and conservation this wetland.

P1.5 Acevedo, P.*; FarfÃ¡n, M.A.; Marquez, A.L.; Delibes-Mateos, M.; Real, R.; Vargas, J.M.; Universidad de MÃ¡laga, Biogea Consultores, IREC-CSIC; *pacevedo@uma.es*

Past, present and future of wild ungulates in relation to changes in land use

In recent decades, Mediterranean landscapes have been experiencing more rapid changes in land use than usual. These relatively rapid changes have affected the ecology of the species inhabiting this biodiversity hotspot. Some studies have assessed the effect of such changes on biodiversity, but most of these were diachronic studies of population dynamics, or synchronic studies of species habitat selection, whereas few studies have simultaneously taken into account temporal changes in habitat composition and changes in species distribution. The present study analyzed the effects of land-use changes on the evolution of the distribution of wild ungulates (Iberian wild goat, red deer, roe deer and wild boar). Thus, we i) describe the environmental determinants of ungulate distribution in past scenario (1960s) but also in present one (1990s), ii) assess the biogeographical differences between scenarios, and iii) model land use for 2040 to forecast future species distributions. Our results show that, with the exception of wild boar, which drastically altered its distribution between both scenarios, natural vegetation has more explanatory power in models of the present, but crops were more relevant in models of the past. Generally, areas favourable to the species studied will continue to increase in the future. The results are discussed from the perspective of the socio-economic relevance of wild ungulates in relation to some unfavourable areas of Mediterranean regions.

SY23 Adams, VM*; Pressey, RL; Stoeckl, N; James Cook University; *vanessa.adams@jcu.edu.au*

Applying choice modeling to design payment programs for off-reserve conservation in the Northern Territory, Australia

The need to integrate social and economic factors into conservation planning has become a focus of academic discussions and has important practical implications for the implementation of conservation areas. However, to date the focus has been only on selection of areas for strict reservation. With limited resources, progressive degradation of habitats, and rising expectations about the necessary extent of conservation management, it is increasingly likely that other conservation actions such as stewardship agreements or conservation covenants on private land will be necessary. We conduct a survey in the Daly Catchment, Northern Territory, to estimate the current land management costs for landholders associated with current conservation actions and threats. The Daly Catchment is a national priority for biodiversity conservation but also highly suitable for intensified extractive uses. We use choice modeling to assess the probability of success of three conservation actions by land parcel: acquisition for reservation, payments to support a Conservation Management Agreement, and payments to support a Conservation Covenant. We produce a spatially explicit map of areas that have a high probability of success for the various conservation actions. Additionally, we assess the current costs of conservation for the catchment and use regression techniques to estimate the budget required to support the various conservation actions under consideration.

SP4.4 ADAMS-HOSKING, CHRISTINE*; Patrick T. Moss ; Jonathan R. Rhodes ; Hedley S. Grantham ; Clive McAlpine ; University of Queensland; *c.hosking@uq.edu.au*

Climate Change Modelling of an Ancient Endemic: a Koala Case Study.

Ongoing concern about climate change and its effects on species distributions and global biodiversity has seen the increasing utilisation of numerous predictive modelling approaches. Species distribution modelling is now a tool that has become an essential component in biodiversity conservation and management. Australia's endemic folivorous marsupial, the koala, is increasingly threatened by the synergistic threats of primarily, habitat fragmentation and loss, drought and heat waves. Using a range of distribution modelling techniques, we investigated the future distribution of koalas under projected climate change scenarios and incorporated these models into a reserve selection framework. We found significant range contractions from their western arid and semi-arid range towards rapidly urbanising eastern and coastal regions, suggesting population declines and local extinctions of western populations under a projected hotter climate. Our reserve selection modelling identified priority future habitat refugia for koalas, information that can feed into a broader land use planning decision-making process. We recommend that koala conservation policies urgently develop systematic conservation strategies that aim to reduce the contemporary land use pressures on extant koala populations and help buffer against the projected impacts of climate change. Such strategies are essential if this flagship species is to survive in the wild.

P1.165 Agoramoorthy, G*; Hsu, MJ; College of Environmental Sciences, Tajen University, Yanpu, Pingtung 907, Taiwan, Department of Biological Sciences, National Sun Yat-sen University, Kaohsiung 804, Taiwan ; *agoram@mail.tajen.edu.tw*

Biogas plants promote forest conservation in India

Over 80% of the total energy consumed in rural India comes from biomass fuels such as firewood, crop residues and livestock dung. This paper presents data on household biogas plants successfully established in remote tribal villages of western India with an emphasis on their impact in enhancing local ecology. Between January and June 2007, 125 biogas plants in Gujarat, Rajasthan and Madhya Pradesh States were visited to record data on their impact on the local ecology and community. The annual average use of firewood was 638.3 kg/household, which dropped drastically from 1,048.9 kg before launching the biogas plants to 410.6 kg afterwards. An annual total of 79.8 tons of firewood from the forest was saved by the 125 households, which showed the enormous potential of household biogas plants in relieving ecological stress in forest areas of rural India. Similarly, the usage of kerosene (from an average of 120.7 to 46.3 l/year) and chemical fertilizer (from an average of 472.2 kg/year to 235.5 kg/year) was also drastically reduced after the launch of the biogas plants. Therefore the eco-friendly biogas technology deserves serious attention.

P1.167 Aghanajafi,Sh*; Hemami, M.R; Heydari, F; Department of Environment, Islamic Azad University, Maybod branch, Depatment of Environment, Isfahan University of Technology, Iran, Department of Environment, Khatam province, Iran; *shirinaghanajafi@gmail.com*

Cavity-nest site selection by Syrian woodpecker(Dendrocopos syriacus) in Yazd province, Iran

The Syrian Woodpecker is a resident breeding bird from southeastern Europe east to Iran. We studied tree features influencing cavity-nest site selection by this species in an forest oasis in semi-arid central Iran. Habitat features of the detected cavity-nests were compared with randomly selected control trees by quantifying a number of habitat variables including height, diameter and canopy cover of the selected trees. All the nests have been selected on pistachio (Pistachia atlantica) trees, while other tree species such as Amygdalus scoparia and Acer cinerascens have not been chosen. The most important factors influencing cavity-nest selection was tree species and the diameter of trees. The mean tree diameter at base of 40 selected pistachio trees by Syrian woodpecker was 7.2 cm + 1.16 SD, which was significantly larger (P

SP7.8 Ah-King, J; None; *jenniferahking@gmail.com*

Effects of weeding and fencing on the regeneration of native sapling communities in Mauritius.

Invasive alien species impair the regeneration of native forests in Mauritius. I investigated the effects of two management practices, weeding and excluding (via fencing) of alien taxa, on the regeneration of native sapling communities at two sites. A managed (weeded, fenced) and a controlled (non-weeded, non-fenced) plot were surveyed in 1998/9 and re-sampled in 2008 at each site. All woody saplings (20-130 cm tall) were identified and counted. Communities at each site were compared using two-way ANOVAs and diversity derived from Shannon Index. Wilcoxon tests were used to investigate changes in density and importance value (IV) of the ten most important species in 1998/9 with their paired value in 2008. Sapling recruitment in the managed plots increased by 122% and 234% whereas sapling recruitment in the control plots increased by 81% and 32% respectively. ANOVA results confirmed that management had a significant positive effect on recruitment at both sites (p

SY12 Ahmad, Shumila*; Barta, David; Fore, Seth; Overmoe, Kate; Nemitchenko, Tetiana; Wang, Chao; Zhou, Qiang; University of North Dakota; *seth.fore@und.edu*

Threats to grassland conservation on the Northern Great Plains: agriculture and oil development

The Northern Great Plains (NGP) is an ecoregion of high conservation value. Grasslands in this region provide essential ecosystem functions such as preventing soil erosion, filtering ground water, cycling of nutrients, and sequestering carbon. Although preservation of these ecosystem services is vital to human society, conservation of the NGP ecoregion is often neglected due to high developmental pressure from agriculture and oil production. The expansion of agriculture and oil production results in habitat loss, habitat fragmentation, invasive species, and increased pollution. In the NGP, conversion of grassland to cropland is between 68 and 80 percent in Alberta, Saskatchewan, and Manitoba and between 50 and 67 percent in North Dakota, South Dakota, and Montana. In Manitoba, Saskatchewan, North Dakota, and South Dakota alone there are nearly 38,000 actively producing oil wells. A recently revised estimate of undiscovered oil reserves in the NGP indicate a 25-fold increase over previous estimates. Consequently, the impact of oil development is likely to increase substantially. Given existing and emerging threats to conservation on the NGP, public policy initiatives that explicitly value functional, resilient ecosystems are paramount. Sustainable development of the NGP requires that state/provincial, federal, and international policies promote multifunctional landscapes that maintain ecosystem function while concurrently providing economic benefits.

4.8 Aiello-Lammens, Matthew*; Akcakaya, H. Resit; Fischer, Richard A.; Convertino, Matteo; Chu-Agor, Maria Librada; Martinez, Chris; Linkov, Igor; Stony Brook University, U.S. Army Engineer Research & Development Center, University of Florida, Gainesville, US Army Engineer Research and Development Center; *matt.lammens@gmail.com*

Integrated Climate Change and Threatened Bird Population Modeling to Assess Risks from Changes in Sea-level and Weather Patterns

Rising sea-level due to climate change is likely to alter the amount and suitability of habitat for species dependent on coastal areas. To investigate these effects on Snowy Plover (Charadruis alexandrinus) in the Florida Gulf coast where it is state-threatened shorebird, we used a novel approach of integrating forecasts of land-use change and effects of sea-level rise with a spatially explicit demographic model for the species. We parameterized the demographic model using data from ongoing population surveys. We used the Sea-level Affecting Marshes Model (SLAMM) to forecast the effects of sea-level rise on the habitat types used by Snowy Plovers (inland fresh marsh, salt marsh, beach). We used species distribution models to estimate a habitat function. We then projected suitable habitat based on three IPCC climate change scenarios, and incorporated other habitat suitability characteristics, including land-use trends. Other effects of climate change (frequency of rainy days and storms) were incorporated as effects on the demographic rates. Thus, several effects of climate change were considered to evaluate the spatial distribution of Snowy Plovers and the risk of extinction and decline of their populations as a function of future climate change. Our analysis focused on Snowy Plover population dynamics on military installations and in the Gulf coast region, resulting in recommendations for conservation management in light of changing habitat and land use.

SP6.4 Ainsworth, GB; Aslin, HJ; Garnett, S. *; School for Environmental Research, Charles Darwin University, Darwin, Northern Territory, Australia 0909, Charles Darwin University; *gill.ainsworth@cdu.edu.au*

Eagles, Cuckoos and Little Brown Jobs: Majestic, Manipulative and Miscellaneous or Species of Equal Merit? How Do Human Values Bias Wildlife Conservation?

Using Australian avifauna as a case study, our research aims to examine how the values of wildlife to Australian society affect conservation programs. We discuss how different bird species are represented in Australian society through a social values framework. Value (â relative worth, merit or importance') cannot be observed directly but only through expression in the form of attitudes and behaviours. Socio-psychological techniques can be used to measure fluctuating attitudes and behaviours and link them to underlying aesthetic, utilitarian, intrinsic and other values. Alternatively the economic techniques can be employed to assess use, option, existence or bequest values. Although much of the world's population is urbanising, non-human animals remain vitally important: examples can be found in everyday symbolism, imagery and language as well as the products we buy, the organizations we join and the nature documentaries we enjoy. In this presentation, we hope to engage the audience in a broader discussion about the social values of birds, how these values can be assessed, and how different values influence conservation effort.

P1.182 Akinyemi, A. F; Dept. of Wildlife and Fisheries Mgt, University of Ibadan, Nigeria; *akinyemi_wildlife@yahoo.com*

Wildlife - crops conflicts and local community participation in the management of Yankari Game Reserve, Bauchi, Nigeria

ABSTRACT The close proximity of wildlife to suburban areas leads to an increase in human - wildlife encounters and potential conflicts which inflict costs on local communities and can erode local support and tolerance. Assessment of crop losses with systematic measurements of crop damage by wildlife reveals that farmers' perception did not correspond closely to the monitored records. The main factors influencing local risk perception were labour investment, potential for total loss, gender identity and an animal's ability to destroy large crops areas. Farmers ranked maize (Zea mays) and millet (sorghum spp) as the most vulnerable crops out of ten different cultivated plants. The most damaging animals identified were olive baboons (Papio cynocephalus), bush pig (Potamochoerus spp) and elephants (Loxodonta africana). Also, a positive association between monthly rainfall and attacks, demonstrate that lions (Panthera leo) are more likely to attack livestock during seasonal rains. Conflicts can be exacerbated by local people's lack of access to natural resources, substantiating the concept of conflict co-management as a means to achieve sustainable wildlife conservation Key words : conflicts, community participation, game reserve

SY63 Aldridge, Cameron L*; Schmiegelow FKA; Hebblewhite, M; NREL, Colorado State University, & US Geological Survey, Northern Environmental and Conservation Sciences Program, Department Department of Renewable Resources, University of Alberta, Wildlife Biology Program, College of Forestry and Conservation, University of Montana; *cameron_aldridge@usgs.gov*

How to reconcile the science-policy gap in implementation of critical habitat under ESA and SARA? A panel discussion.

Many scientific challenges exist in the identification of critical habitat for endangered species, including definition of the words â critical and â habitat', determination of the appropriate scale(s) for assessments (individual, population, geographic), and appropriate incorporation of demographic processes into the spatial delineation of critical habitat. Many of these challenges were highlighted in case studies of individual species presented in this symposium, and evaluated in the assessment of approaches in conservation science to addressing critical habitat. Moreover, once critical habitat has been identified based on ecological criteria, implementing critical habitat designations through existing policy and legal frameworks represents another set of challenges that has rarely been addressed, particularly in Canada, where federal legislation (SARA) has only recently been enacted, and related policy is still under development. Here, identifying the institutional impediments to effective conservation and management of critical habitat, to support the recovery and long-term persistence of species at risk, is key. In this panel discussion, we involve participants in the symposium in a round-table discussion aimed at identifying and reconciling science-policy gaps when implementing critical habitat provisions under ESA and SARA.

SY63 Aldridge, CL*; Gummer, DL; NREL, Colorado State University, & US Geological Survey, Northern Service Centre, Parks Canada Agency; *cameron_aldridge@usgs.gov*

Lessons learned in the application of habitat models to identify critical habitat for Greater Sage-Grouse

Identification of habitat necessary for survival or recovery of imperilled species is critical for future conservation, yet quantitative understanding of resources required for a viable population is not available for most species. For Greater Sage-Grouse (Centrocercus urophasianus) populations in the U.S. and Canada, there is a considerable base of knowledge that includes detailed, quantitative understanding of habitat selection across scales and life stages, and assessment of the effects anthropogenic and abiotic drivers. Capitalizing on existing quantitative models to provide a credible analysis of critical habitat poses many technical challenges, including: (i) the need to extrapolate beyond original models to different time and space; (ii) comparable geospatial datasets for predictor variables are not readily available across the area of interest; (iii) there is a paucity of independent data with which to validate the habitat identification; (iv) habitat model results need to be classified in a meaningful way to represent critical habitat; and (v) propagation of spatial and statistical uncertainty need to be evaluated. We highlight recent work to identify critical habitat for Sage-Grouse in Canada. Lessons learned have high relevance to future efforts to identify important habitat for Sage-Grouse throughout its range, and for other endangered species in general.

P1.93 Alessio Mortelliti*; Giovanni Amori; Stefano Fagiani; Luigi Boitani; University of Rome , CNR Institute for Ecosystem Studies; *alessio.mortelliti@uniroma1.it*

Independent Effects of Habitat Loss, Habitat fragmentation and Structural Connectivity on the Distribution of Vertebrates: When Should We Increase Hedgerows?

Disentangling the different processes often included in the term "habitat fragmentation" is crucial, since different conservation actions are required depending on whether a species is sensitive to habitat loss rather than habitat fragmentation per se. Nevertheless, few studies have evaluated their independent effects on the distribution of vertebrates and none has evaluated the independent effect of changes in structural connectivity (e.g. decrease of hedgerows in the landscape). We carried out a landscape-scale mensurative experiment, using an experimental design that allowed separation of the independent contribution of these three processes, to examine the distribution of 11 forest-dependent vertebrates (3 species of arboreal rodents and 8 species of birds). Habitat loss, rather than habitat fragmentation per se, was the major driver of distribution patterns for 7 species. Structural connectivity (hedgerow networks) played an important role in determining the distribution of 5 species. Our empirical findings indicate that implementation of structural connectivity must never be carried out regardless of the amount of habitat in the landscapes: with less than 10% of forest cover in the landscape the implementation of a hedgerow network, even if extensive, may prove ineffective. The key message is, therefore, that before investing resources in the implementation of landscape linkages, their efficacy for the given level of habitat amount should be assessed.

SY33 Allendorf, F. W.; University of Montana; *fred.allendorf@gmail.com*

Hybridization and Genetic Extinction of Native Cutthroat Trout

Human-mediated hybridization is a leading cause of biodiversity loss worldwide. How hybridization affects fitness and what level of hybridization is acceptable pose difficult conservation questions with little empirical information to guide policy and management decisions. This is particularly true for westslope cutthroat trout (Oncorhynchus clarkii lewisi), where widespread introgression with introduced rainbow trout has often created hybrid swarms over extensive geographical areas resulting in genomic extinction. Recent results indicate that small amounts of hybridization markedly reduced fitness of male and female trout, with reproductive success sharply declining by approximately 50 per cent, with only 20 per cent admixture. However, hybridization may spread even when hybrids have severely reduced fitness because the production of hybrids is unidirectional-that is, all the progeny of a hybrid will be hybrids. However, such short-term increases in fitness may disrupt important long-term adaptations of native populations. Thus, rapid spread of hybridization could result in the loss of local adaptations in native populations of westslope cutthroat trout and decrease their probability of long-term persistence.

10.7 Amano, T*; Smithers, RJ; Sparks, TH; Sutherland, WJ; National Institute for Agro-Environmental Sciences, Japan, The Woodland Trust, UK, PoznaÅ University of Life Sciences, Poland, University of Cambridge, UK; *amatatsu@affrc.go.jp*

A 250-year Index of First Flowering Dates and its Response to Temperature Changes

Widespread concerns about global biodiversity loss have led to a growing demand for indices of biodiversity status. Today, climate change is among the most serious threats to global biodiversity. Although many studies have revealed phenological responses to climate change, no long-term community-level indices have been developed. We derived a 250-year index of first flowering dates for 405 plant species in the UK for assessing the impact of climate change on plant communities. The estimated community-level index in the most recent 25 years was 2.2 to 12.7 days earlier than any other consecutive 25-year period since 1760. The index was closely correlated with February-April mean Central England Temperature, with flowering 5.0 days earlier for every 1 Â°C increase in temperature. The index was relatively sensitive to the number of species, not records per species, included in the model. Our results demonstrate how multi-species, multiple-site phenological events can be integrated to obtain indices showing trends for each species and across species. This index should play an important role in monitoring the impact of climate change on biodiversity. Furthermore, this approach can be extended to incorporate data from other taxa and countries for evaluating cross-taxa and cross-country phenological responses to climate change.

P2.173 Ambrosini, R*; Saino, N; Dipartimento di Biotecnologie e Bioscienze, UniversitÃ degli Studi di Milano Bicocca, Dipartimento di Biologia, UniversitÃ degli Studi di Milano; *roberto.ambrosini@unimib.it*

Proper Farmland Management May Reduce Barn Swallow Hirundo rustica Population Decline

The widespread decline of farmland birds is currently a major issue in conservation biology. The Barn Swallow Hirundo rustica is a flagship species for biological conservation owing to its aesthetic and cultural value and to the sharp decline observed in several populations. Based on a long-term monitoring project on a declining population in a protected area in Northern Italy, we here demonstrate that the extent of pastures and hayfields within as few as 200 m from the colony positively influences colony size and therefore reduces population declines. This effect is significant even when presence of livestock farming, that is considered the major determinant of barn swallow colony size, is taken into account. New conservation strategies based on these findings have been planned in the protected area where the study was conduced.

SP9.8 Amirhossein Khaleghi Hamidi*; Arash Ghoddousi; Taher Ghadirian; Plan for the Land Society; *a.h.khaleghi@gmail.com*

A Flagship Species Based Conservation Program in the Middle East: Persian Leopard (Panthera pardus saxicolor) Conservation in Bamu National Park, Southern Iran

The long-term prospects for conservation of ecosystems in the Middle East are not feasible without support from local communities which are traditionally involved in domestication, agriculture and hunting. This project brings the Persian leopard as a conservation icon for local people whom respect this powerful animal in order to promote their involvement in conservation. After extinction of the Caspian tiger and the Persian lion, it is the biggest surviving cat in the region listed in the 2009 IUCN Red List of Threatened Species as "Endangered". We initiated our project in Bamu National Park (Fars Province, Southern Iran) which is known by relatively high leopard density coupled with quite intense prey poaching, habitat degradation and poacher-warden conflicts. The first step was to assess the species status, estimate the population size, identify the threats to tackle and propose the focused conservation measures. As a result of intensive camera photo-trapping in eastern Bamu (September 2007 - May 2008, 360 km2, 2024 trap-nights), we obtained 72 leopard pictures, including 31 independent ones, from which we identified 7 individual leopards: 1 adult male, 1 sub-adult male, 1 female with cub, 2 adult females and 1 cub. Based on this information, 1200 schoolchildren aged 10-14 years living in 10 villages around the park were educated. As a result, a female leopard (14% of local population) with two cubs was saved from poisoning by one of those children. The process of awareness-raising and capacity building among local people is ongoing, having chosen the Persian leopard as a symbol of conservation and control over anthropogenic impacts on Bamu National Park.

20.3 AMOS, NEVIL*; Pavlova, Alexandra; Jim Radford; Jim Thomson; Matt White; Graeme Newell; Ralph Mac Nally; Paul Sunnucks; School Of Biological Sciences, Monash University., Deakin University, ARIER, DSE, Vicotira Australia; *nevil.amos@sci.monash.edu.au*

Does Structural Connectivity Matter For Woodland-Dependent Birds? Genotypic Datasets For Eight Bird Species Explore Landscape Connectivity Models

Structural connectivity is often used as a proxy for functional connectivity in conservation planning and assessment, but the relationship between structural and functional connectivity largely is unknown. Functional connectivity, for eight south-eastern Australian woodland-dependent bird species, was predicted with isolation-by-resistance models in which resistance varied with land-cover. The birds differed in mobility and included species that were â decliners' - exhibiting disproportionately large decrease in occurrence with habitat loss - and â tolerant' - species where decrease is in proportion to habitat loss. Local-(1-10km) and regional-scale (20-200km) population and individual based genetic distances were estimated from microsatellite genotypes of > 3000 individuals sampled from 60 sites in 12 landscapes with 10 -80% tree cover. These estimates of effective functional connectivity and recent dispersal were used to test the fit of the connectivity models. Functional connectivity was high both for â tolerant' and mobile â decliners' even where fragmentation was severe. The absence of these â decliners' from apparently suitable habitat is not due to their inability to reach isolated habitat. Other more sedentary â decliners' show decline in functional connectivity with structural connectivity. Their absence from patches in low cover landscapes may be due to constraints on their dispersal. Landscape management strategies must accommodate these different responses.

SY13 Andelman, SJ*; Ahumada, J; O'Brien, T; Rovero, F; Conservation International, Wildlife Conservation Society, Trento Museum; *sandelman@conservation.org*

A Global System for Monitoring Tropical Mammal Communities

We describe the first pantropical, standardized monitoring network for tracking the changing state of tropical mammal communities and the drivers of those changes. The network spans representative environmental and anthropogenic gradients and currently comprises 16 sites in Africa, Asia and Latin America, and will expand to 40 sites by 2012. The system for monitoring mammal diversity is part of a broader monitoring effort: The Tropical Ecology, Assessment and Monitoring (TEAM) Network. The design of the network facilitates comparisons of tropical mammal diversity and trends with the diversity and trends of other taxonomic groups, e.g., tropical trees. All of the data from the Network, including camera trap images (~ 10,000 images per site per month) and metadata, are freely available in near real time at www.teamnetwork.org. We describe the underlying sampling design and its statistical power to detect change. To illustrate what we can learn from this system, we present some initial data sets characterizing tropical mammal communities at five sites and compare mammal diversity with tropical tree diversity. Our system, which tracks trends in mammal communities, complements other systems, such as the IUCN Red List, which can be used to monitor changes in the status of individual mammal species.

P1.72 Anderson, C.J.*; Peterson, M.N.; Cobb. D.T.; Sills, E.O.; Bondell, H.D.; North Carolina State University, North Carolina Wildlife Resources Commission / North Carolina State University; *cjanders@ncsu.edu*

Assessing willingness to dedicate tax funds to nongame conservation in North Carolina

Biodiversity conservation is underfunded on global and local levels. The current economic crisis illustrates the need for consistent, government-based funding. Prior to 2008 most U.S. states relied on State Wildlife Grants to fund conservation of nongame species, however, the match requirements for these grants have since tripled. We surveyed 3,000 randomly selected North Carolina (NC) residents to evaluate whether they would be willing to increase state tax allocations to fund nongame species conservation (and meet the match requirements). Respondents were asked whether taxes should be dedicated to nongame conservation. More than three quarters of NC residents supported a tax increase for biodiversity conservation. On average respondents were willing to pay additional $33.25 in taxes annually to support nongame conservation. Virtually all respondents who were unwilling to pay a tax increase reported they were opposed to any tax increases, regardless of the beneficiary. An additional sales tax on outdoor recreation equipment was the most preferred method for generating tax revenue for biodiversity conservation. When asked how they would reallocate the state budget to support nongame conservation, respondents selected prisons as the preferred source to receive less funding. Our study suggests there are high levels of support for biodiversity conservation funding through tax revenues, and that these taxes will be most supported if they are perceived as user-based.

P1.13 Andrews, Chandler*; Kendall, Peter; Lalumiere, Lucie; Woerner, Paul; Clapinson, Christopher; Dudar, Katrina; Science Advisor, Earth Rangers, Executive Director, Earth Rangers, Vice President, Interactive, Earth Rangers, Director, Live Productions, Earth Rangers, Associate Director, Social Marketing, Earth Rangers, Manager, Education, Earth Rangers; *candrews@earthrangers.com*

Engaging Children in Biodiversity Issues to Engender Support for Nature Conservation

Since the industrial revolution, human activities have dramatically reduced the diversity of life on Earth. Although this massive loss of life has weakened the very systems that sustain humanity, public support for nature conservation is generally lacking. We believe, as do many other researchers, that one of the best ways to renew humanity's devotion to nature is by engaging children in biodiversity issues. Through our interactive program, Bring Back the Wild (BBtW), children will witness the wonder of nature, learn about the impact of human activities on the natural environment, play a role in protecting wildlife, and develop a lasting conservation ethic. We anticipate that within five years, more than 500,000 Canadian children will participate in BBtW and, in doing so, protect approximately 2,500 hectares of wilderness in Canada each year.

8.7 Andrews, Tracy J.*; McCollum, Paul; Fuller, Dave; Professor, Central Washington University, Natural Resources Director, Pt. Gamble S'Klallam Tribe, Water Resources Manager, Pt. Gamble S'Klallam Tribe; *andrewst@cwu.edu*

Community-based Conservation and Ecological Restoration: Integrating Indigenous Knowledge and Science

Environmental challenges faced by the Port Gamble S'Klallam Tribe (Washington State) and its approaches to meeting them reveal how indigenous ecological knowledge (IEK) and science can contribute to the development of innovative conservation strategies and ecological restoration programs. Located in the northern Puget Sound, increasing water quality problems in Port Gamble Bay (pollution, ocean acidification etc.) are reducing the availability of key tribal cultural and economic resources. The Bay's marine sediments are ranked among the most contaminated in Puget Sound and reflect problems affecting the wider regional ecosystem. In addition, climate change impacts on water temperature/availability have negatively impacted tribal shellfish, finfish and plant resources, and are posing other threats to this coastal community and its resource base. Our interdisciplinary research project is documenting the significance of indigenous knowledge for: 1] understanding and planning for environmental change, and 2] adaptive management for resource restoration and sustainable management. The project information will be incorporated into a data management system that can be used by other tribal and non-tribal programs for community-based conservation and restoration in northern Puget Sound. This integrated sociocultural-ecological systems research approach addresses the context in which environmental challenges have developed, and now must be addressed.

SY72 Andy Dobson*; Jennifer Dunne; Susan Kutz; EEB, Princeton University, Santa Fe Institute, School of Veterinary Biology, Calgary; *Dobson@princeton.edu*
Y2Y2Serengeti: How do foodwebs collapse as parks get smaller?
A handful of large national parks on each continent contain almost complete faunas. The ultimate goal of conservation biology is to maintain these parks as fully functioning natural ecosystems. How useful are food-webs in determining how species interact and how the webs of life in each park will unravel. We will use data on food-webs from Serengeti and the Y2Y project to illustrate the different ways that food-webs might collapse as species are lost from (or added to) relatively intact natural systems. The work questions currently held perceptions about keystone species, wildlife monitoring, and what to protect.

P2.65 ANJALI MATHUR*; ANUJ SAXENA; Govt. Raj Rishi College, Alwar(Rajasthan), Department of Science & Technology, Govt. of Rajasthan, Jaipur; *anjalipcr@yahoo.co.in*
Integrated Pest Management Tools For Agricultural Sustainability: A Step Towards The Development Of Ecoagriculture Systems.
Changing agricultural landscape is a global phenomenon as agriculture has increased its ecological footprint. Indian agricultural landscapes hold a vast arena of biodiversity conservation and therefore pay special attention towards ecoagriculture approach to embrace agriculture production, biodiversity conservation and rural livelihoods. Increased crop yield demand for pest management strategies, associated with conservation of insect pests of high value crop like eggplant (brinjal) a cash crop, native to India. Leucinodes orbonalis Guenee, eggplant fruit and shoot borer (EFSB) is a primary and most destructive pest of eggplant. Indiscriminate use of chemical pesticides in past has led to pest resurgence and resistance. Prospects of transgenic crop, Bt brinjal to combat EFSB may also face chances of developing Bt resistance. This has shifted our focus towards Integrated Pest Management (IPM) approach for sustainable agriculture. Our research included studies on life table for timing of crop harvest and on farm trials of newer IPM modules using biopesticides and botanical oils under semi arid ecological conditions. The results show a significant correlation between developing stages and temperature/RH. As compared to check (Endosulfan) IPM modules gave significant effective results to manage EFSB in fields. We conclude that IPM modules should be promoted and tailored according to landscape ecology for effective ecoagriculture systems.

SY33 Anna Kuparinen; University of Helsinki; *anna.kuparinen@helsinki.fi*
Selectivity of fishing and its implications on targeted populations
During the past decades the genetic impacts of fishing have become a matter of concern, with particular attention paid to identifying potential evolutionary responses to fishing. In contrast, less attention has been directed to identifying and quantifying the processes through which fisheries induced selection arises. These can be roughly grouped into â fish availability to a fishing gear', â fish contact with the gear' and â fish retention by the gear'. Here, I focus on identifying traits targeted by commonly applied fishing gears and sketch through two case-studies how selectivity associated with fishing practices might affect targeted populations. The first case-study illustrates how spatial aggregation of fishing (availability selection) can affect effective size of a spatially structured Atlantic salmon (Salmo salar) population, while the second case looks at the shifts in the phenotype distribution of Baltic cod (Gadus morhua) caused by alternative gears. The analyses stress the importance to consider the multiple ways in which selectivity of fishing might affect populations and suggests that shifts in phenotype distributions generated by fishing might at least partly be avoided by allocating fishing effort between gears with differing (or opposing) selectivity patterns.

8.5 ANUJ SAXENA; Department of Science & Technology, Government of Rajasthan, Jaipur; *anuj_anjali@yahoo.co.in*
Intellectual Property Rights, Traditional Knowledge and Biodiversity Conservation: An Indian Perspective
In the developing world we are now seeing the emergence of â Traditional Knowledge' (TK) and knowledge industries. Convention on Biological diversity (CBD) highlighted the need to promote and preserve TK, access and benefit sharing. We therefore consider the relationship between intellectual property system and the access and benefit sharing principle of the CBD in context of Indian TK and biodiversity which is inextricably linked with the means of daily survival (food, health, shelter, energy etc.) of about 70% of India's population and thus to the rights of the communities. The cross border flow of genetic material in the age of globalization may help to build strong data base on biodiversity for global market share but in the absence of legal rights for traditional innovators and the collective rights of the communities as owners of â biodiversity', bioprospecting may degenerate to â biopiracy'. To prevent this we need to move towards TRIPS with ethics and equity. Establishment of a sui generis law protecting plant varieties (PVP) and framing of TK Digital Library are steps taken for stronger IP system, a subject that was before considered essentially a matter of science & technology now is regulated by the amount of commercial profits that it can protect. Therefore, stronger IP protection is required to reap the full benefits of knowledge industries.

P2.185 Arakelyan, MS; Gasparyan, AH*; Young Biologists Association NGO; *gasparyan.arsen@yahoo.com*

An Urgent Application of Conservation Measures for Endangered Semi-Desert Ecosystem of Armavir region, Armenia

Armavir region is located in southern west of Armenia, and has some of the richest and most fertile land. However this land is actively used for agriculture (wine-growing). Almost all the land (90% of valley) is in private hands and converted. Unfortunately, there are no specially protected areas. We have conducted inventory of plants, fungal and animals' diversity to outline the most vulnerable sites for establishment of wildlife conservation, design of a breeding center (ex-situ conservation) at the base of Private Armavir Zoo. We also organized eco-educational activities among local people. The research site is characterized by the richest biodiversity of flora and fauna (at least 3 species of vascular plants, 17 species of vertebrates are listed in the Red Book of Armenia and 8 are currently in the IUCN Red List of threatened species among them 3 species are critically endangered).Our research has been indicated the wild area (approximately 24 hectares) proposed for conservation. It is located in Armavir region, between villages Vanand and Talvorik. On basis of obtained data we create the Action Plan for conservation activities of local government, NGOs etc.

SP2.11 Archila, L; Penuela, G; Beltran, LM*; Delgadillo, DA; Parra, JE; Universidad Pedagogica y Tecnologica de Colombia, Fundacion Conserva, Fundacion Conserva; *marcebelt@gmail.com*

Facing Chicamocha dry forest conditions: Behavioural strategies of the endangered Chestnut-bellied hummingbird in Colombia

The chestnut bellied hummingbird is a global endangered species endemic of the Chicamocha canyon in Colombia. Studies about its ecological requirements are scarce to understand and predict its necessities in order to protect it. Hence, this study pretends to establish the main behavioural strategies of the endangered Chestnut bellied hummingbird to face current seasonal changes in the Chicamocha dry forest. Additionally, to determinate how the seasonality affect its competitors (hummingbird community) during the year. Seven male territories were located in a recently created natural reserve in the Chicamocha canyon Colombia. For each male was measured territory area, flower density, and time budgeting (ethograms) during two rainy and two dry periods. Besides, the abundance of nectarivorous bird species was estimated with line transects. Results showed that A. castaneiventris increases aggressiveness in the second dry season related to the two rainy seasons. In the rainy season, it depends on insects and in the dry season on flowers. Territory areas remain stable during the year, but in the driest season this species migrates. Seasonality affects hummingbird community abundance. Results are critical to protect not only A. castaneiventris' habitat in the Chicamocha canyon, but also its habitat in the places where it migrates, and to understand possible future changes in its range and its ability to adapt to the driest conditions as a consequence of global warming.

P2.89 Argie Miller*; David Cruz; Dorothy Peteet; NYCDOE, Dickenson College, NASA-GISS; *argie@hoofocnnection.com*

Stratigraphic Analysis of Decodon Pond Wetland

This study is a stratigraphic examination of core sediment samples collected from Decodon Pond in Alley Pond Park at Queens, New York on January 30, 2008. We examine paleoecological changes of vegetation and fire patterns in the area of the pond over time. Decodon Pond was chosen because it is one of a series of unusual, intact 15,000 year old kettle ponds within the New York City limits. Alley Ponds are geological features left in the glacial moraine after the last Ice Age ended. As ice broke from the glacier it was subsequently covered with soil; holes left by the melted ice exist today as a series of depressions in the ground allowing surface water to accumulate. A team of student researchers retrieved two pond sediment cores from Decodon Pond that measured two meters each. These cores represent over 2000 years of organic and inorganic sedimentation within Decodon Pond. A spruce needle found at the depth of 200cm. Since today spruce does not naturally grow in Queens, NY, 2000 years ago the climate would have had to have been cooler and dryer for the area to support spruce.

14.4 Arlettaz, R.*; Patthey, P.; Eiermann-Jenni, S.; Braunisch, V.; University of Bern, Swiss Ornithological Institute; *raphael.arlettaz@iee.unibe.ch*

Integrated disturbance ecology: from the impact of outdoor winter sports on Alpine wildlife to the creation of winter preserves

The steady spread of tourism and leisure activities exerts huge impacts on biodiversity. Rapidly developing outdoor winter recreation such as free-riding is threatening wildlife of mountainous ecosystems, with traditional networks of nature reserves being insufficient for effectively mitigating disturbance effects. We studied the impact of outdoor winter sports on the Black grouse, a threatened bird whose timberline habitat largely overlaps with snow sports in the Alps - the main winter tourist destination of Europe - with the idea to propose corrective measures. We could first quantify (wide-range comparative approach plus flushing experiments) the detrimental physiological (stress and energetics) and behavioural responses of Black grouse subjected to anthropogenic disturbance in winter. Second, we modelled the winter habitat of three different Â«speciesÂ» (Black grouse, skiers - including snowboarders - and snowshoers) from aerial photographs: this enabled recognizing and predicting main areas of conflicts between Black grouse and winter snow sports, especially free-ride activities. The resulting maps allowed setting priorities for delineating optimally located winter preserves in the SW Swiss Alps, where public steering measures will be implemented (forbidden access in winter). The methodology developed can be used for other wildlife submitted to anthropogenic disturbance in other areas where winter recreation represents a potential threat to biodiversity.

SY26 Armstrong, DP; Massey University; *D.P.Armstrong@massey.ac.nz*

Toward an Integrated Theoretical Framework for Making Decisions about Assisted Colonization

The idea of assisted colonization - i.e. translocating species outside their historic ranges in anticipation of climate change - is extremely controversial. Opponents rightly point out that there are huge uncertainties involved and that introductions of species outside their historic ranges have often been disastrous in the past. Proponents rightly point out that regardless of the uncertainties, the "do nothing" option isn't necessarily the sensible default position. The solution is surely to develop a decision framework with a clear objective function, but doing this will be fiendishly complex. Research in all of the following areas is relevant, if not essential: 1) climate change modeling; 2) predicting how habitat characteristics such as hydrology and vegetation will track climate change; 3) species-habitat modeling, allowing changes in distributions of suitable habitat suitable for species to be predicted based on predicted changed in habitat characteristics; 4) predicting the degree to which species will adapt to changing habitat through evolution or phenotypic plasticity; and 5) dispersal modeling, allowing predictions about which species will naturally track shifts in habitat distribution and therefore don't need to be moved. I suggest that decision making should be based on a framework that incorporates uncertainties in all of these areas, and that the data used to inform those decisions needs to combine broad comparative analyses with intensive research on specific model systems.

6.8 Arup kumar Hazarika*; Amalesh Dutta; Cotton College, Guwahati, Assam, Gauhati University; *hazrikacotton@sify.com*

Threats to One-Horned Rhino and their Grassland habitat in Pobitora wildlife sanctuary, India - the land of highest density of rhinoceros in the world

Rhinoceros faces tremendous pressure for its survival in Pobitora as the grass land habitat changes to human settlements. Conversion of prime rhino habitat into agricultural land coupled with a high demand of rhino horns made serious threats to rhino. There is invasion of Ipomoea "weeds" into grassland areas, invasion of woodland into grassland, siltation and drying up of some water bodies. Analysis of satellite imagery has shown that there is substantial increase in woodland (34.51%) in Pabitora accompanied by decline in alluvial grassland (68%). This change of habitat is mostly because of natural succession process, livestock grazing as well as improper management of the grassland. Thus, Pobitora requires targeted programmes to control invasive plants, to prevent the spread of woodland, to safeguard wetlands through appropriate water management, and to limit the extent of grazing by livestock. Specific recommendations have been made to increase the quality of feeding habitat of rhino through meticulous manipulation and checking livestock grazing. Furthermore, internal policy response must begin to consider external factors such as socioeconomic conditions within buffer zone to be more effective. Finally, for long-run control, antipoaching policies should be directed at increasing the opportunity costs of poaching by creating better alternative economic opportunities.

18.6 AsmÃ¼ssen, MV*; Ferrer-Paris, JR; RodrÃ–guez, JP; Centro de EcologÃ–a, IVIC; *masmusse@ivic.ve*

Estimates and trends of illegal wildlife trade in the world

After habitat loss, the greatest threat to biodiversity is the over-exploitation of wildlife for commercial purposes. The Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), signed by 172 countries, regulates the trade of 34,000 species. Illegal trade, however, is still widespread. We conducted a systematic review using the databases of CITES and TRAFFIC, as well as the scientific literature, to assess general patterns of illegal trade for birds, mammals and reptiles, and estimate its impact over wild populations. We developed a linear model and performed a meta-analysis. We found that 2468 species of birds, mammals and reptiles are traded illegally worldwide, and estimated a total of 13,015,230 to 22,732,899 individuals/year. Previous estimates, which focus solely on international wildlife trade, are an order of magnitude smaller. Illegal domestic trade is at least equally important as international trade, but is largely underreported in traffic databases. The meta-analysis was applied to 16 studies that present quantitative estimates of population size, before and after the impact of trade. The results indicate that in these cases trade caused a mean 60-70% decline of wild populations. Significant information gaps remain, however, both geographically and taxonomically. To effectively address the impact of illegal trade on wild populations of species, global policies must combine interventions at the national and international level.

SP2.3 Augustus, Asamoah*; Yaa, Ntiamoa-Baidu ; Ghana Wildlife Society, University of Ghana; *aasamoah@mail.com*

Status of White-necked Picathartes (Picathartes gymnocephalus) in Ghana

Status of White-necked Picathartes (Picathartes gymnocephalus) in Ghana Augustus Asamoah1 and Yaa Ntiamoa-Baidu 1,2 1 Ghana Wildlife Society, P. O. Box 13252, Accra, Ghana, e-mail: aasamoah@mail.com 2 University of Ghana, Centre for African Wetlands, P. O. Box LG 67, Legon, Accra, Ghana. e-mail: ynbaidu@ug.edu.gh Although the White-necked Picathartes (Picathartes gymnocephalus) is wholly protected species under Schedule I of the Wildlife Conservation in Ghana, there is no specific legislative instrument that protects its nesting sites. Loss of lowland forests through logging, farming and other forms of forest clearance has been identified as the major threat to the survival of the species. The phenomenal loss of forest in the last 30 years in Ghana appears to have worsened the status of the species. This paper presents data on current status of White-necked Picathartes in Ghana as part of an on-going study on the ecology, distribution and conservation of the species. There are currently five isolated breeding populations of White-necked Picathartes in Ghana with an unknown population size and unknown genetic relationship. A nationwide search for nesting colonies of the species through scouting of previously known colonies between 2005 and 2008 found new breeding colonies, however most of the previously known nesting colonies were non-existent. In all, about 120 active nests with regular breeding activities have been found in eight forest reserves and farmlands in Ghana. Significant fledging success was observed at several of the active nest sites. Although most nesting colonies are located in forest reserves, the survival of the species is not guaranteed as these reserves are timber production forests and logging has been identified as a major threat to their survival.

P2.70 Ausprey, Ian*; Amanda Rodewald; School of Environment and Natural Resources, The Ohio State University; *ausprey.1@osu.edu*

Are Young Birds City Smart? Survivorship and Habitat Selection of Fledgling Songbirds Across an Urban-to-Rural Landscape Gradient

Ecological changes associated with urbanization may reduce avian survivorship throughout the annual cycle. Specifically, increased abundances of predators and invasive exotic shrubs may have negative impacts on breeding birds. We predicted that avian survivorship would be acutely impacted during the post-fledging period when behavioral limitations make juvenile birds especially vulnerable to predation. Further, we hypothesized that Amur Honeysuckle (Lonicera maackii), an abundant invasive shrub in our system, would either 1) exacerbate predation by drawing fledglings closer to the ground, or 2) deter predation by providing protective cover. During 2008 - 2009 we used radio telemetry to track 45 Northern Cardinal (Cardinalis cardinalis) and 31 Acadian Flycatcher (Empidonax virescens) fledglings in a network of riparian forest fragments embedded within an urban-to-rural landscape gradient in central Ohio. In contrast to the frequent assumption that high mortality rates contribute to avoidance of urban areas by sensitive species, cumulative survivorship was higher for the urban-avoiding flycatcher (0.720 +/- 0.097 SE) than for the synanthropic cardinal (0.440 +/- 0.077 SE). Although we found that urban forests contained more predators and that honeysuckle influenced patterns of habitat selection, neither factor was associated with survivorship. Hence, urban-associated ecological changes may not have the dramatic effect on sensitive stages of the avian life cycle as predicted.

SP8.7 Babalola, Folaranmi Dapo; Department of Forest Resources Management, University of Ibadan; *folababs2000@yahoo.com*

Involving and rewarding the participation of local community in conservation: an effective strategy to biodiversity conservation in Nigeria

Involving local community in management of natural resources has the potential to strengthen conservation efforts and build local economies. The government of Cross River state in Nigeria pays royalties to communities that are in partnership with it in the protection and conservation of community forests. In return, communities protect the forests and this has led to increase in the area of the state's forest estate and decrease in illegal forest activities. Introduction of benefit sharing formular by the government for the products obtained from the forests and utilisation of the royalty by the communities to implement rural projects were the major factors that motivated the local communities in getting involved in conservation method. This strategy of biodiversity conservation is recommended to other regions in the country and beyond. Nevertheless, to sustain the partnership in conservation, all stakeholders must show mutual understanding, transparency and commitment in all their dealings with each other. There should be honest communication of information and coordination between all parties for confidence building and effective partnership. Sharing of the benefits must be transparent, and the communities should not be seen as objects for achieving goals of the programme, but as partners.

SY71 Backus, VM; Montana State University; *vickie.backus@montana.edu*

Population Viability Analysis Models Using a Spatially Explicit Individual-Based Approach: Conservation and Management Tools for a Changing Planet

This research illustrates how the mechanistic approach of individual based modeling (IBM) provides a productive framework for constructing comprehensive population viability analysis (PVA) models that address a wide variety of conservation and management issues. The individual-based perspective facilitates pedigree analysis and the calculation of individual kinship coefficients and other genetic measures, permitting immediate evaluation of inbreeding depression and loss of adaptability, important viability considerations. The approach, when coupled with spatially explicit landscape data, permits direct linkage of a population's viability with geographic attributes, such as important food resources and human-related mortality risk; and consequently, facilitating evaluation of landscape changes. Hence, PVA can be effectively extended as a tool to guide site-specific conservation and landscape management decisions. Grizzly bear behavior and ecology can be directly included in the model, as can historic climate data. Inclusion of climatic data produces a temporally dynamic model that simulates relevant phenological events influencing grizzly bear movement; and when joined with bear behavior, allowing the model to potentially be linked effectively with vegetation succession and climate change models to explore the impacts of future climate scenarios on grizzly bear populations. Such a model was developed for the grizzly bear population inhabiting the Cabinet-Yaak area of northwest Montana/Idaho Panhandle.

9.3 Bacon, MM*; Boyce, MS; University of Alberta; *mmbacon@ualberta.ca*

Predators, Prey and Agriculture: Wild Ungulate Responses to a Re-Established Cougar (Puma concolor) Population in the Canadian Prairies

Return of a large predator is expected to create changes for both the ecosystem and humans inhabiting the area. Re-establishment of carnivore populations can rapidly affect ecosystems by changing the abundance and distribution of prey. Such a trophic cascade is to be expected in the island, forested habitat of Cypress Hills Interprovincial Park in southern Alberta and Saskatchewan, where cougars have recently re-established a very dense population in a region with plentiful prey and no competing predators. Reports from local ranchers informed us that wild ungulates were increasingly using agricultural areas outside the park boundaries. We examined data from aerial surveys conducted between 2000 and 2009 and GPS data from radiocollared cougars in 2008-2009 to evaluate ungulate distribution since the cougar population has rebounded. We created maps showing the density and distribution of ungulates and the locations of ungulates killed by cougars to detect patterns consistent with those reported by local ranchers. The return of a native carnivore can have beneficial effects by restoring ecosystem structure and function, but can also create conflicts with ranchers due to risk of livestock depredation and from wild ungulates displaced onto private lands.

SP9.11 Baker, JD*; Becker, BL; Wurth, TA; Johanos, TC; Littnan, CL; Pacific Islands Fisheries Science Center, Joint Institute for Marine and Atmospheric Research; *jason.baker@noaa.gov*

Review of Translocation as a Tool for Conservation of the Hawaiian Monk Seal

The deteriorating demographic status of the endangered Hawaiian monk seal has motivated renewed and expanded proposals for conservation action, including translocation of seals to improve their survival. Over the past three decades, numerous monk seal translocations have been conducted with a variety of objectives, including rebalancing adult sex ratios, reducing human-seal interactions, etc. Here, we analyze our cumulative experience with translocation of Hawaiian monk seals to identify factors that influenced outcomes. We found that the time seals remained in the vicinity of the release site was inversely proportional to the elapsed time between weaning and translocation. Recently weaned pups (with little or no at-sea foraging experience) exhibited high fidelity to release sites commensurate with that shown by un-translocated pups to their birth location. In contrast, juvenile and adults seals tended to stray from their release locations. Nevertheless, when 21 adult male seals were moved over 1,000 km between Laysan Island, Northwestern Hawaiian Islands (NWHI), to the main Hawaiian Islands (MHI), they subsequently dispersed among the MHI, but only one was observed to return to the NWHI. Although sample sizes for age-specific comparisons were limited, translocated seals appeared to survive at rates comparable to seals native to the release site. These findings will be essential for informing successful larger-scale translocation plans in the future.

P2.155 Baker, MR*; Schindler, DE; Holtgrieve, GW; St Louis, VL; School of Aquatic and Fishery Sciences, University of Washington, Department of Biology, University of Washington, Department of Biological Sciences, University of Alberta; *mattbakr@uw.edu*

Biological Transport of Contaminants: Migrating Sockeye Salmon As Vectors of Mercury

Recent work has highlighted the importance of biological transport in the long-range dispersal of contaminants. Due to their unique life-history, anadromous salmon may act as important vectors, transferring contaminants between marine and freshwater ecosystems. Previous analyses have considered contaminant transport to be unidirectional, estimating import to freshwater by adult returns but ignoring juvenile migration to the ocean. To determine the net mercury (Hg) burden to freshwater systems by salmon, we reconstructed net transport to an Alaskan watershed, using age composition and mass-at-age for adults and juveniles from corresponding brood years. We found higher Hg concentrations in juveniles than adults and determined that juvenile export may range to 30% of total adult import. Proportional export by juveniles will be higher for populations under heavy exploitation with strong density dependence in juvenile recruitment. Our findings suggest that comprehensive analyses of contaminant loading by migratory species should consider the relative contaminant fluxes at all relevant life stages and the effects of density dependent growth and survival. In the case of salmon, this requires attention to both immigrating adults and emigrating juveniles, quantifying the dynamics of populations to understand the effect of adult densities on juvenile growth and survival, and accounting for the impact of commercial exploitation.

SA1 Baker, MR*; Schindler, DE; School of Aquatic and Fishery Sciences, University of Washington; *mattbakr@uw.edu*

Unaccounted mortality in fisheries: non-retention in gillnets and impact on population estimates and management

Bycatch and discard of non-target stocks are recognized as critical economic and conservation concerns. Few studies, however, have examined non-retention mortality in target stocks. Non-retention and disentanglement from gear are rarely quantified and the effects on stocks are unknown. This mortality may have important effects on the dynamics of exploited populations. We surveyed spawning populations of sockeye salmon in Bristol Bay, Alaska, to estimate the incidence of non-retention in commercial gillnets. We also applied a maximum likelihood model to mark-recapture data on spawning fish to evaluate the consequences of injuries associated with disentanglement. A substantial portion of spawning salmon exhibited clear signs of disentanglement from commercial gillnets. Survival among such fish was significantly reduced. Our research suggests that estimates of spawning stocks are inflated by 10-20%. Stock estimates for exploited populations that do not account for non-retention mortality overestimate the number of reproductively viable fish. This may confound understanding of the relationship between stock size and recruitment and obscure the ecosystem impacts of migratory stocks in coastal watersheds. Inter-annual variation in the magnitude of non-retention mortality will also impede optimal management. Given the magnitude of non-retention in this fishery, explicit consideration may be warranted across a range of exploited populations.

SY76 Baker, S*; Grove, S; Jones, N; Wardlaw, T; Forestry Tasmania, University of Tasmania; *sbaker@worldforestry.org*

Using beetles as a monitoring tool for aggregated retention silviculture in Tasmania, Australia

Aggregated retention is a forest harvesting system where patches (aggregates) of forest are retained unharvested in order to maintain structural elements and biodiversity at the stand-level. Aggregated retention is now the main harvesting system applied in oldgrowth wet eucalypt forest in Tasmanian State Forest. Ground-active beetles respond strongly to forest age class, harvesting and edge effects. Results from the Warra Silvicultural Systems Trial show that, three years after harvesting, beetle species composition in retained ~0.5 ha aggregates is similar to that in unharvested control areas. Although aggregates were somewhat edge-affected, forest interior species were nevertheless present, suggesting that this harvesting system can effectively maintain mature-forest beetles at the stand level. We hypothesise that, in the longer term, aggregates will provide source populations for mature-forest species to recolonise harvested areas when conditions become suitable. We will describe a new study which aims to assess the influence of nearby retained forest on ground-active and saproxylic beetle populations in regeneration areas.

15.8 Balasubramanian, H*; McGreevey, M; Stone, C; Conservation International; *h.balasubramanian@conservation.org*

Beyond biodiversity - protected areas' ability to conserve species and contribute to climate change mitigation

Protected areas have been shown to be one of the best tools to protect against the loss of biodiversity, but how do they contribute to other ecosystem service benefits? In 2001 the Global Conservation Fund was established to create and/or expand the global protected area network and to ensure effective management and long term financial sustainability for these sites. Earlier analysis demonstrated that the selection of 122 GCF protected areas focused on important areas for biodiversity (83% of sites are in confirmed Key Biodiversity Areas) and were better than a null model at protecting gap species. We conducted analyses to determine whether these sites contribute additional benefits beyond biodiversity conservation. Using forested sites in the portfolio (90/122) we estimated the total amount of CO2e stored to be ~28.5 Gt. By calculating background rates of deforestation in a 20km buffer zone around these sites, and assuming that the sites are 75% effective at reducing the rate of deforestation, we predicted the annual emissions avoided to be ~0.13 Gt CO2e. GCF sites show annual forest emissions rate of 0.44% compared to the global average of 0.22%, indicating the disproportionate role these areas can play in mitigating climate change and meeting country REDD+ targets. Using these results, we outline criteria for portfolios focused on protected areas to best identify and invest in sites important both for biodiversity and climate change mitigation benefits.

SY72 Baldwin, Robert F.*; Trombulak, Stephen C.; Clemson University, Middlebury College; *baldwi6@clemson.edu*

Conservation Vision, Science, and Action in the Northern Appalachian/Acadian Ecoregion of North America

The Northern Appalachian/Acadian ecoregion in eastern North America stretches from New England to maritime Canada. Despite its uniform forested character, the diverse political, cultural, and language differences have historically made ecoregional conservation planning fragmented and ineffective. In 2001, a confederation of conservation NGO's (Two Countries, One Forest) formed to promote a comprehensive vision for the ecoregion. Its conservation vision emerged from the collaboration of conservation practitioners and academics forming the 2C1Forest's Science Work Group. Charged by the organization's board with identifying locations that were priorities for conservation action based on both current and future needs, this group began an ambitious research agenda that resulted in a number of products, most of which have since appeared in the peer-reviewed literature. They include a spatially explicit map of the region's Human Footprint; projections of Future Human Footprints under different scenarios of population growth, expansion of the roads network, and patterns of recreational amenities development; irreplaceability analyses; threat vs. importance analyses, and connectivity modeling. These results were central to a multi-million dollar, multi-agency/NGO implementation program. Much work remains to realize the full vision, and future work will focus on improving connectivity analyses to account for projected ecological responses to climate change.

P2.130 Ball, R A*; Sanchez-Azofeifa, A; Calvo-Avarado, J C; University of Alberta, Instituto TecnolÃ³gico de Costa Rica Escuela de IngenierÃ–a Forestal; *raball@ualberta.ca*

Assessing Payment For Environmental Services Program Effectiveness Using Spatial Biodiversity Estimates From Forest Change And Natural History Surveys

This study aims to characterize the distribution of biodiversity samples that form the core of the Costa Rica National Biodiversity Institute (INBio) and the country's internationally recognized program on payments for Environmental Services. In the context of this program, biodiversity is one of four key services but has not yet been evaluated in terms of effectiveness. A natural history dataset of species observations across Costa Rica was assessed for suitability producing species richness maps and to test their distributions relative to bioclimatic life zones, conservation areas and forest deforestation/regeneration from 1960-2005. The species data was characterized by uneven sampling densities and was resampled at 5km & 1km grid cells. Richness estimates were produced from co-kriging of sample richness and ancillary layers. These estimates were highly spatially-autocorrelated, increasing with grid size. Standard errors of some estimates peaked orders of magnitudes beyond observed richness values. Boosted regression tree modelling is predicted to decrease the standard errors of estimates. Biodiversity patterns relative to conservation areas and forest cover change are discussed. This study identifies hotspots of species inventory and data gaps that require more investigation to produce reliable national richness distribution maps.

SY24 Ban, NC*; Pressey, RL; Weeks, S; James Cook University, University of Queensland; *natalie.ban@jcu.edu.au*

Advancing Marine Systematic Conservation Planning Through Regional Time Series Analyses of Patch Dynamics

Conservation planning has focused mainly on biodiversity pattern (e.g., habitats and species records that can be mapped and regarded as static). Planners have done less well at identifying the spatial requirements of a myriad of biodiversity processes operating across a range of temporal and spatial scales. Understanding and incorporating such dynamics into conservation is particularly important if we are to mitigate biodiversity losses due to climate change. We describe recent work to include a class of processes - patch dynamics - into marine conservation planning, using the Great Barrier Reef as a case study. We analyzed time-series data depicting one type of patch dynamics - risk of coral bleaching - and measured its spatial and temporal parameters from satellite data. We found that climate change trends are already evident, and that some parts of the Great Barrier Reef are warming faster than others. We assessed whether no-take zones designed using biodiversity pattern would meet conservation objectives related to coral bleaching. We found that no-take zones have the same frequency distributions of high-temperature anomalies as the whole Great Barrier Reef Marine Park. Areas with less frequent high-temperature anomalies could act as temperature refugia, so additional management precautions in these areas might be warranted. Our approach will serve as a basis for simulating potential future patch dynamics, considering climate change, to provide options to managers.

SP4.2 Ban, S*; Pressey, R; James Cook University; *stephen.ban@jcu.edu.au*

Modelling resilience and spatial responses of coral reef ecosystems to climate change and associated stressors

Coral reef ecosystems around the world face a multitude of threats, most of which are ultimately - if not proximately - anthropogenic. These threats include: ocean acidification, increasing coral bleaching, disease, outbreaks of crown-of-thorns starfish, terrestrial sedimentation, eutrophication, and pollution. These stressors are potentially exacerbated by increasing human population, economic development, and increasing human use of coastal areas. Managers of coral reefs face considerable uncertainty around the ways in which multiple stressors interact (e.g., synergistically, antagonistically). Managing the protection of coral reef ecosystems will therefore require new approaches to adaptive management that, under uncertainty, can minimize climate change impacts by managing localized proximate stressors according to their interactions with pervasive climatic stressors. We demonstrate how this can be done through spatio-temporal modelling of the effects of combined stressors upon the ecosystem state of the Great Barrier Reef under various scenarios. Qualitative loop modelling is a promising technique that can be applied to this seemingly intractable problem of modelling the effects of multiple stressors with extremely limited information. Applying this technique, we found that a limited number of stressors could be altered to produce large overall impacts on ecosystem state. Using these results in adaptive management, management under uncertainty can be facilitated.

P1.97 Banfield, JE*; Boyce, MS; University of Alberta; *jbanfiel@ualberta.ca*

Cougar Diet Composition in South-Western Alberta

Diversity in cougar diets has been linked to both geography and prey abundance. In arid environments where wild ungulates are rare, cougars are known to prey on domestic livestock. In south-west Alberta where wild ungulate densities are high, cougar depredation of livestock is thought to be minimal. However, large tracts of Crown land known to support relatively high cougar densities are used seasonally for grazing livestock. Little effort has been put into monitoring livestock during the grazing season and it's likely that depredation events occur. Losses discovered afterward might be falsely attributed to bears and wolves usurping and scavenging cougar kills. In Alberta cougars kill primarily deer and elk, but also will kill llamas, horses, dogs, and occasionally cattle. Our results clarify the role cougars play in livestock depredation in this region.

P1.101 Bar Massada, A*; Wood, EM; Radeloff, VC; Pidgeon, AM; University of Wisconsin; *barmassada@wisc.edu*

Using multiscale spatial context to predict avian species richness in a woodland savanna

Landscape pattern analysis is widely used to predict habitat and species diversity, and ultimately identify priority areas for conservation. However, these analyses are often conducted at a single spatial scale, while habitat characteristics and species occurrence are thought to vary at multiple spatial scales. We developed a novel approach, multiscale contextual spatial pattern analysis (MCSPA), which quantifies the change in habitat amount across scales rather than the amount of habitat at a single scale. MCSPA consists of several coefficients that describe the attributes of scalograms, which are functions that describe habitat change across scales. Our goal here was to test the predictive power of MCSPA coefficients in models of avian species richness in a grassland/savanna/woodland ecosystem in central Wisconsin, USA. MCSPA performed moderately better than existing methods that operate at a single spatial scale. The correlation between MCSPA coefficients and species richness ranged between 0.3 and 0.7, and varied among coefficients and types of habitat maps. We suggest that this multiscale approach may better predict species richness than existing single-scale methods of spatial pattern analysis, and as such could potentially advance habitat and biodiversity assessments.

P1.56 Baral, S*; Gauli, K.; Practical Solution Nepal, Kathmandu, Nepal, Centre for Development Research, University of Natural Resources and Applied Life Sciences, Vienna, Austria; *sonybaral@gmail.com*

Indigenous Mountain Community: Vulnerable to Climate Change and their Coping Strategies

Climate change is considered to be one of the most serious threats to human health, food security, natural resources and physical infrastructure especially in mountainous country like Nepal. Adaptation to the climate change is one of the best coping strategies. Thereby, the country is in the process of making such strategies. The coping strategies that the indigenous people are practicing for years could be crucial information in making national strategies. However, there is limited information on such indigenous practices at national level. To bridge this gap, this study aims to explore such strategies of indigenous Chepang community of Dhading district. Empirical data were collected through household interviews, group discussions, key informant interviews. Meteorological data of 30 years was used to supplement the primary information. The results show that the people have modified their food storage practice to cope up frequent incidence of hail-storm. In addition, they have constructed small ponds in their home garden to conserve their kitchen waste water to be used in home garden. Similarly, they have started harvesting and storing rain water for human and animal consumption. Likewise, they were practicing less tillage technology in agriculture on sloppy land, to reduce soil erosion.

SP7.2 Barbeau,CD*; Larson,BMH; Gobster,PH; University of Waterloo, USDA Forest Service; *cbarbeau@uwaterloo.ca*

The Key to Successful Invasive Species Management: A Meta-analysis of Research Concerning Stakeholder Perspectives of Invasive Species

There is an ever-increasing need for managers and policymakers to anticipate how people will respond to invasive species management programs. But while this need has been stated extensively within ecological and social scientific literature, few empirical studies have been conducted to understand stakeholder perceptions of invasive species or identify factors that might lead to social acceptance of or conflict with proposed management. To test an heuristic model containing multiple predictor variables, we conducted a meta-analysis of available empirical studies on stakeholder perceptions of invasive species. We found few studies that directly addressed stakeholders and those that did focused on conservation managers and experts and largely ignored key stakeholders such as indigenous groups and the general public. Moreover, few studies dealt with stakeholder issues in Northern regions. As the pace of global climate change continues to accelerate in Northern climates and elsewhere, there will be a greater need to manage invasive species, and success will depend upon the cooperative efforts of a wide range of stakeholder groups. We outline directions for continued research needed to identify pathways to stakeholder cooperation in the detection and control of invasive species.

P2.175 BARKER, NKS*; Darveau, M; Cumming, SG; U. Laval & Ducks Unlimited Canada, Ducks Unlimited Canada & U. Laval, UniversitÃ© Laval; *nicole.barker.1@ulaval.ca*

Waterfowl Conservation Planning in the Boreal: Use Of a Pre-existing, Large-scale, Time-series Dataset

Optimal conservation planning should include modelled habitat-species interactions in addition to basic species' distribution information. The USFWS' annual Waterfowl Breeding Population and Habitat Survey (WBPHS) provides estimates of waterfowl populations across Canada and the US extending back to the mid-1950s. We assessed this survey's potential to inform conservation planning in the Boreal by: 1) critically reviewing past research using this dataset; 2) highlighting key questions the survey can address; and 3) identifying potential obstacles and limitations specific to the Boreal. While the survey has historically been used for developing harvest quotas, the focus has shifted to population ecology and species-habitat interactions in recent years, due to advances in spatial analysis and remote sensing. Habitat modelling is a crucial step for identifying priority areas for conservation, and predictive models can assess changes in species populations in response to human activities and climate change. Boreal-specific obstacles include uneven spatial distribution of survey transects, potential gaps in environmental data, and substantially lower population estimates than in the Prairies (which may require Boreal-specific conservation plans). We conclude that with detailed and careful analysis, the WBPHS demonstrates great potential for conservation planning in this changing ecosystem.

P1.34 Barman, Purnima Devi; Aaranyak; *purnima@aaranyak.org*

Conservation challenges for protecting endangered Greater Adjutant Leptoptilos dubius in Assam, India

Greater Adjutant Leptoptilos dubius is currently facing extinction threat. Assam population of the Greater Adjutant is considered as the last stronghold for this endangered bird. Almost all of this population resides outside the State owned protected area network and mainly nests on the privately owned trees. The future of this bird depends on basically the wishes of these tree owners. These tree owners on the other hand are very poor and many times they cut the nesting trees to earn their livelihood. The bird also makes the campus of the nest tree owners dirty by throwing rotten foods, dead chicks etc and thus it irritates the tree owners. In this critical situation a conservation initiatives have been made to encourage the tree owners for their support to save this bird. Celebrities and media houses were roped in to highlight the tree owners' involvement for saving this endangered bird. For long term sustainability of this initiatives â lobbing has been done for a State owned compensation schemes.

P2.105 BarragÃ¡n-Barrera, DC*; Palacios-Alfaro, JD; Taubitz, E; May-Collado, LJ; Universidad de BogotÃ¡ Jorge Tadeo Lozano, FundaciÃ³n Keto, Universidad de Rostock, University of Puerto Rico-Rio Piedras, George Mason University; *dalia.barraganbarrera@gmail.com*

Effect of boat traffic on habitat use of a small resident population of bottlenose dolphins in Bocas del Toro, Panama: strengthening local conservation efforts

The main problem facing cetacean conservation in Latin America is the scarce information on most populations and potential threats to them. The coastal bottlenose dolphin from the Archipelago of Bocas del Toro exemplifies this situation. They live in a small population, and the easiness at which these dolphins can be found has led to intensive and fast growing dolphin-watching industry in the Archipelago. The bottlenose dolphins in Bocas del Toro use primarily shallow waters near mangrove forest where dolphin groups are found primarily traveling (35.53%), feeding (23.81%) and engaging in social activities (20.88%). Behaviors like milling (8.42%) and resting (1.10%) are related to absence of boats, whereas in the presence of multiple boats dolphins tended to shift to diving and traveling behaviors. Thus, in previous and this study we found not only that Bocas dolphin avoid actively dolphin-watching boats in terms of behaviors but also spatially. The Bocas dolphin population has become an important source of income for the locals through boat-based dolphin watching. Despite recent regulations to manage this activity there is a need for local guidelines and education, dolphin-watching boats fleet has increase and these are becoming the main source of noise in several important dolphin areas, potentially threatening their survival as dolphin rely on sound for many basic activities. Ongoing conservation efforts should take in consideration the regulation of this industry.

SY63 Barrett-Lennard, L.G.; Vancouver Aquarium Marine Science Centre, Box 3232, Vancouver, B.C. V6B 3X8, Canada and University of British Columbia, Zoology Department, 2370-6270 University Blvd, Vancouver, B.C. V6T 1Z4, Canada.; *Lance.Barrett-Lennard@vanaqua.org*

Killer whales and critical habitat in Canada and the US: different paths, similar endpoints.

Killer whales live in small sympatric or parapatric populations, are highly mobile, have no predators, and tolerate wide ranges of water temperature, salinity, turbidity, and depth. They therefore present two challenges to conservation managers: delineating management units and identifying critical habitat. The endangered southern resident population straddles the Washington/British Columbia border and affords an opportunity to compare the application of the US Endangered Species Act and the Canadian Species at Risk Act (ESA and SARA). In the US, recognizing the population as a â distinct population segment' took several years and a court decision. Following this, critical habitat was defined with few further delays in 2006. In Canada, the distinctiveness of the population was formally recognized without controversy, prior to the US decision, and a draft recovery plan with a description of critical habitat was completed in 2006. However, the Canadian government undertook a series of measures, each one of which, if not subsequently withdrawn, would have relieved it of legal requirements to define or protect critical habitat. The final measure was rescinded in 2009 after environmental groups filed suit. At the present time, the situation in both countries is similar: the effect of the ESA and SARA decisions has been a marked increase in conservation-oriented research. No broad-reaching plan to protect critical habitat has yet been developed in either country.

P1.65 Barros, H.*; Vieira, R.; Universidade Federal de Pernambuco, Fundacao Joaquim Nabuco; *hdbarros@terra.com.br*

Decommissioning of mature oil fields and artisanal fisheries: The case of Todos os Santos Bay, Brazil

Decommissioning of mature oil fields and artisanal fisheries: The case of Todos os Santos Bay, Brazil Consequences of decommissioning oil fields on artisanal fishing activities are still little known in the literature. This paper is intended to shed some light on a process of dismantling and sinking of oil and gas structures in shallow waters, with severe disturbing impacts on low income artisanal fisher activities. From a socio-economic perspective, the relationship of oil industry with local communities is described, with the main perceived problems pointed out by local fishermen leadership perspective. The notions of â damages' and â mitigation' taken by the oil industry towards fishermen are discussed in connection to the expansion of installations during the past 20 yrs. A comparative view of decommissioning of oil fields in Europe and Brazil over the late 1990's suggests the need to review transparency and social commitment standards which are far less prominent in this Brazilian case. We believe that the Brazilian oil industry has acquired a social and environmental debt towards the whole society, as far as it has not been able to establish a clear and effective process for decommissioning their oil installations within artisanal fishing areas in the Todos os Santos Bay. Furthermore, the discussion of fair and specific compensations has been avoided, which would be instrumental to regain local economic conditions found among fishermen just few decades ago.

P2.33 Barta, David*; Zhou, Qiang; UND College of Earth System Science and Policy; *david.barta@und.nodak.edu*

Conservation Status of Native Prairie on North Dakota Public Lands

North Dakota has the most conserved grassland in the U.S.; however, there is little emphasis on comprehensive grassland conservation at either the state or federal level. This study utilizes public sources to determine the amount, status, and location of publicly owned grasslands and whether or not those grasslands contain native prairie. We analyzed all state and federally managed public lands within North Dakota using a land classification system developed by the North Dakota GAP analysis project from a combination of surveyed lands and aerial imagery. The accuracy of predicted land cover classes was within 3% of the proportion of land cover determined in ground surveys. Our analysis shows that all public lands have some native prairie, and that USFS, NDLD, and USFWS contain the highest percentage of native prairie. Even though many agencies have similar or coinciding mandates, none have a specific focus on preserving grasslands for the sake of ecosystem diversity or function. Furthermore, the lack of information detailing the status of native prairies makes developing a strategy for preserving native species difficult. Without a coordinated state and federal conservation approach, native prairie is likely to disappear on all but the most highly conserved public lands.

P1.128 Barton, PS*; Manning, AD; Gibb, H; Lindenmayer, DB; Cunningham, SA; Australian National University, La Trobe University, CSIRO Entomology; *philip.barton@anu.edu.au*

Beetle responses to a large-scale restoration experiment

We used a large-scale experiment to test the effects of two ecological restoration techniques, (1) reduced kangaroo grazing and (2) augmentation of coarse woody debris (CWD), on ground-dwelling beetles in an endangered woodland community, southeastern Australia. A significant increase in beetle species richness and biomass was detected in sites with reduced grazing levels, and this was most pronounced for herbivorous beetles. This response was accompanied by an increase in grass cover and grass height in reduced grazing treatments and indicates reduced grazing radically alters both resource availability and the structure of ground-dwelling beetle habitat. In the presence of high kangaroo grazing levels, the addition of CWD had a positive effect on beetle species richness and biomass in the immediate vicinity of the logs. Increasing structural complexity through augmentation of CWD therefore appears to have a mitigating effect on kangaroo grazing by acting as refuges from grazing and protecting small pockets of grass and increasing habitat heterogeneity. The longer-term consequences for ecosystem function are discussed.

24.1 Basille, M*; Fortin, D; Dussault, C; Ouellet, J; Courtois, R; UniversitÃ© Laval, MinistÃ¨re des Ressources naturelles et de la Faune, UniversitÃ© du QuÃ©bec Ã Rimouski, MinistÃ¨re des Ressources naturelles et de la Faune; *basille@ase-research.org*

Space use seasonality in a multi-predator and multi-prey system

Forest-dwelling woodland caribou is considered as endangered in Canada. The vulnerability of caribou populations is currently explained by complex interactions among anthropogenic disturbances, wolf and bear predation, and apparent competition with moose. Because both logging activities and biological needs of the different species of this food web vary extensively during the year, providing an objective and species-specific definition of season could be a prerequisite for the evaluation of caribou population viability. We used a K-means procedure associated with a gap statistic to define seasons specific to woodland caribou, moose, wolf, and bear. All species were followed by Global Positioning System collars, and seasons were defined based on animal movements in relation to habitat characteristics. The analyses highlighted biologically relevant seasons for the various species (e.g. calving and rut for ungulate species), while also outlining temporal changes in habitat use during the year. Species-specific timing of biological seasons was such that predator-prey interactions are expected to vary in intensity over the year. For example, both wolves and moose used regenerating cuts from September until November, while caribou avoided these areas. Our study demonstrates the need to account for similarities and differences, in terms of space use, in the seasonality of predator and prey species to assess the potential consequences of forest management.

SY77 Batary, P*; Matthiesen, T; Tscharntke, T; Georg-August University, Agroecology; *pbatary@gwdg.de*

How does landscape complexity mediate the importance of hedges in conserving farmland bird diversity of organic vs. conventional farmlands?

Hedges provide important nesting, feeding and sheltering sites for birds in agricultural areas. Organic farming is thought to halt the decline of farmland birds. However, there is a lack in knowledge, how the interaction of these local variables (amount of hedges and organic management) and landscape scale variables (landscape complexity) affect birds. We selected paired conventional and organic winter wheat fields and meadows in each of 10 landscapes in Germany, where birds were surveyed in the fields and in the adjoining hedges. More bird species occurred in organic than in conventional fields regardless of land-use type. However, hedge length had a much stronger effect on bird richness than farmland management. We found an interaction of landscape complexity and hedge length in that hedge length enhanced bird richness only in case of simple landscapes (< 17% semi-natural areas within a 500 m radius). In more complex landscapes the effect of hedge length tailed off as the total locally available species pool became represented. Therefore, the addition of more hedges or any other woody semi-natural habitat just as organic farming practices should be used and promoted in simple landscapes, where it really makes a difference for the targeted organism group.

P2.207 Bateman, B. L. *; Vanderwal, J; Williams, S.E.; Johnson,C.N.; Centre for Tropical Biodiversity and Climate Change, School of Marine and Tropical Biology, James Cook University; *brooke.bateman@jcu.edu.au*

Inclusion of biotic interactions in species distribution models improves predictions under climate change: the northern bettong, its resources and a competitor

Species distribution models (SDMs) are often used to predict where suitable habitat for a given species may occur in altered climate conditions. The inclusion of biotic interactions in SDMs is rare because it requires detailed ecological knowledge of the species. We examined the influence of biotic interactions on predicted current and future distributions of an endangered marsupial, the northern bettong (Bettongia tropica). Climatic models were developed independently for each of the northern bettong, two of its food resources, and a likely competitor. To determine how the inclusion of biotic interactions altered predicted distributions, northern bettong models were augmented by including estimates of climate suitability for the food resources and competitor, and then compared with those of the climate-only model. Differences in predictions were quantified with a â global' metric to test whether predictions were significantly different, and a â local' metric to identify where they differed. Inclusion of biotic interactions improved model performance and provided the most ecologically realistic distributions. Below 3.0 Â°C increase in climatic warming predicted northern bettong models differed only in the margins of their predicted distribution, but beyond this level, predictions of models that incorporated biotic interactions diverged from those which did not. This study highlights how the use of ecological knowledge is essential for developing useful models.

SY42 Baydack, R; University of Manitoba; *baydack@cc.umanitoba.ca*

Hunting As A Way of Knowing Sustainability

In Manitoba as in most North American jurisdictions, the Wildlife Act defines â hunting' as chasing, driving, flushing, attracting, pursuing, worrying, following after or on the trail of, searching for, shooting at, stalking or lying in wait for wildlife, whether or not the wildlife is then or subsequently captured, killed, taken or wounded. This rather formal definition has fueled considerable debate about whether hunting is a necessary and sufficient condition for wildlife management, and more recently, about whether hunting promotes sustainability. Sustainability can be defined as the capacity to endure, and today's resource managers must consider ecological endurance as well as its related economic and social components. â Ways of knowing' have recently been coined as the new terminology for â figuring out reality'. Ways of knowing result from things such as sense perception, reason, emotion and language/tone/symbols/nomenclature. So what does it mean to really know something? Science has discovered an empirical and multi-generational way of obtaining verifiable knowledge. But what about areas traditionally assigned to ethics, and other topics not, or not yet, in the domain of what science studies? How do other ways of knowing relate to the way of science? This presentation will focus on hunting as a way of knowing that contributes to ecological, economic, and social sustainability by using examples from personal hunting experiences.

21.5 Bayne, EM*; Cumming, SC; Song, S; Schmiegelow, FKA; Mahon, CL; University of Alberta, Universite Laval, Environment Canada, Environment Canada; *bayne@ualberta.ca*
Evaluating the current and future status of boreal forest songbirds through a national data collection, analysis, and reporting system
Many studies on the effects of human land-use on boreal songbirds have been conducted. However, most are at local scales, focused on one land-use, and use different statistics for reporting effects. The lack of a coordinated framework for reporting has slowed our ability to make effective conservation decisions about boreal songbirds. The Boreal Avian Modelling project has integrated all point-count information in the boreal into a single database and used standardized statistics to estimate density estimates for all boreal songbirds in Canada. Distance sampling and bootstrapping provide density estimates that predict current population size and uncertainty. These density models have been linked to land-use simulators and suggest that in areas like NE Alberta proposed land-use plans could result in population declines of up to 70% for the Black-throated Green Warbler in the next 50 years while the White-throated Sparrow could increase by 30%. Current and future population sizes for all boreal species are important for evaluating risk to species. However, such a fine-filter approach has limitations and we suggest that incorporating these population estimates into community similarity indices will provide a more useful tool for managers. The same land-use plan suggests that the overall similarity of boreal bird communities will change by 40% and we discuss whether such a change is in the range of natural variation that might be expected due to natural disturbance.

SY77 BÃ LDI, ANDRÃ S; Hungarian Natural History Museum, Budapest, Hungary; *baldi@nhmus.hu*
Farmlands in Europe: the Geographical Distribution of Biodiversity, Evidence, and Support for Nature Friendly Management
Europe is a highly diverse continent regarding biodiversity, research evidence and available resources to fund extensive, nature friendly habitat management. Half of the continent is farmland, which harbors a rich wildlife and several globally endangered species, like the Great Bustard, which have adapted to the centuries long extensive land use. In the 20s century intensification of agriculture resulted in sharp decline of many farmland species. The changes, however, and the recent distribution of diversity varies: depauperated populations exist mainly in the western half, while large ones in the eastern half of the continent. This pattern contrasts to the distribution of existing research evidence that is necessary for wise conservation, and contrasts to the available funding for nature friendly farmland management. In addition, the supported nature friendly farmland managements had mixed effect on biodiversity, partly due to lack of local research evidences. Therefore, less intensive regions, mainly in the eastern half of the continent should get more attention, as conserving farmland biodiversity would be more effective there. In addition, management should be monitored and supervised by conservation biologists to improve success. The present evaluation has messages on the importance of balancing, and shows that extrapolation of research evidence may be misleading at the continental scale conservation.

SY43 Bear, D; Attorney at law; *bear6@verizon.net*
How Environmental Impact Assessment Can Contribute to the Conservation of Biological Diversity
This presentation will focus on how environmental impact assessment (EIA) generally, and the National Environmental Policy Act specifically, can contribute to the conservation of biological diversity. The discussion will be applicable to citizens of countries that have ratified the Convention on Biological Diversity as well as those that have not. Key components of EIA's value are requirements to identify reasonable alternatives to a proposed action and to analyze the direct, indirect and, importantly, the cumulative effects of the proposed action and reasonable alternatives to it on the affected ecosystem. These analytical requirements combined with opportunities for interagency coordination and meaningful public involvement can lead to the selection of an alternative that minimizes adverse effects on biological diversity, or in some cases, the decision not to move forward with a proposed action. These requirements can also help shape needed adaptations in the face of climate change and minimization of a project's contribution to climate change. An effective mechanism for citizen enforcement is an important component to ensure implementation of EIA and has been a major characteristic of the process in the United States under the National Environmental Policy Act.

SY72 Beard, B.; US DOD; *Bruce.Beard@osd.mil*
US Department of Defense: New Partners to Address Conservation and Sustainability in the West
The Western Regional Partnership's (WRP) mission is to provide a framework for Federal, State and Tribal leadership at the senior-policy level to proactively and collaboratively address common goals, identify potential conflicts and develop solutions that protect our natural resources, while promoting sustainability, homeland security and military readiness in the states of Arizona, California, Nevada, New Mexico and Utah. The WRP was initiated after DoD's first successful regional partnership: Southeast Regional Partnership for Planning and Sustainability (SERPPAS). There are many issues in the West and a scarcity of resources; working together improves chances of long-term success. WRP combines an effective working relationship supported by a robust geographic information system with value-added benefits to all Partners. WRP Committees are working to better improve cooperation among States and agencies on the following critical Western regional issues: Border; Disaster Preparedness; Energy; GIS; Land Use; and Wildlife Corridors, Critical Habitat, and Threatened and Endangered Species. WRP Committees provide a forum for information exchange and a clearinghouse for focus areas across the five-state region. Committee participation includes WRP Partners (States, federal agencies and Tribal leadership) and non-governmental organizations working collaboratively. This presentation will provide an overview of the WRP including updates on pilot efforts.

P2.176 Beaudry, F*; Ferric, MC; Pidgeon, AP; Radeloff, VC; Mladenoff, DJ; Howe, RW; Bartelt, GA; University of Wisconsin-Madison, University of Wisconsin-Green Bay, Wisconsin Dept. of Natural Resources; *fbeaudry@wisc.edu*

Regional Conservation Planning: Contrasting Optimization Methods for Forest Birds with Incompatible Habitat Requirements

Spatially explicit conservation planning involves a variety of trade-offs, between for example, land cover management for species with contrasting habitat requirements. Two approaches that accommodate such trade-offs are heuristic algorithms and mathematical optimization. Heuristic algorithms are logical iterative processes that use stepwise rules and the progress toward certain goals is checked at each step, while mathematical optimization precisely identifies the optimal solution set. Spatial optimization of conservation objectives can be complicated when potential habitat, rather than current condition habitat models are used. Our goal was to 1) identify areas of greatest conservation value over a large landscape in northern Wisconsin, for 16 forest bird species, while solving habitat incompatibility conflicts, and 2) to evaluate the strengths and weaknesses of the two approaches to this problem. Both methods were used to find the spatial arrangement with the highest conservation value, were parametrized to minimize the area needed to meet species-specific population objectives, and to maximize habitat connectivity. The heuristic algorithm identified the 20% highest ranking area, approximately 1 million hectares, which if managed appropriately would provide enough resources to meet the minimum habitat needs for 15 species. However the heuristic approach had to be followed by post-hoc adjustments to resolve conflicts among 30 species pairs with overlapping potential habitat. In contrast, mathematical optimization yielded comparable results while resolving habitat conflicts between species optimality. The computational capacity required for the mathematically derived solution was considerably greater.

SP3.5 Beck, MW*; Hatch, LK; Vondracek, B; Valley, RD; University of Minnesota, United States Geological Survey, Minnesota Department of Natural Resources; *beckx266@umn.edu*

Development of a Macrophyte-Based Index of Biotic Integrity for Minnesota Lakes

Minnesota's 11,842 lakes sustain a diversity of aquatic organisms. However, several threats to water quality, both current and anticipated, may compromise long-term persistence of healthy biotic communities. As such, methods for evaluating negative impacts of anthropogenic activities on lake condition will be valuable components of water quality monitoring programs in Minnesota. Initially proposed in the early 1980s, an index of biotic integrity (IBI) is composed of metrics that quantitatively assess the structure, function, and composition of aquatic communities. Using long-term lake monitoring data, we developed an IBI using aquatic plants (macrophytes) to assess the biotic integrity of Minnesota's lakes. We selected metrics that measured unique characteristics of macrophyte communities and responded to several gradients of anthropogenic disturbance describing non-point sources of pollution. IBI and individual metric scores indicated significant relationships with lake trophic state and watershed land uses. IBI scores reflected the impacts of statewide patterns of land use on lake condition as indicated by differences in scores between ecoregions. Further evaluation of the index, including an evaluation of congruency with fish-based indices, will provide managers with a regulatory framework to protect the biotic integrity of Minnesota's lakes.

P1.83 Becker, L*; Ancel, A; Bologov, VV; Institut Pluridisciplinaire Hubert Curien, DÃ©partement Ecologie Physiologie Ethologie, UMR7178, CNRS/UdS, 23 rue Becquerel, 67087 Strasbourg Cedex 02, France., Central Forest State Nature Reserve, Zapovednoye, 172513, Tverskaya oblast, Nelidovsky raion, Russian Federation.; *laetitia.becker@free.fr*

Involving hunters in research programs to protect wolves

In Russia, every spring takes place the den hunting of wolves (Canis lupus). After the fladry, hunting at the den is the second more used technique. Hunters able to find wolf dens empty them to get a bounty per wolf pup (about 50US$) or to sell the pups as pets to private people. Hunters have a high knowledge about wolves and the forest, which can be used to save wolf pups and stop illegal traffic. Since 2000 we have involved hunters of Tver region in our wolf research work. They have worked as guides for eco-volunteers, helping in tracking and howling survey. In return, they stopped hunting wolves, saving up to 10 wolf pups per year per hunter. The data collected allow us to draw a yearly map of wolf population in the district (den location, pack number, reproductive rate, movements, proximity to villages, potential attacks on livestock). In 2010 the program will be spread to more 3 regions (Novgorod, Smolensk and Pskov). We conclude on the benefits of participation of local hunters for wolf conservation and public education. We suggest that encounters between hunters and eco-volunteers may lead to better understanding of each side.

SY51 Beier, Paul; Brost, Brian*; Jenness, Jeff; Northern Arizona University, Jenness Enterprises; *paul.beier@nau.edu*

Conserving the stage, not the actors: using land facets to conserve connectivity in a changing climate

Human-caused climate change during the next century will threaten many wild populations and species. One conservation response is to link protected areas to support range shifts by plants and animals. Ironically, most wildlife linkages are based on today's vegetation communities, which will be reassembled by climate change. Some scientists try to design linkages to support range shifts by chaining highly uncertain models (emissions, air-ocean circulation, biotic response), with high risk of error propagation and compounding; furthermore, the map outputs are too coarse for conservation decisions. Instead, we advocate designing for diversity and interspersion of land facets - landscape units with uniform topographic and soil attributes. This coarse-filter approach would conserve the arenas of biological activity, rather than the temporary occupants of those arenas. Because topography, soils, and (changing) climate determine biodiversity, conserving a diversity of land facets should conserve biodiversity. In particular, a linkage strand with high interspersion of land facets should support ecological processes and range shift, and continuous strands of different land facets should support continuous strands of future vegetation communities and species associated with them. We illustrate this new approach for 3 topographically diverse regions in Arizona. This approach is not biased toward data-rich areas, and can be applied where no maps of land cover exist.

SY72 Beier, Paul; Northern Arizona University; *paul.beier@nau.edu*
No species left behind: Science-based approaches to connectivity from statewide decision-support maps to local linkage designs
Planning for connectivity includes 4 tasks that follow a logical hierarchy (but that need not be applied in sequence): (1) Defining natural landscape blocks throughout a state or region and developing a map of â fuzzy' linkages between neighboring blocks. The Western Governors' Association recently mandated such "decision-support maps" for each state. I describe lessons learned from my work on the Arizona Wildlife Linkage Assessment (2006) and California Essential Habitat Connectivity Project (2010). (2) Prioritizing linkages for detailed planning and conservation action. Having participated in several prioritization efforts, I find this is inevitably a political decision. I argue that is just fine, and that scientists should simply help investors make data-informed decisions. (3) Developing optimum linkage designs (implementable plans) for priority linkages. I offer insights from my experience developing 27 linkage designs in California and Arizona. (4) Evaluating practical alternatives to the optimum linkage design. Because the optimum design (#3) will rarely be fully implemented, I developed tools to help decision-makers identify biologically good compromises. I describe use of these tools in one linkage near Tucson, Arizona, USA. Science-based approaches have the following virtues: they makes assumptions explicit, they can be improved as underlying data are improved, and they help implementers focus on desired conservation outcomes rather than other constraints.

15.7 Beissinger, S.*; Tingley, M.; University of California, Berkeley; *beis@berkeley.edu*
Impact of a Century of Climate Change on Montane Small Mammal and Bird Communities in California: The Grinnell Resurvey Project
Assessments of effects of climate change on species' ranges have been limited by use of historical surveys of short time spans with low spatial resolution, by confounding effects of land use change, by false absences due to limited historic sampling and inability to control for changes in detectability between sampling periods. We repeated a detailed, early 20th century surveys of small mammals and birds across elevation gradients spanning the long-protected landscapes of Yosemite National Park (YNP), Lassen National Park (LNP) and Kings-Canyon-Sequoia National Park. Climate change over the past century was variable at these transects, ranging from a 3C increase in average annual minimum temperate at YNP to cooler, wetter conditions at LNP. Using occupancy modeling to control for variation in detectability, we show substantial (ï ¾500m on average) upward shifts in elevation limits for half of 28 small mammal species monitored. Ranges of formerly low elevation species expanded and high elevation species contracted, leading to changed community composition at mid and high elevations. Responses were idiosyncratic among closely-related and ecologically-similar species. Nearly 50% of 70 bird species moved upward in elevational range, 10% moved downward, and 40% showed no change. Local colonizations and extinctions of birds followed the trends predicted by their climatic niche based on long-term temperature and precipitation shifts.

SP1.8 Bellard, C.; Courchamp, F.*; UniversitÃ© Paris-sud 11; *celine.bellard@u-psud.fr*
Forecast of submerged islands and biodiversity loss due to sea-level rise
A general rise in sea level is one of the unavoidable consequences of global warming. Since 1900, sea levels have risen by more than 20 centimeters. The current estimates suggest a sea-level rise of one to three meters by 2100. With such dramatic increases, the risk of having entire islands submerged by seawater seems inevitable, which would be catastrophic for biodiversity given the very high level of biodiversity on insular ecosystems. We present the first quantitative estimate of the loss of islands worldwide due to sea level rise of 1, 2 or 3 meters taking into account increase regional variability. This estimate is based the study of a database of the height and location of the 2,000 French islands present all over the globe and which are deemed representative of the world islands. French islands represent 20 % of the global atolls, contain 3,450 plant and 380 vertebrate endemics and encompass 4 of the 25 biodiversity hotspots. Our results indicate that the potential loss of worldwide islands and biodiversity due to sea level rise could be considerable under some scenarios.

SY77 BENNETT, ANDREW F*; Holland, Greg J.; Stewart, Alistair; Clarke, Rohan H.; Deakin University; *andrew.bennett@deakin.edu.au*
Landscape-level Revegetation Reverses the Decline of Woodland Birds in Agricultural Mosaics
Replanting and restoration of vegetation is being undertaken in many regions where excessive loss of natural habitats has occurred. Generally, it is assumed that this will reverse faunal decline and reinstate the original biota. We examined the species richness and composition of woodland-dependent birds in 43 landscapes, each 8 km2 in size, across an agricultural region in southern Australia. These were selected as sets of landscapes in which wooded cover was either: a) primarily remnant natural vegetation; b) a mixture of remnant and replanted vegetation; or c) primarily replanted vegetation. In each set, wooded vegetation cover ranged from

P1.33 Bennett, NJ*; Lemelin, RH; Department of Geography, University of Victoria, School of Outdoor Recreation, Parks and Tourism, Lakehead University; *njbennet@uvic.ca*
A Capitals Framework for Supporting Tourism Development in Protected Area Communities
Tourism is often touted as an important livelihood option and conservation incentive for communities that are located near parks and protected areas. Proponents suggest that gateway communities can benefit significantly from the development of tourism through, for example, increased employment, financial gains, infrastructure creation, cultural revitalization, and environmental protection. Yet, tourism has not often been the panacea for protected area communities that it was originally made out to be. In the context of protected area communities, the development of a local tourism industry has often failed to deliver significant economic, social, cultural, and environmental benefits. Clearly defined frameworks for maximizing the benefits from tourism development for protected area communities are needed such that tourism can more directly support both community development and conservation efforts. This paper forwards a framework for supporting tourism development in protected area gateway communities based on the idea of building seven capital assets (i.e., natural, physical, financial, political, social, cultural, and human). The authors utilize research from several Canadian indigenous communities near protected areas in the development of this framework.

P1.179 Bentz, Julia*; Gil, Artur; Calado, Helena; CCPA - Centre for Conservation and Protection of the Environment, University of Azores, CIGPT - Centre for Geographic Information and Territorial Planning, University of Azores; *jbentz@uac.pt*
Recommendations for the Development of Management Plans for EU-NATURA 2000 Sites
Natura 2000 is the centrepiece of EU's nature and biodiversity policy. Due to its specific legal framework and its lack of financing, an efficient conservation of Natura 2000 sites requires an optimized, inclusive, feasible management. This paper consists of recommendations for the development of Management Plans for Natura 2000 sites, allowing future managers and decision-makers a more efficient and informed application of the elaboration and revision processes. These recommendations are based on the case-study of the Management Plan of the Special Protected Area - Pico da Vara / Ribeira do Guilherme (Sao Miguel Island- Azores, Portugal). Participation is a key element in this process, as effective implementation is only achievable when landowners, public and private stakeholders, decision-makers, scientists and the public are involved right from the beginning. The demonstrated model of consensual management planning can be adapted and applied, according to the specific environmental and socio-economic characteristics, to any Natura 2000 site in Europe. It enables the balance of various interests, such as conservation and development, and empowers sense of ownership for the participants.

P1.186 Berger-Tal, O*; Peled, T; Ben-Zvi, A; Saltz, D; Lubin, Y; Kotler, BP; Mitrani Department of Desert Ecology, Ben-Gurion University of the Negev; *bergerod@bgu.ac.il*
A CONCEPTUAL FRAMEWORK INTEGRATING ANIMAL BEHAVIOR and CONSERVATION BIOLOGY
Conservation behavior is a relatively new discipline aimed at investigating how proximate and ultimate aspects of animal behavior can be of value in preventing the loss of biodiversity. This new discipline's usefulness in promoting practical conservation-matters is subject to debate, with some scientists arguing that the importance of behavior in conservation practice is over-emphasized. Newly developed, interdisciplinary scientific fields are often characterized by having no paradigm, forcing every researcher to invent the foundation for his or hers own work and thus creating a random collection of observations with little structure. We propose that a major cause for the frailty of the link between behavioral ecology and conservation biology is the absence of a unifying paradigm that will bridge the gap between the two disciplines and establish a framework in which the field of conservation behavior can develop and prosper. We developed a simply structured, hierarchical, and parsimonious paradigm, merging the disciplines of animal behavior and conservation biology and showing in what contexts and aspects animal behavior is important to conservation.

SY76 Bergeron, Colin*; Spence, John; University of Alberta; *cb1@ualberta.ca*
Biodiversity Surrogacy and Coarse Filter Approach to Managed Land Conservation
Coarse filter approach to biodiversity conservation requires a good knowledge of the landscape under management and how it affects local biodiversity. In this study, we investigated the accuracy of provincial forest inventory data derived from air photo interpretation and their performance in explaining landscape patterns of ground-beetle bioviversity. Provincial inventory estimations of the four main tree species were accurate between in 70% to 86% of the cases when compared to field survey. Confusion between similar tree species often occurred and unmerchantible timber was sometimes classified as merchantable which might affect annual allowable cut calculation. Data derived from air photo could explain 22% of the ground-beetle diversity while ground data could explain 30%. This difference is caused by particular poor estimation of uncommon tree species by provincial inventory having great importance on landscape biodiversity. The use of Canadian Forest Ecosystem Classification (CFEC) as biodiversity surrogate allows to capture up to 30% of the ground beetle biodiversity and may be a more suitable base (although not a perfect solution) for application of coarse filter approach to landscape scale conservation.

SY9 Berke, Phil; University of North Carolina-Chapel Hill; *pberke@unc.edu*
Translating Conservation Science to Action through Land Use Planning: Challenges and Choices in Strategic Points of Intervention
Knowledge about the causes and consequences of natural system degradation is increasing, but losses in biodiversity continue to rise largely because of where and how we design communities. I first discuss the major benefits of land use planning when applied to bio-conservation, and then why communities fail to enact effective planning programs to prevent biodiversity losses. I then review major empirical research findings and examples from local planning practice about five sets of critical choices that land use planners, elected officials, and the public can make to advance land use planning for bio-conservation including: 1) the design of state planning programs aimed at motivating local action; 2) the design of local public participation programs for visioning and goal setting; 3) how to incorporate green community design concepts into land use plans; 4) the formation of plan implementation strategies based on choices among local regulatory, incentive, and infrastructure investment powers; and 5) the design of local plan monitoring and evaluation programs. The final part concludes by examining the implications of placing these choices at the core of recommendations for guiding future research on a strategic choice theory of integration of bio-conservation science information into land use planning. I also offer recommendations for policy formation aimed at creating more ecologically sustainable communities.

SY73 Berteaux, D; UniversitÃ© du QuÃ©bec Ã Rimouski; *dominique_berteaux@uqar.qc.ca*
The Arctic ecozone : some fascinating paradoxes for conservation biologists
The Arctic ecozone is Canada's largest, spreading over 2.3 million km2 (3.5 times the size of Alberta or 5.5 times the size of California). The Arctic has low species diversity, and most organisms are highly specialized to cope with low temperatures and omnipresent frozen water. This ecozone is home to many charismatic species such as the polar bear, snowy owl, arctic fox and muskox. While vast expanses of the ecozone are still in a virtually pristine state, some of its core structures and processes are threatened by climate heating, increasing exploitation of mineral resources, and the invasion of southern species. For example, some high Arctic ponds, which have been permanent water bodies for millennia, are now completely drying in summer. In some areas, melting permafrost increases coastal erosion and no longer provides infrastructure stability. Disturbance to wildlife is increasing due a wide range of development activities. It is also possible that some feedback mechanisms (e.g., emissions of CO2 and CH4) specific to this ecozone might affect the whole biosphere. At the same time, Northern protected areas are under development, some species might be recovering from overexploitation during the past centuries, and both biological productivity and net biodiversity should increase during this century. These are some fascinating paradoxes for conservation biologists to explore through science and better use of local knowledge.

1.8 Bertelsmeier,C.*; Luque,G.; Courchamp,F.; UniversitÃ© Paris-Sud 11; *cleo.bertelsmeier@u-psud.fr*
Ant invasions in a warming world
Global climate change and biological invasions are among the most important drivers of the current rapid decline of biodiversity. However, the link between those two threats remains largely unexplored. Global warming can enhance the invasiveness of many species by altering the climatic conditions of an ecosystem. For example, non-native species which are currently unable to colonize higher latitude regions because of physiological constraints (e.g., too low temperatures) could become invasive within the next century due to warming temperatures. Our aim is to make spatial predictions about future invasion risks by ants in Europe based on their species characteristics (mostly physiology) and future climate scenarios. We show, with the combination of spatial models of predicted temperature increases (IPCC mapped data) and of field experiments with invasive Argentine ants to what extent the species' distribution is currently limited to the Mediterranean region by temperature and how this might drastically change in a warming climate. We used ants as model species to explore the link between climate change and invasions because of their role as key stone species in many ecosystems and the huge impact of ant invasions on ecosystem functioning. But global warming is likely to favour numerous biological invasions threatening biodiversity.

P1.108 BEVAN, TISA*; Bork, Edward; Student, Supervisor; *tlbevan@ualberta.ca*
Habitat Selection of Feral Horses in the Alberta Foothills
Feral horses have been present in Alberta since the early 1900's when unwanted workhorses were released. These horses are present in three main herds along the Alberta foothills and each herd is broken into smaller social groups called harems. The last information gathered on these horses was in 1980 by Salter and Hudson. Since then the populations of these herds have been increasing, along with the level of recreational and grazing use in the area. Due to the increasing potential for environmental and social conflicts there needs to be efforts to gather accurate information on which habitats the horses prefer. There are five harems in the Mclean Creek Recreational Area that are being monitored with GPS collars from November 2008 to November 2010 to gain information on where the horses are spending their time. Geospatial analysis coupled with field sampling will be used to determine presence or absence of horses and what habitats they are in. Preliminary analysis of 2009 data shows that the horses prefer lowland grasslands and cutblock areas.

P2.213 Bhotika, Smriti*; Holt, Robert D.; School of Natural Resources and Environment and Department of Biology, University of Florida, Gainesville, FL 32611, USA, Department of Biology, University of Florida, Gainesville, FL 32611, USA; *sbhotika@ufl.edu*

Spatial Patterns of Diversity of Ungulates in Serengeti National Park

Understanding habitat use is essential for effective management and conservation. Mobile organisms in a community choose habitats in response to a variety of underlying factors including availability of resources, protection from predators, competition for space, and topographic dispersal barriers. This study investigates patterns of habitat use by the diverse ungulate community within the savanna ecosystem of Serengeti National Park, East Africa. Data were available from aerial surveys for eight wet season surveys from 1988-2006. Densities of ungulates were estimated for sample locations 5 km apart. Habitat use within the area is explored by identifying hotspots and coldspots of diversity across space in relation to habitat characteristics. Habitat features were selected to incorporate principal environmental and human influences. Specific regions of the park, as well as locations outside the park boundary, support higher diversity. These are locations of potentially greater interactions among species and importance in management. The patterns of diversity appear consistent over time. However, use of space can vary with changing conditions, for instance following a strong El Nino that resulted in wet season floods. Identifying potential critical areas and characteristics of preferred habitat will contribute to our ability to predict how the ungulate community will respond to changes over time such as shifting rainfall patterns associated with climate change.

SY45 Bielby, J*; Clare, F.C.; Fisher, M.C; Garner, T.W.J.; Walker, S.F.; Institute of Zoology, Imperial College London, UNEP World Conservation Monitoring Centre; *jon.bielby@ioz.ac.uk*

Predicting disease-related declines in amphibians: rules of thumb, pitfalls, and the importance of context dependence

Recent years have seen a massive increase in the amount of attention given to amphibian conservation. Much of this attention is a result of the emerging infectious disease, chytridiomycosis, which has been linked to a large number of species declines and even extinctions. Broad-scale analyses have outlined several rules-of-thumb that may be used to prioritise species for conservation attention at a global-scale. However, as we learn more of the host-pathogen system apparently involved in these declines, the more we see that a species' response to pathogen exposure depends on a wide-range of factors, which may vary amongst species and systems. Predicting species/population level response may therefore rely on a large amount of information not only on the species itself, but also upon the system in which a given species or population lives. This highlights the importance supplementing larger-scale risk-assessments with finer-scale knowledge that will take into account the context in which species exposure and infection may occur.

P1.199 Bingham, DM*; Leary, RF; Allendorf, FW; University of Montana; *daniel.bingham@umconnect.umt.edu*

Dynamics of Hybridization between Sauger and Introduced Walleye in Montana

We used three diagnostic allozyme loci to study hybridization between native sauger (Sander canadensis) and introduced walleye (Sander vitreus) in Montana. In Fort Peck Reservoir, 10% of the Sander samples (n=158) were hybrids, and 69% were walleye, and 21% sauger. In the Yellowstone River below Miles City, 10% were hybrids, 62% were sauger, and 23% were walleye (n=48). A majority of the hybrids from both locations (>90%) were post-F1. The samples showed a bimodal distribution for genotypes representative of sauger and walleye, and, therefore, did not appear to have come from hybrid swarms. These and previous data suggest hybrids between the species are common in the Missouri and Yellowstone River drainages and represent a conservation threat to native sauger. Further interpretation of the results is limited, however, by the fact that samples did not come from spawning aggregations and only three diagnostic loci were used. To address these issues, we have examined 20 microsatellite loci; three of these loci are diagnostic, and seven are informative to distinguish between these species. Allele frequency differentiation between the species at these ten loci is high: FST=.25, RST=.69 (n=48 sauger and 63 walleye). Bayesian analysis with STRUCTURE assigns sauger and walleye with 100% confidence (cutoff = Qi >.90) with these 10 loci. We are now using these markers to examine the conservation threat of introgression by sampling discrete spawning aggregations in Montana and Wyoming.

P1.109 Blanchet, FG*; Bergeron, C; University of Alberta; *gblanche@ualberta.ca*

The Factors Structuring Beetle Communities in Boreal Forest

The maintenance of biodiversity in forested landscapes is important for sustainable management of boreal forest. The majority of known species in this type of forest are insects and therefore, understanding how to maintain boreal forest biodiversity requires a good knowledge of what structures insect diversity in mature forest. The goal of this research is to evaluate which factors influence the ground beetle community of Alberta's boreal forest. The data used to answer this question come from 195 regularly distributed sites covering an area of 84 Km2 old grown forests, in Northern Alberta, Canada. Sampled environmental variables were organized in three groups: fire history, floor and drainage, and trees. Variable constructed through the Moran's eigenvector maps framework were also used to better understand what structures the spatial distribution of the ground beetles community. Results give insights on how management and harvesting of the boreal forest should be done in order to preserve the highest ground beetle diversity. For example, drainage in the exploited area must be kept as intact as possible. The spatial structure of the beetle community would suggest not creating any physical barrier at a scale under 2 Km2. Reforestation should be carried out with as many endemic trees species as possible. Finally, ground beetle diversity is affected by fire, such as slash and burns, but to a lesser extent. A holistic understanding of boreal forest ecosystem is important, especially in management.

P2.52 Blanco, Gabriela S.*; Morreale, Stephen J.; Paladino, Frank V.; Spotila, James R.; Department of Biology, Drexel University, Philadelphia, PA 19104 USA;, Department of Natural Resources, Cornell University, Ithaca, NY 14853, USA, Department of Biology, Indiana-Purdue University, Fort Wayne, Indiana 46805-1499, USA.; *gsb22@drexel.edu*

Urgent action is needed during the migration and internesting periods to conserve eastern Pacific green turtles nesting in Northwestern Costa Rica

The Pacific coast of Costa Rica hosts important nesting sites for endangered eastern Pacific green turtles (Chelonia mydas). We studied migration, inter-nesting movements and behavior of turtles that nest on Nombre de JesÃºs and Zapotillal beaches using satellite telemetry. Turtles remained in the vicinity of the nesting beaches, using depths between 5 and 10 m (89%) during internesting. Post nesting movements showed different migration routes and foraging areas: 3 turtles stayed in nearby Papagayo Gulf (Costa Rica), 3 moved to Santa Elena Gulf (Nicaragua) and 3 migrated 400 km north to Fonseca Gulf (El Salvador). We also identified threats to the population that require urgent attention for its protection. The majority of the north pacific Costa Rican nesting beaches have no enforced protection, which facilitates illegal egg recollection and uncontrolled tourism. Additionally, we observed incidental capture of turtles by artisanal fisheries that operate in waters surrounding the nesting beaches. Our findings suggest that green turtles inhabit waters off the coasts of El Salvador, Nicaragua and Costa Rica during their entire reproductive life; which also makes them vulnerable to fishing activities in these areas. Urgent action is needed both on land and at sea.

SP1.10 Blankespoor, Brian*; Kraft, Robin; Hammer, Dan; World Bank, Center for Global Development; *brian.blankespoor@gmail.com*

The Impact of Poverty on Deforestation in Indonesia

Forest conservation has gained more attention recently from the climate change dialogue of carbon financing. Satellite technology has enabled remote estimates of forests and deforestation. The Forest Monitoring for Action (FORMA) system provides estimates of deforestation in Indonesia from 2000 to October 2009, producing monthly \\\"time-lapse\\\" maps from December 2005 to the present, currently at approximately 1km spatial resolution. In addition to potential carbon gains from forests, tropical forests have high global biodiversity significance and play a crucial role for many poor people. This analysis elucidates a typology of deforestation areas according to socio-economic and physical characteristics including: suitable soils, economic density, and near and far travel distance from major cities. The results display a series of deforestation characteristics maps over time.

P2.199 Blatt, Jantje*; Kreft, Stefan; Strixner, Lena; Luthardt, Vera; Ibisch, Pierre; University of Applied Sciences Eberswalde; *jblatt@fh-eberswalde.de*

Global change vulnerability assessment of conservation targets and its implications for nature conservation management - a case study from eastern Germany

Any proactive and strategic nature conservation management should be based on a thorough vulnerability assessment of its targets, such as populations or ecosystems. Global change is increasingly exposing conservation targets to a diversity of stresses, both directly and in interaction with other anthropogenic stresses. We therefore propose an index of ecosystem vulnerability to global change in order to facilitate the identification of adaptive conservation strategies. The methodology of this study is based on a concept of vulnerability as a function of change in exposure, sensitivity and adaptive capacity. In terms of exposure changes, we consider regional climate projections and dynamic trends of current threats (e.g., land use pressure). Sensitivity and adaptive capacity are factored in both by community and habitat aspects and their interactions. The indicators are rated semiquantitatively, resulting in discrete ecosystem vulnerability classes. Highly global change-vulnerable ecosystems in eastern Germany are water dependent ecosystems such as peat bogs and mesic forests, threatened by increasing temperature, altering precipitation and droughts as well as increasing land use pressure. The vulnerability of goal and target setting is part of a vulnerability assessment of conservation systems and therefore contributes to a strategic and adaptive management in the face of global change.

4.7 Blickley, JL*; Patricelli, GL; Blackwood, DJ; University of California, Davis, Florida Fish and Wildlife Conservation Commission; *jlblickley@ucdavis.edu*

The impacts of energy development noise playback on lek attendance and behavior in greater sage-grouse

The spread of human development has caused a dramatic increase in noise across the landscape. Recent studies suggest that noise may negatively impact wildlife, yet little is known about the causes and consequences of this impact. Further, most previous studies have not been designed to isolate noise impacts from other confounding factors. This study is investigating the impacts of energy development noise on greater sage-grouse (Centrocercus urophasianus), a species of management concern across western North America. Sage-grouse are declining in areas of energy development and circumstantial evidence suggests that noise is a cause of this decline. To test this hypothesis, control leks and leks with experimentally-introduced energy development noise were monitored for three seasons. Noise playback resulted in immediate and drastic declines in lek attendance by male sage-grouse relative to paired controls. Additionally, males remaining on noise leks had elevated levels of fecal corticosterone, suggesting that noise exposure has both physiological and behavioral impacts. This is the first long-term playback experiment investigating the chronic impacts of noise on any wild population, offering a unique opportunity to experimentally address noise impacts on avian behavior and breeding site selection while informing conservation efforts for this species.

P2.138 Bogich, TL*; Green, RE; Balmford, AP; Wildlife Trust, University of Cambridge; *bogich@wildlifetrust.org*

A global empirical test of the Species-Area Relationship for predicting extinction risk in relation to habitat conversion

Habitat loss is undoubtedly one of the greatest threats to species persistence and a predictive tool that links habitat loss to extinction risk would be invaluable to conservation. For the past three decades the Species-Area Relationship (SAR) has been this tool, providing the basis for countless conservation priority setting analyses. However, it has rarely been tested with data on real extinction rates; it ignores threats to biodiversity other than direct habitat conversion; and it assumes that species are uniform in their susceptibility to habitat loss. We developed alternative models to the classic SAR to describe the relationship between the proportion of species that are threatened with extinction and the proportion of their individual ranges that has been converted from its native state. The models take into consideration threats other than habitat loss (a multi-threat SAR model), or variation in a species' ability to live in areas partially modified by human use (a differential susceptibility SAR model). We tested these models at the global-scale using data on amphibians, mammals and birds and found that the traditional SAR model never provided the best fit to observed patterns. The results strongly suggest that in order to make more accurate predictions of species extinction risk, the classical SAR model needs to be adjusted to incorporate additional data on multiple-threats and differential susceptibility.

SY13 Boitani, L*; Rondinini, C; Falcucci, A; Maiorano, L; Baisero, D; Visconti, P; Pressey, B; University of Rome, James Cook University; *luigi.boitani@uniroma1.it*

What the available data on the world\'s mammals are (not) good for

Recent advances in the compilation of large databases on mammal species distribution, natural history and conservation status (e.g., GMA, GBIF, PanTheria) offer new opportunities for global analyses, particularly on conservation prioritization and effectiveness. However, the information available in these databases is highly variable in content, quality and taxonomic coverage. For example, about 20% of all species are classified by the GMA as Data Deficient for threat categorization showing lack of even minimum information to assess their status. Of all mammal species, only 251 have at least 20 locations collected later than 1990 and listed in GBIF. The heterogeneity of taxonomic and spatial data is a serious constraint for several applications at global scale. We review the intrinsic weaknesses of many point location datasets to produce and/or test the validity of distribution models, including their age, sample size and environmental/geographic distribution, independence, accuracy, time relevance and, often forgotten, representation of biologically optimal sites in relation to the natural history of the species (Î»>0). We show how the quality of point locations available in GBIF limits the possibility to model species distribution using statistical methods and compels the use of expert-based distribution models as the only way to obtain a consistent product for all species.

P1.37 Bola Adeleke; Redeemer's University; *thebhozz@yahoo.co.uk*

Ecotourism Benefits and the Role of Non-Governmental Organisations at Yankari Game Reserve, Nigeria

An investigation ecotourism at Yankari Game Reserve in Sudan Savanna of Northern Nigeria and one of the country's most visited protected areas focused ecotourism benefits and the role of Non-Governmental Organisations in promoting conservation awareness.Interviews, participant observation and archival research were used to investigate the role of Non-Governmental Organisations,residents attitudes,toward Yankari Game Reserve and ecotourism as a method of protected area and rural development.Many factors make Yankari Game Reserve a prime ecotourist destination, including the possibility of viewing easily its endemic species, such as Waterbuck. The Game Reserve has a strog Non-GovernmentalOrganisation involvement and currently conbines conservation and development through a progamme that returns a portion of tourism revenue to local communities. Actual benefits received from the Game Reserve, including ecotourism revenues were found to influence the positive and negative perception of Yankari Game Reserve held by residents in the Game reserve periphery. However limitation on ecotourism development include infrastructure and political instability. KEY WORDS: Ecotourism,Conservation,Yankari Game Reserve,Local Communities,Rural Development

12.1 Bolger, DT*; Morisson, TA; Vance, B; Farid, H; Environmental Studies Program, Dartmouth College, Department of Biological Sciences, Dartmouth College, Computer Science Department, Dartmouth College, Computer Science Department, Dartmouth College; *dbolger@dartmouth.edu*

Development and Application of a Computer-Assisted System for Photographic Mark Recapture Analysis

Photographic mark-recapture is a cost-effective, non-invasive way to study populations. However, to effectively apply photographic mark-recapture to large populations, computer software is needed for efficient image manipulation and pattern matching. We created an open source application for the storage, pattern extraction, and pattern-matching of digital images for the purposes of mark-recapture analysis. The resulting software package is a stand-alone, multi-platform application implemented in Java. We applied this system to a population of giraffe (Giraffa camelopardalis) in the Tarangire Ecosystem in northern Tanzania. Over 1200 images were acquired in the field in three primary sampling periods, Sept.-Oct. 2008, Jan.-Mar. 2009, and Dec. 2009. The pattern information in these images was extracted and matched resulting in capture histories for over 600 unique individuals. These histories were then analyzed with Cormack-Jolly-Seber models to estimate survival rates and closed population models to estimate population sizes. Our program employs the SIFT operator (Scale Invariant Feature Transform) which extracts distinctive features invariant to image scale and rotation. This was advantageous in this application as it allowed reduced preprocessing of images and accepted a greater range of image quality with low matching error rates. This new tool allowed photographic mark-recapture to be applied successfully to this relatively large population.

P2.171 Bolger, DT*; Morisson, TA; Vance, B; Farid, H; Environmental Studies Program, Dartmouth College, Department of Biological Sciences, Dartmouth College, Computer Science Department, Dartmouth College, Computer Science Department, Dartmouth College; *dbolger@dartmouth.edu*

A New Software Application for Photographic Mark Recapture Analysis

Photographic mark-recapture (PMR) is a cost-effective, non-invasive way to study populations. However, to effectively apply PMR to large populations, computer software is needed for efficient image manipulation and pattern matching. We have created an open-source application for the storage, pattern extraction, and pattern-matching of digital images for the purposes of PMR. Our software is a stand-alone, multi-platform application implemented in Java that employs the SIFT operator (Scale Invariant Feature Transform) which extracts distinctive features invariant to image scale and rotation. In this poster we present a validation of the application for two species with distinct markings, wildebeest (Connochaetes taurinus) and giraffe (Giraffa camelopardalis). We used ROC curves (Receiver Operator Characteristics) to characterize the trade-off between false negative and false positive error in the photo-matching process and to identify the best performing scoring procedure. Because false negative error was of greater concern than false positive, we selected scoring thresholds that minimized false negative error. For wildebeest, the best procedure generated false negative error rates of 14% while yielding a 130-fold labor savings over an unassisted matching process. For giraffe, errors rates were negligible and labor savings even greater. These results suggest that this software should be useful to other researchers employing PMR.

SP11.8 Bologov, VV*; Becker, L; Pazhetnov, VS; Central Forest State Nature Reserve, Zapovednoye, 172513, Tverskaya oblast, Nelidovsky raion, Russian Federation., Institut Pluridisciplinaire Hubert Curien, DÃ©partement Ecologie Physiologie Ethologie, UMR7178, CNRS/UdS, 23 rue Becquerel, 67087 Strasbourg Cedex 02, France.; *vbologov@gmail.com*

Rehabilitation and release of young captive-born carnivores

For the most threatened populations, the last chance relies on stocks of captive animals in zoological parks. But release of captive-born animals demands special handling. Most species of mammals rely on learning as juveniles for their survival. Moreover, released carnivores should not be a danger to human and its livestock. Between 1994 and 2010, we raised and released 20 grey wolves (Canis lupus), 10 brown bears (Ursus artcos), 3 Eurasian lynx (Lynx lynx) and 2 Eurasian otters (Lutra lutra) born in Russian zoos. Raising methods are different from one another. Bears and lynx need rehabilitation in steps and soft-release. Wolves and otters can be hard-released after one year old. Lynx are the most difficult to rehabilitate because of a lack on hunting experience; it remained unsuccessful. Wolves have tendencies to socialize with human and must be taken from the parents after 6 weeks old, or raised under adults. Bears are rehabilitated well, provided they have no close contact with human and have possibilities to experience foraging. We discuss the opportunities of this work for conservation biology, and especially to re-introduce rare and extinct species and subspecies, and to re-enforce small populations.

SY36 Bomhard, B*; Abell, R; Burgess, N; Butchart, S; Coad, L; Hockings, M; Leverington, F; Thieme, M; Protected Area Programme, UNEP-WCMC, WWF-US, Dept of Biology, University of Copenhagen, Birdlife International, Oxford University Centre for the Environment, School of Integrative Systems, University of Queensland; *bastian.bomhard@unep-wcmc.org*

Meeting protected area targets in terrestrial habitats

Parties to the Convention on Biological Diversity (CBD) set a number of targets for the world's protected areas to be met in terrestrial habitats by 2010 and in marine habitats by 2012. These targets include 1) protecting at least 10% of each of the world's ecoregions, 2) protecting areas of particular importance to biodiversity, and 3) assessing at least 30% of the world's protected areas for their management effectiveness. We analyzed progress towards these targets in terrestrial habitats based on the 2010 World Database on Protected Areas (WDPA), a global database of management effectiveness assessments, and a range of biodiversity datasets including terrestrial ecoregions of the world and two subsets of Key Biodiversity Areas: Important Bird Areas (IBAs) and Alliance for Zero Extinction sites (AZEs). We found that almost half the world's terrestrial ecoregions do not meet the 10% target, only 26% of IBAs and 35% of AZEs are completely protected, and only a fraction of the world's 130,000 protected areas recorded in the WDPA have yet been assessed for their management effectiveness. Our analysis thus shows that, although considerable progress has been made, overall the Parties to the CBD have not met the 2010 protected area targets.

1.4 Bonnaud, E*; Caut, S; Watari, Y; Bourgeois, K; Bretagnolle,V; Courchamp, F; University Paris XI, CSIC, Sevilla, CNRS, Orsay, University Aix en Provence, CNRS, ChizÃ©, CNRS, Orsay; *elsa.bonnaud@u-psud.fr*

Slow bird community recovery following rat eradication on Surprise Island

Due to the harmful effects of invasive predators on native island species, an increasing number of eradication plans have been conducted worldwide. In 2005, we successfully eradicated ship rats and mice from Surprise Island, New Caledonia. However, in addition to the recovery of some focal species, the restoration of the ecosystem in general is an important criterion of success achievement. For this purpose, we studied the continuous evolution of populations of seabirds, taking into account the evolution of plant communities. We observed the recovery of some seabird populations, in particular an increase of boobies and noddies but curiously the population of the red-tailed tropic birds continued to decline and no breeders were recorded during the last years. We also observed an overall vegetation increase, probably due partly to the removal of rodent consumption pressure and to the increase of guano production. Yet, even if it resulted in an increase in the available habitat, those effects cannot be expected to be visible before a number of years. Meanwhile, we observed a dramatic increase of an invasive plant that may eventually hinder ground nesting. Only a continuous, long-term, full ecosystem monitoring will demonstrate the successful restoration of this ecosystem.

P2.6 Border, HA; Prescott College; *hborder@prescott.edu*
Social and Environmental Implications of the Chan-75 Dam in Bocas del Toro, Panama
The Chan-75 dam, under construction on the Changuinola River, is affecting terrestrial and aquatic biodiversity in Bocas del Toro, Panama. The NgÃ¤be people of Panama rely on natural resources provided by the river and the surrounding forests of Palo Seco Protected Reserve. Four communities must relocate due to inundations caused from damming the river. Many more families will no longer have access to farms, trails, and trade routes. I will conduct semi-structured interviews in communities surrounding the dam site to understand how stakeholders view effects of the Chan-75 dam on natural resources in the Changuinola watershed. This research is critical because more dams are planned for the region. Data collected through this research will assist with planning and implementing these future projects.

P2.44 Bornatowski, H*; Vitule, JRS; Abilhoa, V; CorrÃªa, MFM; Universidade Federal do ParanÃ¡, Museu de HistÃ³ria Natural CapÃ£o da Imbuia; *anequim.bio@gmail.com*
About an unconventional artisanal fishing activity of large sharks in Southern Brazil: Implications for conservation and urgent needs to investigations
An unconventional artisanal fishery targeted to large sharks in state of ParanÃ¡, Southern Brazil (25Â°39'S, 48Â°26'W) was observed from June 2006 to January 2010. In this community the fishery is executed only by two fishermen with a 24 Hp motorized canoe, with a baited bottom gillnet (40 cm mesh-size between opposite knots). Were recorded 60 sharks in different reproductive stages including pregnant females, females post-partum, adult males and juveniles, belonging to the species: Carcharias taurus, Carcharhinus limbatus, Carcharhinus obscurus, Galeocerdo cuvier, Sphyrna lewini and Squatina guggenheim. This fishery, which captures pregnant females with high reproductive potential and fecundity in a costal nursery area, may influence the population dynamics and species turnover rates locally and regionally over time. Therefore, a constant and effective monitoring about local and regional fisheries is urgently necessary to provide information on the specific target and effort employed. These measures are crucial to develop and implement efficient conservation actions and sustainable artisanal fisheries. It is also imperative to conservation and sustainable fisheries management that the catches data will be recorded species-specific and considers what is the target species intend by fisherman, differently as it is done today, where official statistical reports since categorized in a general category like "shark".

SY14 Boutin, S*; Haughland, D; Schieck, J; Department of Biological Sciences, University of Alberta, Alberta Biodiversity Monitoring Institute; *stan.boutin@ualberta.ca*
Assessing biodiversity change: monitoring programs that measure true progress
The 2010 target of the Convention on Biodiversity "to achieve a significant reduction in the current rate of biodiversity loss" serves as a rallying point to conserve the World's natural biotic diversity. However, if the target is to be more than a simple public relations exercise, we need scientifically credible ways of measuring true progress. Therefore, monitoring biodiversity change is important and there been much recent debate over how best to do this. Biodiversity monitoring programs tend to fall in two camps, those who think that to be effective biodiversity monitoring must be based on research or management programs that are strongly rooted in a priori questions, versus those who advocate programs designed to specifically track broad-scale changes in species, habitats, and ecosystems. In this talk we show how the former research-based monitoring programs provide flawed information regarding how the world's biodiversity is changing in the face of global warming and human activities. We also outline why the alternative approach based on broad systematic monitoring provides the scientific information capable of measuring true progress toward reducing biodiversity loss.

P1.113 Bowerman, T*; Budy, P; Department of Watershed Sciences, Utah State University, USGS Cooperative Fish and Wildlife Research Unit, Utah State University; *tracybowerman@gmail.com*
How Do Habitat Connectivity and Dispersal Rates Affect Population Dynamics of an Imperiled Freshwater Fish?
The effects of habitat fragmentation on population size, connectivity, and dispersal are important impacts to understand for metapopulations of fishes that occupy stream networks. Using a patch framework, we assessed how habitat connectivity and dispersal affected both population size and trend for an imperiled freshwater fish (bull trout, Salvelinus confluentus). First, using GIS, we interpolated between known water temperature points to delineate patches of potentially suitable habitat within a large watershed. Next, we developed a metapopulation model using estimates of population size and growth based on empirical studies, and connectivity based upon the patch delineation, to investigate the effect of dispersal rates on population persistence over time. The GIS analysis indicated that patch size was the single best predictor of occupancy. Results of the metapopulation model indicated that dispersal significantly decreased patch extinction probability, and even very small rates of dispersal helped mitigate negative effects of stochastic variability on population size. When considered together, these results suggest that in some systems, the trade-off between protecting habitat size vs. connectivity should not be an either/or decision, but that management should be prioritized to enhance connectivity between critical habitat patches while simultaneously maintaining adequate habitat patch size.

SY45 Boyer, Alison; Yale University; *alison.boyer@yale.edu*
Using the Past to Predict the Future: Consistent selectivity through time in anthropogenic extinctions
Understanding the ecological mechanisms that lead to extinction is a central goal of conservation. Can understanding ancient extinctions help us to predict extinction risk of modern birds and mammals? Using classification trees trained on both prehistoric and historic extinctions from continental and island settings, I found that ecology, including endemism, large body size, and slow life-history, has been tightly linked with human-caused extinctions. For birds, species ecology, along with phylogeny, was a better predictor of extinction risk through time than extrinsic or abiotic factors. Although human impacts on species and habitats have changed through time, modern endangered species share many of the same ecological characteristics as victims of previous extinction waves. Detailed predictions of extinction risk were used to identify species potentially in need of conservation attention, demonstrating the utility of paleoecology for modern conservation biology.

7.1 Bradley, M.*; Neufeld, L.; Wilmshurst, J.; Parks Canada; *mark.Bradley@pc.gc.ca*
Why have South Jasper Caribou declined, and are they still declining?
Southern Mountain Caribou in the southern portion of Jasper National Park have declined from a subjectively estimated 430 caribou in the mid 1970's to a population estimate of 87 (90 confidence limits of 87 to 96) in the fall of 2009. We examine the evidence available to answer the question of why the caribou have declined. There are currently 3 main hypotheses for caribou decline in JNP: human disturbance, climate change, and perturbations in the predator/prey dynamic. There is also an historical theory (competition with elk) that we examine as well. We use human use statistics, climate and landcover data, and animal abundance information to weigh the evidence for these competing hypotheses. We also present data on the current population trend (i.e. the last 7 years), and expectations for the future.

18.5 Bradshaw, J.A.*; Yang, G.-J.; Brook, B.W.; Zhou, X.-N.; McMichael, A.J.; Butler, C.D.; Giam, X.; Sodhi, N.S.; The Environment Institute & School or Earth & Environmental Sciences, Jiangsu Institute of Parasitic Diseases, China Centre for Disease Control, National Centre for Epidemiology and Population Health, Princeton University; *corey.bradshaw@adelaide.edu.au*
Global-scale evidence that environmental degradation worsens human health
A compelling argument for protecting natural ecosystems is that environmental degradation damages human health. Although there are many examples of how pollution and other forms of environmental degradation negatively affect human health at a local scale, no global evidence yet exists. I examine the relationship between some key indicators of human health (Disability-Adjusted Life-Years, infant mortality, life expectancy, and deaths arising from infectious and non-infectious disease) and environmental quality (habitat conversion, water and air quality, CO2 emissions, combined indices), using data from over 100 countries. Reduced environmental quality correlates positively with disease prevalence and death rates in humans (e.g. a 10% reduction in water quality is predicted to kill another 35.5 million infants/yr globally, and a 10% reduction in air quality will kill another 343,000 people/yr from cancer), after controlling for population growth and density, per capita wealth and expenditure in health services. Healthy natural ecosystems therefore probably buffer human populations from life-threatening disease and increase life expectancy.

P2.8 Branch, LC; Thornton, DH*; Sunquist, ME; University of Florida; *branchl@ufl.edu*
Analyzing the Relationship Between Species Traits and Vulnerability to Fragmentation: Passive Sampling Effects and Cross-landscape Comparisons
As tropical reserves become more isolated, the ability of species to use fragmented landscapes will be a key determinant of species survival. Although several species traits are commonly associated with vulnerability to fragmentation, the set of traits that are most influential, and the applicability of those traits across distinct landscapes, remains poorly understood. We studied use of forest patches by 25 tropical mammals in Guatemala to determine how 7 species traits influence vulnerability to fragmentation. We also examined the influence of species traits on patch occupancy rates of the same set of mammals on two landscapes in Mexico. In Guatemala, body size, home range size, and hunting pressure were related to occupancy rates, but after controlling for passive sampling effects only hunting pressure strongly influenced vulnerability to fragmentation. Species that were heavily hunted were less common in forest patches. The cross-landscape comparison revealed both similarities and differences in the species traits that influenced occupancy on each landscape. Our findings indicate that management efforts in fragmented landscapes that do not account for hunting pressure may be ineffective in conserving tropical mammals in Guatemala. Our study also suggests that species traits may be somewhat useful in predicting vulnerability to fragmentation across landscapes, but that caution must be used as different traits can become important drivers of response on distinct landscapes.

SP7.9 Brandt, AJ*; Seabloom, EW; Oregon State University, University of Minnesota; *brandtan@science.oregonstate.edu*

Direct vs indirect competitive effects of exotic plants on locally-declining natives

Biological invasion effects often vary with spatial scale, but temporal changes in native-exotic diversity over a range of scales is rarely documented. Understanding the cause of localized native species declines would inform research and management, and is essential to predicting effects of invaders and successfully restoring natives. Long-term monitoring has shown declines in certain native annual forbs over the past 40 years at one California grasslands site, while abundance of certain exotic grasses has increased. These grasses may competitively exclude forbs via direct competition between seedlings or indirect competition through build-up of litter. We established a two-way factorial competition removal experiment to examine the effects of these two factors on the grassland community and six seeded forb species with documented declines. Herbicide application significantly reduced grass and increased forb abundance; litter removal did so to a lesser extent. Combining treatments did not produce a synergistic effect on either grass or forb abundance, however. Seeded species responses were highly idiosyncratic among species, treatments, and spatial location. High levels of spatial variation in community properties were observed overall, suggesting that the effects of such management actions will strongly vary. Thus, limited resources should either be focused on locations where they will have the greatest impact or, when this is unknown, spread over highly variable sites.

SY77 Braunisch, V.*; Suchant, R.; Forest Research Institute of Baden-WÃ¼rttemberg, Germany and Institute of Ecology and Evolution, University of Bern, Switzerland, Forest Research Institute of Baden-WÃ¼rttemberg, Germany ; *veronika.braunisch@iee.unibe.ch*

Metapopulation conservation in fragmented landscapes of Central Europe - the Natura 2000 protected area network and beyond

Confining biodiversity conservation to protected areas is inadequate in human-dominated landscapes. In recognition of this, the European protected area network Natura2000 promotes a system of functionally interacting sites, with the unique specification that interventions planned outside of a designated site, but representing a potential threat to the protection aim, also require impact assessment. This specification is crucial for preserving (meta-)populations of species with extensive area requirements, however its effective implementation is frequently hindered by a lack of knowledge about the supplementary areas required to ensure population dynamics and connectivity. The capercaillie (Tetrao urogallus) is severely affected by habitat loss and fragmentation in Central Europe. In the Black Forest (Southwestern Germany) its occurrence was one of the primary criteria for designating special protected areas (SPA, EU Birds' directive) but these areas only cover permanently occupied habitats. We used species monitoring and population genetics in combination with spatial modelling of habitat and habitat connectivity to localize and prioritize all areas - inside and outside SPAs - relevant for long-term metapopulation conservation. The results provided the spatial framework for the regional Capercaillie Action Plan that includes measures of habitat improvement, tourism management and predator control and was developed in collaboration with all responsible stakeholder groups.

P2.190 Brekke, Heather; Fisheries and Oceans Canada; *heather.brekke@dfo-mpo.gc.ca*

Recovery efforts for the endangered Basking Shark (Cetorhinus maximus) within Canadian Pacific Waters

The Basking Shark (Cetorhinus maximus) is the only extant species in the family Cetorhinidae. The Pacific population is estimated to have experienced a rate of decline exceeding 90% within

P2.117 Brito, IB*; Redford, KH; Ingram, JC; Earth Institute, Columbia University, Wildlife Conservation Society; *ilb2111@columbia.edu*

Assessing the use of public health as a conservation strategy

Although there is a growing body of evidence revealing the linkages between ecosystem health and human health, this body of literature has traditionally been separated from conservation implementation efforts. By drawing from significant public health findings, we explore unique opportunities for conservation that arise from assessing the health impacts resulting from ecosystem disturbance. These may be negative and obvious, such as increased infectious disease prevalence following dam construction or more elusive, such as impaired bioprospecting for potential drug candidates as key species become extinct. Quantifying the human health value of ecosystem conservation would allow for more accurate comparisons of the costs of natural resource degradation when compared to conservation. Additionally, demonstrating that improved health can sometimes be a result of conservation under certain conditions can potentially broaden the constituency invested in conservation efforts. We outline the strengths and weaknesses of this approach in order to explore the power of public health arguments in influencing land use decisions.

SP1.9 Brook, RK*; McLachlan, SM; University of Saskatchewan, University of Manitoba; *ryan.brook@usask.ca*

Re-Thinking the Culture of Corridors

While the importance of landscape connectivity is well established in conservation biology, much less is known about the role of the motivations and behaviour of people living within habitat corridors. In this study we examine the combined influences of habitat and human attitudes and actions on wolf and ungulate (moose, elk, and white-tailed deer) use of corridors and the agriculture-dominated matrix and assess the relative contribution of these social and biological aspects. Farmer observations of wildlife and the associated attitudes and farm management practices were documented within the agriculture-dominated matrix around two large protected areas, Riding Mountain National Park and Duck Mountain Provincial Forest in southwestern Manitoba, Canada using 786 responses to a mail-back questionnaire and participatory mapping interviews with 107 farmers. Biological datasets from radio-collaring, aerial surveys, and wildlife mortalities were used separately and in comparison to the social datasets to evaluate biological and social variables predicting the occurrence and survival of each species outside of the protected areas. For elk, deer, moose, and wolves, 46% of all human-caused mortalities on farmland occurred within 2km of a protected area. The probability of occurrence of each species was directly influenced by a combination of habitat and farm management variables. Our results strongly support the need for an integrated approach to corridor establishment and management.

P1.28 Brook, RK*; Kutz, SJ; Muelling, C; Flood, P; Anderson, J; University of Saskatchewan, University of Calgary; *ryan.brook@usask.ca*

Tools and Collaborative Approaches to Bridge the Communication Gap between Scientists and Northern Communities about Caribou Heath and Conservation

Barriers to communication among scientists and indigenous communities in northern Canada about caribou and reindeer (Rangifer tarandus) health and conservation include: language, world-view, motivations, and a lack of suitable communication tools to facilitate knowledge sharing. The need for improved communication and collaboration is particularly acute given recent dramatic caribou declines. Understanding changes to caribou requires a diverse set of knowledge, tools, and approaches. Despite a range of anatomical features that are unique to the species and active research on diverse aspects their biology, relatively little work has been done to describe the anatomy of the genus Rangifer. It is important to describe what is `normal` structure and function so that we can begin to understand `abnormal`. The purpose of the Rangifer Anatomy Project (RAP) is to describe the anatomy of Rangifer from both scientific and traditional perspectives. Data on caribou anatomy have been obtained from lab-based scientific dissections of preserved reindeer and field-based dissections of caribou while participating on community caribou hunts. Interviews with hunters and elders have elicited information on traditional uses of caribou parts as food, medicine, clothing, and equipment. We anticipate that the process of this project and the final products that describe caribou anatomy from multiple perspectives will ultimately facilitate greater discussion about caribou health and conservation.

5.3 Brooks, JS*; Waylen, K.; Borgerhoff Mulder, M; University of Illinois, Urbana-Champaign, Macaulay Land Use Research Institute, University of California, Davis; *jsbrooks26@gmail.com*

The effect of national socio-political context on community-based conservation outcomes

Since the 1980s, various forms of community-based conservation (CBC) have been promoted in developing countries. Understanding why CBC projects have had mixed outcomes is of importance to conservation efforts. Two previous quantitative comparative evaluations of CBC projects have, respectively, suggested that market integration, benefits provision, and community involvement are associated with successful projects and that projects should engage with local culture. However, these studies did not test for the influence of the broader sociopolitical context in which all projects are embedded. This is needed because a growing body of theory and anecdotal evidence suggest that factors ranging from national governance institutions, to levels of corruption, to general standards of living can influence project outcomes. We present the findings of a new systematic review, which uses a larger dataset than previous quantitative comparisons to associate four measures of project outcomes (attitudinal, behavioral, ecological, and economic) with aspects of national sociopolitical and economic context. Associations with well-implemented national policy, low levels of corruption, and high ranking on the Human Development Index, were detectible even though their influence may be expected to be complex and nuanced. We also tested variables including provision of social benefits, engagement with local institutions and culture, market integration, and resource access. Conservation planners should account for broader socio-political institutional context as well as understanding local biophysical systems and cultures. These findings highlight a challenge for conservation practice and policy.

SY45 Brooks, TM*; Baillie, JEM; Boitani, L; Cox, NA; Lacher, TE; Stattersfield, AJ; ViÃ©, J.-C.; Stuart, SN; NatureServe, Zoological Society of London, University of Rome, Conservation International, Texas A&M University, BirdLife International, IUCN Species Program, IUCN Species Survival Commission; *tbrooks@natureserve.org*

A fifth of vertebrate species face a high probability of extinction? Progress and directions for the IUCN Red List

The IUCN Red List of Threatened Species provides the authoritative, comprehensive measure of extinction risk for the world's species. It is documented through the efforts of the ~8,000 specialists of the IUCN Species Survival Commission, managed by the IUCN Species Program, and supported by the Red List Partnership. The process of assessing extinction risk for the Red List involves: a) application of quantitative categories and criteria (to ensure transparency and repeatability); b) comprehensive assessment of all species in a given higher taxon (not just those considered likely to be threatened); and c) systematic compilation of supporting documentation on distribution, habitat, threats, and conservation actions (to maximize utility for conservation action). In total, 27,893 vertebrate species have now been assessed (45%), including all mammals, birds, and amphibians. Of non-Data Deficient species, 23% mammals, 12% birds, and 40% amphibians are threatened; sampled assessment yields equivalent proportions of 21% reptiles and 23% freshwater fishes. These data can inform conservation implementation, and track its progress over time for reporting and as a basis for adaptive management. They also provide the starting point for modeling predictions of the impacts on extinction risk of landuse trends (e.g., biofuels, REDD) and emerging threats (e.g., climate change, invasives).

SY41 Buchanan, B.*; Wise, S.; McCarthy, T.; Savage, H.; June, J.; Bingel, K.; Utica College; *bbuchan@utica.edu*

Artificial Night Lighting Alters Growth and Development of Aquatic Snails and Frog Larvae.

The expanded global use of artificial night lighting increasingly exposes organisms to unnatural patterns of illumination within natural habitats. Growth and development of vertebrates and invertebrates is controlled in part by hormones that are produced in daily cycles associated with illumination-dependent shifts in the production of photoperiodic hormones like melatonin. We studied growth and development of snails (Physa acuta) and frog larvae (Xenopus laevis) exposed to different amounts of light at night in laboratory studies. All animals were exposed to diurnal illuminations of 100 lx and varying nocturnal illuminations of 0.0001 lx (starlight; dark control), 0.01 lx (moonlight), 1.0 lx (twilight), and 100 lx (dim room lighting). After 37 days of larval development, we photographed and measured frog larvae and established their developmental stage. Frog larvae grew the fastest when exposed to small to moderate amounts of artificial night lighting and their development was significantly delayed at these illuminations relative to dark controls. Snails monitored over 120 days responded similarly with peak growth occurring at low to moderate levels of artificial night lighting. Our results suggest that even small amounts of light pollution commonly found in aquatic habitats can significantly alter growth and development of aquatic organisms.

SY60 Bull, G.Q.; University of British Columbia; *garybull@forestry.ubc.ca*

Forest Carbon Markets and Conservation: The Human Dimension

For decades efforts have been made to find the magic bullet for the conservation of forest landscapes. In the tropics, various schemes have emerged - tropical forest action plans, debt for nature swaps, conservation concessions and the Global Environmental Facilities. In the temperate forest, of countries such as China and New Zealand, halting clearcut logging, logging bans, large scale afforestation/reforestation and industrial plantations have been promoted. In the boreal forest emulation natural disturbances, increasing protected areas and stopping illegal logging are the emphasis. But have any of these schemes, initiatives, institutions and policies really worked? If not, what are policy makers suggesting to replace them? One suggested answer: Payments for ecosystem services in forest based carbon conservation projects. In all of the world's forested regions the projects are still at project level or experimental stages as policy actors grapple with the logistics, incentives schemes, contract design and human welfare. This paper will illustrate our research findings on key dimension of human welfare: income, subsistence, social capital, trust, and corruption from countries such as China and Mozambique.

SY10 Burgess, ND*; Lopa, D; Jambiya, G; FIsher, B; UNiversity of Copenhagen, Care, Tanzania, WWF Tanzania, Princeton University; *neil.burgess@wwfus.org*

From theory to reality: some examples of PES schemes being established in Tanzania

Payments for Environmental Services have been proposed as a way to link the provision of services of value to people to the natural habitats from which these services derive. This mechanism explicitly connects human benefits and the conservation of natural habitats and their concomitant biological diversity. Like many good ideas, it has proven more tricky to operationalise the concept on the ground than was originally envisaged, and there are many more feasibility studies and economic analyses than projects working on the ground. In this talk we will explore two categories of PES schemes: payments for water services, and payments for carbon storage services in the mountains of Tanzania. We describe the operational water PES scheme in the Uluguru mountains and outline the challenges faced in terms of linking service provision to downstream users, and of channeling funds to the providers of the service. We also describe similar sets of challenges in attempts to operationalize REDD forest carbon payments in Tanzania; we show the economic justification for REDD and outline those places where it theoretically could work; we also outline the challenges that are faced in terms of channeling funding from a forest carbon fund to the forest managers on the ground. The overall challenges of implementing water PES and REDD in Tanzania at the operational level are on final analysis very similar. They revolve around financial flows, governance, and the monitoring of implementation and delivery.

SP10.6 BURGESS-HERBERT, SARAH*; Mwenja, Iregi; Opyene, Vincent; AAAS Science & Technology Policy Fellow/BarcodingBushmeat.org, East African Wildlife Society/Bushmeat-Free East Africa Network, Uganda Wildlife Authority/Bushmeat-Free East Africa Network; *Sarah@BarcodingBushmeat.org*

From Science to Action: Taking DNA Barcoding to Battle Against the Bushmeat Crisis

Consequences of the unsustainable and illegal commercial trade in wildlife species known as the bushmeat trade include biodiversity loss, impoverishment of rural communities, compromised ecosystem services, and increased incidents of zoonotic diseases. A recent assessment of wildlife laws and governance in East Africa revealed that successful prosecutions of illegal hunting are very rare, that a lack of forensic evidence in wildlife cases leads to their high failure rate, and that most conservation capacity building projects focus limited attention on the prosecution stage of law enforcement. Meanwhile, proof-of-concept testing in a genetics â field lab' in Cameroon, and in labs in the United States, has shown that a tool known as DNA barcoding can identify to species unrecognizable samples of fresh, dried, and smoked bushmeat. Since the identification of animal products can provide crucial forensic evidence, DNA barcoding has the potential to transform the legal battleground in the prosecution of bushmeat cases. For this to happen in East Africa, we conclude that capacity building conservation projects need to focus more heavily on the prosecution of wildlife crimes, such as through the development of government-sanctioned forensic laboratory facilities with at least one central facility equipped to deal with DNA sequencing, and through technical and awareness training for lab technicians, law enforcement partners, wildlife managers, prosecutors, and magistrates.

P2.200 BURGESS-HERBERT, SARAH*; Euling, SY; Mortensen, H; AAAS Science & Technology Policy Fellow, U.S. Environmental Protection Agency; *s.burgessherbert@gmail.com*

Using Genomics to Reduce Uncertainty in Environmental Risk Assessments

A critical challenge for environmental risk assessment is in reducing the uncertainty introduced by the extrapolation of inferences across differing levels of biological organization, across species, and across variation within species. Our goal here is to critically evaluate the ways in which genomics data and associated computational biology approaches can address these latter two factors by reducing uncertainty in extrapolation across and within species. We evaluate cross-species methods for comparing genes and proteins important in the perturbation of biological pathways leading to toxicity-induced diseases; and, we evaluate methods for comparing the pathways themselves. We ask how genetic, protein, and pathway information can be interrogated from an evolutionary biology perspective to effectively characterize variations in biological processes among organisms. And, finally, we examine the use of genetic polymorphisms, transcriptomics, and proteomics in investigating the variation within species that leads to differences among life-stages, males and females, and among individuals with differing nutrition status, and existing health conditions. We conclude that, while improved bioinformatics methods and resources are needed, genomics approaches show promise for reducing uncertainty both within and across species. **Disclaimer: The views expressed are those of the authors and do not necessarily reflect the views or policies of the US Environmental Protection Agency.**

18.7 Burgman, M.; University of Melbourne

How to obtain better expert judgments

Expert judgments are pervasive in conservation biology, from listing decisions to estimating model parameters. Yet there are no comprehensive guidelines in conservation biology that describe how best to obtain them. Evidence from cognitive psychology and management science suggests that structured methods for expert elicitation will substantially improve the accuracy and calibration of expert opinion about facts. This presentation outlines the steps in acquiring and combining judgments from experts about facts that provides better-calibrated and more accurate estimates than naÃ¯ve elicitation. It uses a 4-step elicitation procedure, embedded within a modified Delphi-technique, and relying of frequency formats for questions. It can be used in small local groups or large groups linked by phone and the web. It is designed to provide for eliciting judgments about â best' estimates and their uncertainty, partitioning lack of knowledge and natural variation. Perhaps most importantly, it generates group estimates that outperform the best-performing individual expert.

SP11.4 Burton, AC*; Balangtaa, C; Sam, MK; Brashares, JS; University of California, Berkeley, Wildlife Division of the Forestry Commission of Ghana; *cole@berkeley.edu*

Evaluating Carnivore Persistence and its Predictors in an Impacted West African Protected Area.

Despite their great ecological and cultural significance, many carnivores are increasingly threatened and inadequately studied. Effective conservation requires better knowledge of carnivore status and the factors underlying their vulnerability. This is particularly true in West Africa, where populations are poorly known and facing heavy impacts. We conducted the first assessment of carnivores in Ghana's Mole National Park, a regionally important savanna reserve, using 253 remote camera stations deployed for 5,469 camera-trap days between October 2006 and January 2009. Only 9 of 16 historically occurring carnivores were detected, with spotted hyena (Crocuta crocuta) and leopard (Panthera pardus) among the most abundant. A hierarchical multi-species occupancy model estimated low detection probabilities across species but only limited support for the presence of undetected species. Additional data sources, including village interviews and anti-poaching patrols, indicated the park's top predator, lion (Panthera leo), may still persist, but confirmed that it and other undetected species are likely at least functionally extirpated from the ecosystem. Contrary to expectations, variation in carnivore persistence was not explained by ecological or life-history traits such as body size, home range size or fecundity. Our results imply an urgent need for new conservation initiatives to protect and restore these regionally important carnivore populations.

SP4.10 Burton, PJ*; Rose, NA; Canadian Forest Service, University of Northern British Columbia; *pburton@nrcan.gc.ca*

Projecting Patterns of Climate Refugia for Conservation Planning in Central British Columbia

The prioritization of conservation targets that can persist under a changing climate has recently emerged as an important challenge for planners. We devised bioclimatic envelopes for some rare plant species and ecosystem types using the 5th to 95th percentiles of four interpolated climate attributes describing the range currently occupied by those conservation targets. Current and future climate attributes for existing rare plant populations and a 1-km grid of the study area were interpolated using ClimateBC and projected based on the A2 scenario and the 3rd generation of the Canadian general circulation model, CGCM3-A2. Locations where suitable climate is projected to persist through current and future conditions can be expected to provide habitat continuity over time, and should receive higher priority for protection than other locations. Rare species typically do not fully occupy the climatically suitable habitat open to them, yet only 7 of the 73 plant species evaluated are projected to experience climatic conditions suitable for persistence in our study area. Only 6 of the 30 terrestrial ecosystem units evaluated are projected to persist, over just 2561 km2 or 1% of the study area. When combined with other conservation criteria, areas projected to be climate refugia become clear priorities for protection. These results illustrate the magnitude of ecological change that can be expected, and the utility of available spatial modelling tools to set conservation priorities.

14.3 Bustamante, J*; Seoane, J; RodrÃ–guez, C; Figuerola, J; Dept. Wetland Ecology, EstaciÃ³n BiolÃ³gica de DoÃ±ana, CSIC, AmÃ©rico Vespucio s/n, 41092, Sevilla, Spain, Dept. of Ecology, Universidad AutÃ³noma de Madrid, Campus Cantoblanco, Madrid, Spain; *jbustamante@ebd.csic.es*

Predicting the Effect of Climate Change on Habitat Available for Waterbird Species in European Mediterranean Wetlands

It is expected that climate change will have a profound effect in Mediterranean wetlands. The increase in temperature and reduction in rainfall predicted in Southwestern Europe will affect seasonal wetlands reducing their extent, duration of flooding and depth, and increasing salinity. From February 2008 to February 2009 we carried a total of 1718 waterbird point-counts at 80 localities in Southwestern Spain. Covering a whole range of types from tidal to freshwater and from permanent to seasonal. We fitted statistical models (GAM & BRT) to presence-absence data of 69 species of birds using as predictors environmental variables measured on site at the time of the count and wetland characteristics measured on a GIS. We generated several climate-change scenarios for our localities assuming changes in extent, hydroperiod, depth and salinity, and predicted new probabilities of presence for each species. Comparing the mean probability of presence in each climate-change scenario with current probabilities we predict which species will be more affected by habitat reduction in Southwestern Europe.

22.4 Butsic, V.A.*; Radeloff, V.C.; Pidgeon, A; Kummerle, T; UW-Madison , UW-Madison; *butsic@wisc.edu*

A theoretical model of the effect of land use intensity and extent on species richness and economic production

Land use change - both changing land use intensity and extent - has profound effects on the earth's capacity to preserve species. At the same time, land use change drives economic production for an increasingly populated world. The question is how to best manage landscapes for both species and economic output. We combine general models of species richness (species area curves) and of economic output (Cobb-Douglas production function) to model the effect of changing land use intensity and extent on species richness and economic production. Ultimately, we solve for the landscape that provides maximum amount of economic output, given a target level of species richness. Our results suggest that the underlying assumptions about the relationship between species richness and land use intensity and extent matter greatly. Depending on the functional form of the model, optimal land use is either intense with a small extent, or diffuse with a large extent. Regardless of the model, species richness responded to changing land use intensity and extent with threshold dynamics. This suggests that optimal land management may be a risky strategy if models are not well parameterized, or if unforeseen events occur.

23.5 C. Ronnie Drever*; Mark C. Drever; Daniel Fortin; Cheryl Ann Johnson; Yolanda F. Wiersma; The Nature Conservancy, Centre for Applied Conservation Research, Department of Forest Sciences, University of British Columbia, DÃ©partement de biologie, UniversitÃ© Laval, Environment Canada, Landscape Science and Technology, Department of Biology, Memorial University; *cdrever@tnc.org*

Conservation by coincidence: Woodland caribou, surrogacy and biodiversity in the boreal forest of Canada

Woodland caribou is an at-risk species often portrayed as emblematic of functional boreal wilderness, partly because its principal threats include habitat loss and increased predation facilitated by extensive industrial activity. Since large protected areas are frequently proposed to maintain its persistence, caribou's emblematic status may have functional value for conservation of other species. We estimate the surrogacy value of the boreal population of woodland caribou by (i) evaluating co-occurrence of native taxa with caribou distribution for mammals (n=101), birds (n=338), at-risk mammals (n=7) and at-risk birds (n=28); and (ii) conducting systematic conservation planning to identify representative reserve networks, comprised of planning units deemed large enough (10,000 km2) to enable persistence, both at the extent of woodland caribou range and the entire boreal forest. Our analyses indicate strong anisotropy in the surrogacy of woodland caribou for overall mammal and bird diversity partly due to the pronounced latitudinal gradient in richness. Surrogacy values for at-risk species did not follow expected latitudinal patterns, suggesting priority areas for biodiversity conservation need to carefully consider a range of patterns, and not overall richness gradients. This information can help prioritize caribou management and planning in areas of high surrogacy for other taxa of conservation importance.

P1.90 C. Takahata*; S. Izumiyama; Shinshu University; *takahatacat@nifty.com*

A prediction of high-risk areas for Asian black bears mortality caused by conflicts with humans in historically modified landscape in Japan.

Spatial approach to address a major agency in human-wildlife conflicts has potential to lead a long-term conservation to maintain local populations. Asian black bears Ursus thibetanus japonicus are under serious threats having high mortality caused by a rapid increased conflict with local communities in Japan. Due to limited studies in bear-habitat relationships, the main causes and mechanisms of surging conflicts are not enough understood, and as a result, ad hoc conflict mitigations have been implemented based on only human needs. We focused on a food scarce season for bears and areas enormous conflicts occurred, and investigated characteristics of habitat use by bears in a modified landscape using resource selection functions (RSF). The result showed bears used marginal areas of their habitat disproportionally such as forest edges, riparian forests and some crops currently unmanaged and much closed to human settlement. It indicates that bears become susceptive to meet conflicts with people in those landscapes. The probable habitat-use distribution map estimated by RSF represented that unmanaged and abundant forestry or agriculture lands are the main predictors for habitat use of black bears. Further, we could identify some aggregated used areas that would have a high-risk for bear survival in the season. These results provide fundamental information to conduct more effective mitigations in human-bear conflicts based on more reliable estimation, and to contribute to conservation planning including landscape management, while lethal control is still the major implementation in wildlife management in many parts of Japan.

SY13 Cabeza, Mar*; Eklund, Johanna; MNCN-CSIC, Spain, Dept Biosciences, University of Helsinki, Finland; *mcabeza@mncn.csic.es*

Governance Factors in the Identification of Global Conservation Priorities for Mammals

Global conservation priorities have often been identified based on combinations of species richness and threat (e.g. Biodiversity hotspots). With the development of the field of systematic conservation planning more attention has been given to conservation costs. This leads to prioritizing developing countries, where costs are generally low and biological diversity is high. But many of these countries have poor governance, which compromises conservation success. Poor governance has negative effects on conservation outcomes, either by resulting in ineffective conservation or by resulting in larger costs than initially expected. Mammals are a group especially susceptible to threats that are linked to illegal actions, such as poaching. We explore how the consideration of governance indicators affects global conservation priorities for the worldÂ´s mammals in a complementarity-based conservation planning approach. We use data on Control of Corruption (Worldwide Governance Indicators project) as the main indicator of good governance, and GDP per capita as an indicator of cost differences between nations. We show that, while there is some variation in the countries of choice, poor governance seems to have little influence on which countries are main conservation priorities. Only when poor governance results in much higher management costs, conservation budgets are more effectively allocated to countries with better governance. Overall, the analysis supports the concentration of conservation efforts in most of the generally considered priority nations, but highlights the loss of conservation benefits through poor governance.

P1.168 Caners, RT*; Macdonald, SE; Belland, RJ; Department of Renewable Resources, University of Alberta, Department of Renewable Resources / Devonian Botanic Garden, University of Alberta; *rcaners@ualberta.ca*

Biological traits of boreal bryophytes reveal the species most susceptible to habitat change after partial forest harvest

Mosses and liverworts (bryophytes) contribute to the plant diversity and function of boreal forests but are susceptible to changes in habitat conditions after forest harvesting. We examined how different levels of partial harvesting affected the persistence of species with differing traits. Bryophytes were intensively sampled in 24 forest stands (each 10 ha) five to six years after application of 10, 50, and 75% dispersed green-tree retention harvesting (unharvested stands as controls), in forests with contrasting abundances of broadleaf and coniferous canopy trees. Both retention level and forest type affected the composition and diversity of bryophytes, with the strongest predictor of bryophyte response being forest moisture. Liverworts and bryophyte species that preferentially colonize decayed wood and tree bark were more negatively affected than mosses and species with other habitat preferences. Species with infrequent sporophyte production, larger spores, dioicous sexuality, and which require greater moisture and shade were less abundant in the lower retention treatments and may also have more limited capacities to reestablish after harvesting. Assessment of bryophyte traits provides novel insight into the species most susceptible to changes in habitat conditions after partial harvesting, and helps to identify species that require careful consideration of alternative management practices for their conservation.

SY73 Cannings, RJ; Bird Studies Canada; *dickcannings@shaw.ca*

Status of the Western Interior Basin

The Western Interior Basin of southcentral British Columbia represents the northernmost extension of the arid sage-steppe and grassland ecosystems of western North America. Numerous microclimates related to the rolling topography and deep valleys support a high proportion of the listed Species at Risk in Canada as well as BC-listed species, despite the tiny size of this ecozone within Canada. Habitats in this ecozone are threatened by rapid growth of the human population, a century of fire suppression that has turned park-like woodlands into dense forests, current severe mountain pine beetle outbreaks in upland forests, and conversion of grasslands to vineyards, orchards, and urban zones. Rivers and lakes are affected by channelization, dams, and water withdrawal for agricultural and other human uses. Likely future threats include the over-all lack of protected areas within the region, predicted large effects of climate change, and continued human population growth.

SY67 Cantrill, James; Northern Michigan University; *jcantril@nmu.edu*

Amplifiers on the Commons: The Role of a Sense of Self-in-Place and Community-Based Sustainability Initiatives to Promote Conservation Biology

As with other regional and local planning regimes, such as adaptive management plans, community-based sustainability initiatives (CBSIs) are required to deal with complex and intertwining systems of social and ecological organization. In an effort to conserve threatened biological resources, successful efforts to foster CBSIs must take into account the ways in which citizen's individual and community-based beliefs regarding who they are in relation to where they live-or their sense of self-in-place-influence the role community dialogue plays in amplifying the risks and opportunities attending species protection. This paper reviews various ways in which a sense of self in place can be applied in the context of landscape-scale planning to conserve biological resources and promote sustainability in general. Analysis at spatial and temporal scales of community engagement in the development of CBSIs is then summarized in a suite of principles for incorporating the sense of self-in-place into opportunities occasioned by the sustainability imperative as it relates to conservation biology.

P1.137 Carleton, Alexa; Washington State University Vancouver; *alexacar@wsu.edu*
A future for Fender's: restoring habitat for the endangered prairie butterfly, Icaricia icarioides fenderi
Development, agriculture, and invasive species have claimed over 99.5% of the Willamette Valley's prairie landscape. One alarming consequence is the decline of the endangered Fender's blue butterfly (Icaricia icarioides fenderi) and its threatened host plant, Kincaid\'s lupine (Lupinus sulphureus kincaidii). This study evaluates the effectiveness of three restoration projects, initiated adjacent to existing habitat in 2001, 2005, and 2007, in assisting the recovery of a Fender's blue population in Eugene, OR. In 2009, I assessed vegetation, butterfly, and egg distribution in native and restored habitat. The oldest restoration area (2001) provided less native nectar (22.6 mg/m2) than the more recent restoration areas (37.6 for 2005 and as much as 317.2 for 2007). However, it was visited by more butterflies: 0.018 individuals/m2 compared to 0.003 (2005) and 0.001 (2007). Comparable trends were seen for a variety of indices, including lupine density, egg density, and butterfly fecundity, such that older restorations had greater habitat value for Fender's blue. As restoration areas mature, they will play a key role in Fender's blue recovery. Results suggest that habitat quality improves with restoration age and that assessing a restoration's impact requires long-term monitoring, at least 6-10 years. Given the rate of decline of Lepidopteran species, there is an urgent need to pursue restoration strategies that directly impact resource availability and in turn butterfly fecundity.

P1.8 Carolina Franco Espinosa*; Javier HernÃ¡ndez FernÃ¡ndez; Department of Molecular Biology and Genetics, Universidad Jorge Tadeo Lozano; *javier.hernandez@utadeo.edu.co*
PHYLOGEOGRAPHY OF THE LOGGERHEAD TURTLE Caretta caretta (TESTUDINES: CHELONIIDAE): FIRST CASE OF STUDY FOR THE COLOMBIAN CARIBBEAN
Genetic markers are useful for determining how sea turtles rookeries are related; this information is especially relevant when management concerns include anthropogenic mortality of feeding and nesting aggregations. Considering the lacking of information for the Colombian Caribbean we performed a preliminary phylogeographic analysis including some the rookeries of loggerhead turtles worldwide reported in GenBank, and new information of individuals surveyed in two nesting beaches of Colombia. Eight blood samples from cervical sinus were extracted and amplified for PCR and directly sequenced in order to perform an editing, alignment and phylogenetic analysis using Maximum Parsimony and Maximum-Likelihood. Two existing haplotypes were identified in this assesment: CCA1 and CCA2 reported for major nesting aggregations of South Florida (E.U), also a new haplotype was recognize showing 7 deletions (SNP) named as CCH1SM. Three main clusters for populations of C. caretta worldwide were hypothesize as clades A ,B and C, grouping rookeries and feeding populations from the Caribbean (Florida-U.S, Mexico, Brazil, Colombia) and Mediterranean. Clade C grouping the 4 major rookeries in the Pacific (Australia and Japan), showing an evident separation of the linages due to oceanographic and geographic barriers. An effort should be made to get samples from smaller, unsurveyed beaches, particularly in Colombia, in order to detect rare haplotypes.

P2.152 Carretero-PinzÃ³n, X; AsociaciÃ³n Colombiana de PimatologÃ–a; *xcarretero@gmail.com*
Primate density in fragments of gallery forest at Colombian Llanos
Habitat fragmentation is one of the main threats for primates in neotropical countries. Forest areas are highly reduced by colonization fronts due to an expansion of palm oil crops in some areas as Colombian Llanos. A six-year study of primate density monitoring was made in four gallery forest fragments of different sizes in San MartÃ–n area (Colombian Llanos). Direct counts and group recognition of five species of primates present at these fragments were made: Alouatta seniculus, Cebus apella, Callicebus ornatus, Saimiri sciureus albigena and Aotus brumbacki. Average densities found for Alouatta seniculus range 81,90 - 23,37 ind/ km2; Cebus apella range 53,33 - 26,92 ind/ km2; Callicebus ornatus range 57,94 - 7,61 ind/ km2; Saimiri sciureus albigena range 167,62 - 7,69 ind/ km2; Aotus brumbacki range 15,24 - 4,35 ind/ km2. Densities reported here are higher than that reported in other studies of C. apella, C. ornatus, A. brumbacki and S.s.albigena; except for A. seniculus which is between normal ranges of densities reported. Variations in densities between fragments are due to difference in primate community composition, vegetation and fragment size. All primates species present at this area used fence rows to cross between fragments. Connection between fragments and an education program are necessary at this area in order to improve sustainability of this primate community.

SY12 Carroll, C; KCCR; *carlos@klamathconservation.org*
SCB's evaluation of the federal delisting of the gray wolf in the U.S. Rockies: Can controversy advance dialogue among scientists and policymakers?
Debate over management of endangered species is frequently contentious, both among the public at large and within scientific societies. In 2007 and 2009, SCB's North America Section submitted comments critiquing aspects of delisting proposals for the US Northern Rocky Mountains gray wolf. These statements subsequently received support and criticism from prominent scientists both within and outside SCB. Similar controversy occurred in response to policy positions on this issue by the American Society of Mammalogists. Scientific societies face several challenges in their efforts to bring science to bear in policy debates concerning endangered species management. They must work to develop strategic partnerships with agencies yet maintain the ability to offer independent critiques of problematic policies. They must meet rapid comment deadlines yet encourage input from a broad spectrum of their membership. They must maintain rigorous peer review of policy positions by relevant species experts yet maintain consistent criteria across taxa. Permanent committees such as the new SCB policy task forces may help increase the inclusiveness and rigor of policy statements while maintaining SCB's ability for rapid response to emerging issues, and help SCB balance its collaborative and critical roles in order to fulfill an unique niche in advancing science-based conservation policies.

SY72 Carroll, C.; KCCR; *carlos@klamathconservation.org*

Designing landscape networks to enhance species persistence in dynamic systems

Early conservation planning addressed biodiversity pattern while implicitly ignoring landscape dynamics. This assumption becomes more untenable as anthropogenic climate change alters ecosystems. However, land designations such as reserves, when designed with an awareness of landscape dynamics, can retain an important role in conserving species. Several methods for "climate-change" aware landscape design have been recently developed. Ecoregional plans in British Columbia and eastern North America have prioritized areas based on patterns of heterogeneity in topography, soils, and climate, in order to maximize retention of variability in habitat types despite changing climate. Alternative methods, which have been applied to conservation of Proteaceae in the Cape Province of South Africa and old-growth-associated taxa in the US Pacific Northwest, involve development of species-specific climatic niche models in order to identify refugia and "climate corridors", where habitat for each species will be persistent or contiguous across time. New tools that use circuit theory to map linkage habitat for wide-ranging species may also enhance prospects for these species to persist as their range shifts. The effects of climate change emphasize the need for "thinking big" to ensure persistence of not only charismatic area-dependent focal species such as large carnivores, but also narrowly-distributed endemics whose persistence may depend on protection of refugia and climate corridors.

P2.214 Castilla, G*; McDermid, G; University of Calgary; *gcastill@ucalgary.ca*

Continuous Fields of Vegetation Characteristics for Species Distribution Modeling: An Alternative to Predictors Based on Landcover Categories

Most species distribution models include one or more predictor variables related to vegetation. Those predictors are customarily extracted from landcover maps derived from remote sensing, and thus are based on categories (e.g., proportion of pixels belonging to the class 'forest' within a circle of diameter x centered at the count station). In this talk we present some pitfalls to using this kind of predictors, and introduce an alternative approach based on continuous fields of vegetation characteristics, wherein a series of key vegetation variables are mapped as scalar fields that vary continuously across space and through time. For example, instead of using arbitrary thresholds in tree cover to separate 'forest' from 'non forest' and 'deciduous forest' from 'evergreen forest', two continuous fields could be employed: 'tree cover fraction' and 'evergreen to deciduous ratio'. This approach yields a more proximal and parsimonious set of predictors (the conventional approach requires a separate variable for each landcover type); preserves more of the fine-grained information contained in the input data (i.e., satellite images) that otherwise is lost amidst discrete patches of homogenous cover; and is more versatile (the same predictors can be used for very different response variables, thus facilitating the simultaneous analysis of multiple species). We illustrate the new approach with a grizzly bear habitat mapping project in Alberta.

P1.162 Castillo-Ayala, C*; Palacios, E; Conservation International Colombia; *cicastil@ualberta.ca*

New notes on the biology of the Mottled-face Tamarin in the Colombian Amazon

Saguinus inustus (Schwartz, 1951) is a poorly studied Neotropical primate which is known for its adaptability to slightly disturbed habitats. This species is frequently found in areas of secondary forest around indigenous settlements and consequently is commonly used as a pet. Due to the increasing human population and the expansion of areas for swidden agriculture within its distribution range, there is a need to understand how these habitat changes are affecting the mottled-faced tamarin populations. To contribute to the knowledge of the biology and population status of this species, behavioral observations of a group of S. inustus and censuses by the line transect method were carried out to estimate the density of S. inustus around two native settlements located in the Colombian Amazon. Results showed that this species used differently proportions of primary and secondary forests suggesting that this use depends on habitat preferences and resource offer patterns. This is the first density estimation of the mottled-face tamarin and with the new observations presented here this is a starting point for the understanding of the ecology of the species in order to formulate appropriate conservation strategies in areas with high levels of habitat transformation.

SY26 Catry, I; Franco, AMA*; Sutherland, WJ; University of Cambridge, UK, University of East Anglia, UK; *a.franco@uea.ac.uk*

DETERMINING THE EFFECTIVENESS OF CONSERVATION MEASURES: A CASE STUDY WITH LESSER KESTRELS (Falco naumanni)

Identifying the effectiveness and constraints of conservation interventions is crucial to maximize conservation success in a changing planet threatened by human activities. Dramatic declines (c.95%) in lesser kestrel populations led to its classification as a globally threatened species and the start of conservation actions across its European breeding range. Lack of nest-sites was identified as one of the main causes of population decline in Portugal. Consequently, a large conservation programme providing different types of artificial nest-sites was implemented alongside a monitoring scheme to evaluate their effectiveness and cost-benefit. In 10 years, the lesser kestrel population increased from 155-158 to 527-552 pairs, 50% currently breeding in artificial nests. Provisioning of artificial nests increased colony size, reduced predation rate and interspecific competition, resulting in overall increased breeding success and population size. However, in 2008, unusual high temperatures registered during the chick rearing period caused high chick mortality and severe weight loss in broods from wooden nest boxes. Other types of artificial nests provided (e.g. cavities in walls or clay pot nests) performed better. These high temperature mortality events stressed the importance of monitoring conservation interventions. The future of lesser kestrels is highly dependent on artificial nests, so these should be cost-effective and designed to account for potential high temperature events during the breeding season.

SY45 CEBALLOS, G; Universidad Nacional Autonoma de Mexico;
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Patterns and processes underlying global distribution of endangered mammal species and populations

Research on population and species extinctions shows an accelerating decay of contemporary biodiversity. This pressing environmental problem is likely to become even worse in coming decades. While impacts of human activities are global in scope, they are not uniformly distributed. The biota of certain countries and regions can be identified as being most at risk, having both exceptionally high richness and endemism, and exceptionally rapid rates of anthropogenic change. Here I evaluate the global distribution patterns of mammal population and species losses, and analyse possible causal processes underlying those patterns. I specifically describe and contrast global patterns of distributions at different taxonomic levels; evaluate the variation in overall species richness explained by higher - taxa richness, constituent taxa species richness, and environmental predictors; and explain the implications of the results for conservation.

P1.125 Celentano, D*; Zahawi, RA; Finegan, B; Ostertag, R; Cole, RJ; Holl, KD; Tropical Agricultural Center for Research and Higher Education (CATIE), Organization for Tropical Studies (OTS), University of Hawaii in Hilo, University of California in Santa Cruz;
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Effects of different tropical forest restoration strategies on litterfall dynamics in southern Costa Rica

Restoration strategies to facilitate tropical forest recovery may accelerate the reestablishment of nutrient cycling. We evaluated litterfall dynamics under four treatments: plantation (entire area planted), islands (planting in six patches of three sizes), control (natural regeneration), and young secondary forest (7 to 9 yrs). Treatments (plots of 50 Ã 50 m) were established in June 2004 at six replicate sites in Costa Rica. Planted species included two hardwoods (Terminalia amazonia and Vochysia guatemalensis) intercropped with two nitrogen-fixing (Inga edulis and Erythrina poeppigiana). Litter production recovered quickly under the two tropical restorations strategies studied as compared to areas under natural regeneration with same age. Litter production in the plantation plots was similar to young secondary forest. However, litter quality (measured by nutrient concentration and C to nutrient ratios) is greater in natural systems due to higher plant diversity, and it can influence forest restoration in the future. The dominance of litter from few species is not desirable for restoration practice once it determines nutrient availability and can negatively affect successional pathways. Accordingly, restoration strategies with more heterogeneous planting design as the islands may promote a faster increase in plant diversity and litter quality, and then accelerate the reestablishment of nutrient cycling.

P1.54 CerÃ–aco, L.; CEHFCi - University of Ã vora; *luisceriaco@netcabo.pt*

Men And Herpetofauna: Fear, Misperceptions And Persecution

The way that human beings perceives the biodiversity has important implications for conservation efforts. Reptiles and amphibians are some of the more negatively valued animals by people due to misperceptions, aesthetic arguments and the presence of myths and superstitions. Our research demonstrates how a negative perception of specific taxa can lead to persecution and little support for the conservation of these animals. Data from a questionnaire administered to 514 people in the district of Ã vora, Portugal, supported the hypothesis that the existence of misperceptions and negativistic values contributed to the phenomena of human persecution on these animals. In general, reptiles were more persecuted than amphibians, mainly due to fear and misperceptions. A pilot environmental education project held during the investigation indicated that a structured and widely applied program of environmental education can improve understanding and the human relationships with these animals

SP5.12 Cesar Cantu *; Patricia Koleff; AdrÃ©s Lira-Noriega; Michael Scott; Forestry College, UANL, CONABIO, University of Kansas, University of Idaho;
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Assessment of Conservation Indicators for Mexican Terrestrial Ecoregions

The 96 recognized terrestrial ecoregions in Mexico have been recently characterized and prioritized. We assessed them using a detrended canonical correspondence analysis to define relationships between ecoregions and environmental variables, based on widely used biodiversity measures, such as species richness, species endemism, threatened species, among others) combined with indicators of threat (habitat fragmentation, human population, social marginalization, density of roads) as well as conservation management response (number and coverage of protected areas, RAMSAR sites, MAB sites and world heritage sites). We identified ecoregions highly related to threat and management variables. Ecoregion of Sierra Madre del Sur 13.5.2.1: Sierras con bosques de conÃ–feras, encinos y mixtos de Guerrero y Oaxaca showed, as ecoregions of northern Mexico, to be affected by Mean Frecuency of Heath Points 1999-2006, and by Percentage of Secondary Vegetation Types. Outstanding ecoregions were 13.5.2.1 Sierras con bosques de conÃ–feras, encinos y mixtos de Guerrero y Oaxaca; 15.1.2.4 Selva alta perennifolia de la vertiente del Golfo de la Sierra Madre del Sur with 45 and 43 threatened plant species species, respectively. Given the short-term unsolvable lack of knowledge about a mega diverse country such as Mexico, using ecoregions as a surrogate for conservation assessment is a valuable tool in providing a broad viewpoint from which to make more informed decisions concerning biological conservation.

P2.184 Chai, S; University of Cambridge; *slcc2@cam.ac.uk*

On Losing the Best Parts of Protected Areas in Tropical Mountains

Emerging patterns in the placement of protected areas (PAs) towards higher elevations and steeper slopes have been recognized, along with the increasing isolation of PAs due to deforestation outside PAs. There is however an elevation bias inside PAs which has been ignored as a wide scale pattern evident across the tropics, where the accessible lowland portions of PAs have higher deforestation rates than the largely inaccessible high elevation zones. Due to the geometry of mountains, most montane PAs have a significant portion of lowland forest, which has greater species diversity and more threatened species than high altitude forest. We compared the extent of forested and fragmented areas between lowland (1000 m asl) of the Blue and John Crow Mountains National Park in Jamaica, and found that in 2008, inside the montane zone, only 4 % of forest was cleared with minimal fragmentation. In contrast, in the lowlands, 28 % of forest was cleared and the density of fragments was eleven fold higher. These findings reflect an important pattern in tropical forest PAs on mountains worldwide, and we identify a â PA hotspot zone' which lies between the PA boundary and the core high altitude zone, and which should be instituted in IUCN categories I and II PAs. The measurement of PA effectiveness within this hotspot zone will allow legal protection to be truly assessed, preventing PAs from gaining credibility due to large inaccessible high altitude areas.

SP8.8 Chan; University of British Columbia; *kaichan@ires.ubc.ca*

A New Ethical Foundation for Conservation?

Central to biological conservation are ethical values, and yet most non-human organisms are considered to lack moral standing in all commonly accepted ethical theories. Thus arises an awkward tension: the only logic by which conservationists are comfortable promoting and justifying conservation is that of instrumental values (species X is useful for service A) and personal values ("I care deeply about intact ecosystems"). This situation threatens to expose conservation to the vagaries of markets and to relegate conservationists to special-interest status. The possibility that the same arguments that commonly give moral standing to people might apply to all non-human beings (albeit unequally) has received little attention. In this talk, I demonstrate how such "ethical extension" arguments can be extended to all non-human beings, based on recognition of uncertainty regarding the mental capability. Rather than "drawing the line" of moral standing conservatively or liberally (excluding or treating as equals many species, respectively), I argue that we ought to incorporate the uncertainty of moral standing into the strength of our moral responsibilities. From uncertainty rises certainty: we have duties to non-human organisms, although they may often be minor. This modification of extensionist ethics provides foundation for an environmental ethic that parallels interpersonal and animal welfare ethics, and it suggests that we owe much greater concern to â lower' organisms than they are typically given.

SY23 Chan, KMA*; Klain, S; Tam, JY; Satterfield, TA; The University of British Columbia; *kaichan@ires.ubc.ca*

Marine planning for ecosystem services and cultural values: a proposed framework

Marine spatial planning (MSP) has the potential to balance and promote synergies between ecological, social and economic objectives. This requires incorporating ecological understanding in planning contexts, which are often virtual minefields of contesting interests, values and knowledge types (i.e., scientific, traditional, and local). Using case studies, we evaluate the extent to which MSP tools and decision making processes are ecosystem-based, integrated, place-based, adaptive, strategic (focused on long-term goals) and participatory. We found that tools and frameworks are increasingly incorporating ecosystem-service understanding, but stakeholder engagement, consultation and deliberation are often lacking a systematic method to facilitate the expression of a wider range of non-monetary values. No prevailing tool or analytical product acts as an adequate substitute for stakeholder engagement, and no tool or process without deliberation can account for all significant values in environmental decision contexts; accordingly, none can satisfactorily resolve value judgments and tradeoffs. We make recommendations for the design and employment of decision processes alongside tools and frameworks to integrate science and citizenship to help safeguard and rebuild ecosystems and livelihoods.

17.1 Chan, Y-C*; Roos, C; Inoue-Murayama, M.; Inoue, E; Shih, C-C; Pei, KJ-C; Vigilant, L; Max-Planck Institute for Evolutionary Anthropology, Leipzig, Germany, German Primate Center, GÃ¶ttingen, Germany, Wildlife Research Center, Kyoto University, Kyoto, Japan, Graduate School of Science, Kyoto University, Kyoto, Japan, Taipei Zoo, Taipei, Taiwan, Pingtung Rescue Center of Endangered Wild Animals, National Pingtung University ; *yichiao_chan@eva.mpg.de*

Whole genome amplification and high-throughput sequencing enable large-scale studies using limited DNAs: an example in gibbons

DNA sequence data are powerful tools for understanding taxonomy, phylogeny and population history of endangered taxa. Because it may be difficult to obtain DNA-containing materials from wild individuals, the DNA samples preserved in institutes and zoos are very valuable, but even these samples are finite resources. We conducted a study of gibbon phylogenetics that exemplifies how to minimize the usage of original DNA samples and meanwhile generate large amounts of sequence data by combining whole genome amplification (WGA) and high-throughput sequencing. For each sample we used 10 ng of genomic DNA, which is approximately the DNA amount contained in 15 kb of sequence from the mitochondrial genome for each individual. This large dataset provided greater resolution than previous studies of short mtDNA segments (e.g. control region or cytochrome b) and showed with strong support values the basal position of genus Nomascus in gibbon phylogeny and the phylogenetic relationships of Hylobates species. Our study highlights that large amounts of DNA are not needed for the generation of large amounts of sequence data and suggests the routine use of WGAs on limited DNA materials from endangered animals. WGA products will be beneficial for DNA sample management and exchange among researchers.

SP10.11 Chatterjee, A.*; Bhowmick, A.; South Asian Forum for Environment; *amritasafe@gmail.com*

Conservation of Endemic Fish Species: An Agro-environmental Innovation for Restoration of East Kolkata Wetlands

Studies on sustainable development paradigm in East Kolkata Wetlands (EKW) by spreading fiscal risk with alternative economic opportunity and agro-environmental innovations are discussed in this paper. The conservation effort includes developing germplasm bank for endemic fishes of EKW and establishing a seed production unit for them. It conjoins poverty alleviation with environmental conservation of EKW, threatened by habitat loss, urban encroachment and waste escalation. Objective to conserve the unique fish biodiversity of EKW comprising 52 endemic species of fishes of which nearly 23% are reportedly vanishing fast, was achieved in 18 months. It is based on â community-ecosystem approach' of participation and partnership for betterment of livelihood and ecological conservation for rural development. The project show commercial cultivation and germplasm conservation of few indigenous fishes of East Kolkata wetlands that are in the verge of getting ecologically threatened. Initially few self recruiting species were tried out like Puntius sophore, Cirrhinus mrigala, Labeo bata, Mystus gulio, Colisa fasciatus, Odontumblyopus rubicundus, and Labeo calbasu that survived the transmigration to waste waters. The native fishes were collected in oxygen packing from rural Bengal and stocked in harvested rainwater and further naturally acclimatize them in sewerage fed wetlands so as to develop the germplasm bank.

P2.20 Chavez, Virginia*; Macdonald, Ellen; Department of Renewable Resources, University of Alberta; *vchavez@ualberta.ca*

The importance of mixed canopies for understory diversity conservation

The southern portions of the boreal forest region across Eurasia and Canada are dominated by mixedwood forests including a mixture of canopy patch types dominated by varying mixtures of coniferous and broadleaf trees. Understory communities hold most of the boreal vegetation diversity in these forests making their assessment important for the conservation of boreal plant diversity. We assessed the composition patterns and the hierarchical organization of understory diversity in mature boreal mixedwood forests of western Canada in relation to canopy patch types (conifer, broadleaf, mixed, gaps). Understory diversity (richness & Shannon' H\\\') was additively partitioned in relation to the four canopy patches across a hierarchy of four scales; Î±-individual patch+ Î²1-within canopy patch type +Î²2-among canopy patch type + Î²3-lanscape. Understory composition patterns among patch types resembled a microcosm of the boreal mixedwood landscape as these mirrored patterns observed at the landscape scale among forest stands of differing canopy dominance. Our results suggest that the high understory diversity found in mixedwood stands is partly explained by fine scale variation among the four canopy patch types. Management practices that focus on maintaining an intermix of small patches of varying canopy composition will help to retain the natural hierarchies of vegetation patches. This, in turn, will help to conserve the natural patterns of vegetation composition and diversity of boreal mixedwood forests.

P1.188 Chebib, J*; Bernatchez, L; Rogers, SM; University of Calgary, UniversitÃ© Laval; *jmchebib@ucalgary.ca*

UNDERSTANDING THE EVOLUTIONARY MECHANISMS UNDERLYING FISHERIES INDUCED SELECTION IN NORTHERN ALBERTAN LAKE WHITEFISH (Coregonus clupeaformis)

Inclusion of evolutionary genetic considerations in fisheries management is increasingly considered to be a key component in the recovery of a sustainable fishery. Lake whitefish (Coregonus clupeaformis) are the most important commercial freshwater fish in Canada with the Albertan roe fishery worth over a million dollars annually. Sizes of lake whitefish harvested from Lesser Slave Lake, Alberta, have decreased since commercial fishing on the species began over 100 years ago. The evolutionary agent of selection for this decrease is hypothesized to be gill nets selecting for slower growing fish that mature earlier. However, nothing is known about the genetic population structure or the changes in genes underlying adaptive trait variation in Lesser Slave Lake, rendering evolutionary considerations of recovery plans difficult. Our research will use population genomics to test the null hypothesis that lake whitefish in Lesser Slave Lake comprise a single population. Second, using DNA from historical scale samples, we will measure changes in genetic variation over time at single nucleotide polymorphisms (SNPs) associated with adaptive genes affecting growth rate, behaviour and reproduction. Overall, this historical DNA record will increase our understanding of the evolutionary mechanisms underlying fisheries induced selection in the lake whitefish of Lesser Slave Lake.

P2.183 Cheraghi, M*; Lorestani, B; Khorasani, N; Islamic Azad University- Hamedan Branch, Hamedan, Iran, Department of Environmental Science, College of Natural Resources, University of Tehran, Tehran, Iran; *cheraghi_md@yahoo.com*

The Conformity of Wildlife Refuge of Kiamaki In Iran With IUCN Categorization System

Iran is a country with an extensive territory of rare and diverse nature. The Environmental Conservation Organization of Iran has managed to control and safeguard the diversity of its own ecosystems as well as the heredity of its botanical and animal resources by protecting samples of the richest natural regions in a system comprised of national parks, natural monuments, wildlife refuges and protected areas. The categories of Iranian national park and natural monument conform to categories II and III of the IUCN international categorization system respectively and Iranian protected areas conform to IUCN categories IV and VI. Indeed, the true status of the wildlife refuge in Iran may conform to IUCN category VI (Natural monument) rather than category IV when compared with the IUCN category system. We selected the wildlife refuge of Kiamaki as a case study. As soon as the ecological and socio-economical resources which led to the provision of the resources base map (scale: 1.50000) were identified the mapping and zoning processes founded on an analytical system resulted in the understanding of the environmental unit. At the final stage, the zoning model was ascertained. Accordingly, the wildlife refuge of Kiamaki matches the IUCN category IV very well because it contains the protected zone, recovery zone, buffer zone, extensive use zone, special utility and the zone of the other uses. For better management of this region, we suggest managing Kiamaki within the guidelines of the IUCN category IV. Key words: Protected Areas, Zoning, wildlife refuge of Kiamaki, IUCN and Systematic Analysis

SY53 Cherney, DN; University of Colorado at Boulder; *david.cherney@colorado.edu*
Applying Integrative Problem Solving to Critical Habitat Policy
Integrative problem solving (policy sciences) is a proven method to advance the goals of conservation science, policy, and law through identifying key insights across different substantive disciplines. Policy Sciences has a long running track-record of successfully improving conservation policies in a wide range of conservation biology case studies, ranging from endangered species recovery in the Canada and the United States to national park management in developing countries. The methodology focuses on improving decision making through securing a process where empirical knowledge is integrated with disparate human values in pursuit of common interests. The author analyzes the Critical Habitat Symposium's case material using the policy sciences to identify broad policy lessons for improving the implementation of future critical habitat policy in Canada and the United States. Key insights include developing more contextual problem definitions, meaningful arenas for stakeholder involvement, and clarifying stronger signals of authority and control.

SY51 Chester, C; Brandeis University; *charles.chester@gmail.com*
Climate change and adaptive landscape conservation in the Yellowstone to Yukon region
In the 1990s, a group of conservationists and conservation biologists identified the Yellowstone to Yukon (Y2Y) region as one of the North American continent's best opportunities to conserve large predators and to maintain natural processes at an ecoregional scale. A key argument for working at the scale of Y2Y was the need for genetic connectivity, and consequently the conceptual and practical locus of conservation action was targeted on direct threats to connectivity-most importantly habitat loss and fragmentation, but also hunting of endangered species and invasive species. Although climate change was also an acknowledged threat, it was largely perceived as looming on the horizon. Yet in the course of little more than a decade, a number of indicators have brought climate change to the fore, including increasing average temperatures, declining snow packs, the receding of mountain glaciers, earlier spring thaws, and decreased stream flows. Climate change has in turn brought renewed emphasis on connectivity-but now with a focus on species' capacity to respond to changing environmental conditions by moving across latitudinal, altitudinal, and other gradients. On the assumption that climate change will bring landscape change in an unpredictable manner, conservationists working under the Y2Y aegis are promoting adaptive conservation strategies, while at the same time reinvigorating efforts to protect lands of high connectivity value through traditional conservation approaches.

9.5 Chetkiewicz, C-LB*; Boyce, MS; Wildlife Conservation Society Canada, University of Alberta; *cchetkiewicz@wcs.org*
Conservation corridors for carnivores: integrating pattern and process in the Canadian Rocky Mountains
Corridor designs are typically based on patterns of structural connectedness, neglecting processes of resource selection and movement. We examined three questions fundamental to corridor planning for large carnivores in Canmore and Crowsnest using GPS data from grizzly bears and cougars: (1) where are large carnivores more likely to occur?; (2) what landscape features promote their movements?; and, (3) how do large carnivores move on the landscape? Resource selection functions (RSF) suggested grizzly bears were more likely to occur in areas with high greenness values, a variable associated with bear forage. Cougars were more likely to occur in areas with low road density in Canmore during non-winter and in rugged terrain in Crowsnest throughout the year. Step selection function (SSF) models suggested cougars selected habitat closer to paved roads and forest cover for movement and avoided crossing paved roads during non-winter season. Grizzly bears selected habitats closer to paved roads and shrubs when moving during berry season. Finally, grizzly bears and cougars moved faster near paved roads during the berry and winter seasons, respectively. Conversely, cougars in Canmore and grizzly bears in both landscapes moved slower near forest and shrubs during the winter and berry seasons, respectively. Taken together, our results show how diverse, empirically-based modelling approaches can support corridor identification and design.

SY13 Chiozza, F; Boitani, L*; Santulli, G; Baisero, D; Visconti, P; Di Marco, M; Rondinini, C; Sapienza University of Rome, James Cook University; *federica.chiozza@uniroma1.it*
Global Habitat Suitability Models for Mammal Conservation
Despite mammals being one of the best studied taxa, detailed information on their distributions has often been lacking, thereby hindering efforts for their conservation. We used the information from the 2009 IUCN Red List of Threatened Species, collected through a network of thousands of specialists belonging to more than 30 Specialist Groups, as a baseline for developing habitat suitability models for 5415 out of 5488 known mammal species, based on their habitat relationships. We focused on the following environmental variables: land cover, human impact, elevation, and hydrological features. Models were developed at 300 m resolution and limited to within species' known geographic ranges, to avoid predicting species presence beyond their distribution limits. The models were validated comparing the average suitability score in areas of known occurrence of the species with the average score of sets of random points within the species geographic range. This authoritative, updated and fine-resolution data set can provide a substantial support for the development of mammal conservation strategies.

15.1 Chisholm, RA; Princeton University; *chisholm@princeton.edu*

Trade-offs between ecosystem services: water and carbon in a biodiversity hotspot

Carbon sequestration by afforestation can help mitigate global climate change but may have adverse environmental impacts in some regions. For example, economic incentives for carbon sequestration may encourage the expansion of Pinus radiata timber plantations in the Fynbos biome of South Africa, with negative consequences for water supply and biodiversity. I built a dynamic ecological-economic model to investigate whether afforestation of a Fynbos catchment with Pinus radiata is economically viable when the potential benefits of carbon sequestration and timber production are balanced against the potential losses to water supply and tourism. I found that afforestation of the study catchment is currently economically unviable from the perspective of society. However, afforestation appears attractive to the forestry industry because the industry does not pay the true cost of water used by plantations. I also considered various plausible future scenarios and found that, under different scenarios, afforestation can be associated with either large future economic gains or losses. These results motivate two recommendations. Firstly, streamflow reduction fees currently levied on the South African forestry industry could be raised to represent the true cost of water. Secondly, and more generally, relevant climate legislation should be based on the precautionary principle: afforestation for carbon sequestration should not occur where there is a reasonable chance that it will lead to serious, irreversible environmental damage.

P2.154 Choi, TY*; Yang, BG; National Institute of Environmental Research; *gumiran@korea.kr*

The Suitable Size of Road-Crossing Structures for Mammals of South Korea

Roads are a major cause of habitat fragmentation and cause the declines of some wildlife populations. To resolve this problem, a total of 391 wildlife-crossing structures have been installed in South Korea since 1998. The effectiveness of the structures remains controversy. The objectives of this study were to recommend applicable designs and measurements of wildlife crossing structures by monitoring the existing structures. The study results are as follows: 1. The design and measurements of the structure should be determined according to the scale of the ecological corridor and site topography. Overpasses with 7m width were confirmed by field surveys as the narrowest width used by most mammal species in Korea. Hence, overpasses should be no smaller than 7m in width. 2. Openness Index (OI) of underpasses should be larger than 0.7. Regarding the insufficient crossing structures and safety of drivers, water deer (Hydropotes inermis) should be a target species. 3. Converting the existing passageways to OI 0.7 structures could cause budget burdens. Therefore, converting the existing non-wildlife engineered crossing structures to wildlife crossing structures should be included in projects of existing and future road expansion or improvement.

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Understanding the Dynamics of a Vibrosis Reservoir in Shaping Coastal Conservation Efforts

Coastal vibrosis has increased significantly as noted in the recent epidemics affecting crustaceans along the Pacific Northwest and humans, as cholera, along the South American coast. Initial investigations suggest Vibrio bacteria increased due to rising water temperatures and decreasing salinity, conditions associated with a changing coastal climate. However, Vibrio bacteria have no known reservoir to explain the effects of these environmental conditions-a major gap in our understanding of how this pathogenic family shapes our coasts. Reservoir hypotheses for Vibrio center on chitinous crustaceans as virulence genes encode chitin attachment proteins. To elucidate this Vibrio-chitin connection, we examined the physiological correlation between Artemia salina, a common crustacean found along coasts, and Vibrio-specifically investigating the growth of Artemia and Vibrio populations in the water column. We found there was a significant positive correlation between growth in Artemia, as measured by hatching efficiency of Artemia cysts and survival efficiency of newly-hatched nauplii, and Vibrio concentrations in the water column, under conditions mimicking the rising water temperatures associated with the South American cholera outbreaks. These results suggest warmer water temperatures may increase the chitinous crustacean and Vibrio populations, potentiating vibrosis outbreaks along our coasts and complicating conservation efforts to restore marine ecosystems.

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Potential distribution and niche models performance of Baja California Rattlesnake (Crotalus enyo)

The Baja California rattlesnake, Crotalus enyo, is a medium-sized rattlesnake restricted to the southern two-thirds of the Baja California peninsula. Very little is known about the natural history of this species. The goals of this study were 1) to use a Geographic Information System (GIS) as a useful tool for analyzing, predicting and mapping the habitat of wildlife species and distribution. 2) To compare performance of niche models. 3) To identify geographical areas sub-sampled to be surveyed This study combined collections data of the Crotalus species from museums and independent researchers with spatially explicit environmental covariates to understand C. enyo habitat occurrence in order to predict potential distribution using a Maximum Entropy algorithm. The best performance model was the one constructed with a combination of two kinds of environmental variables (continuous and categorical), applying the "target group" approach, and applying re-sampling for a consensus prediction. Geographical analysis showed that some regions were previously poorly surveyed. That is the case of the central Vizcaino region, remote Magdalena lowlands and the San Felipe desert. The methodology, as applied here, takes advantage of museums and collector's huge presence data sets. The best model constructed shows evidence that C. enyo occupy the majority of phytogeographic regions available in Baja California Peninsula, but appear to be absent from the Pine-Oak forest of Sierra la Laguna, the Baja California Coniferous Forest at Juarez, and San Pedro Martir Sierras. And it has limited distribution in Lower Colorado and Californian regions in Baja California State. C. enyoâ s distribution shows evidence that it occupies mild desert climates, avoiding very dry and hot as well as very cool and moist conditions. This pattern resembles the original climate conditions in which this snake evolved as specie. The origin of this specie is supposed to be at the south of the peninsula with prevalence of more benign climates. This pattern could be a hint of the very origin of this specie, that we assume is at the south of peninsula where more benign climates prevail. The information gathered here is a step forward in the process of understanding this Baja California endemic specie, and could help to guide future research, conservation, and management efforts along its distribution area.

P1.115 Churski, M*; Kuijper, DPJ; Jedrzejewska, B; Mammal Research Institute, Polish Academy of Science; *mchurski@zbs.bialowieza.pl*

Conservation regimes affect forest structure in the BiaÅ owieÅ¼a Primeval Forest, Poland in the 19th-20th centuries

The BiaÅ owieÅ¼a Primeval Forest (BPF) (Poland) is one of the few remnants of pristine European temperate lowland forests, with over a 500-year long conservation history. Historical evidence indicates shifts in the protection regimes which may have caused changes in disturbance, potentially shaping the forest structure. We address the question: How did species composition and size structure of tree populations change in the BPF in relation to shifting conservation regimes? Tree diameters in size classes were collected from forest inventories between years 1889 and 2002 covering the BPF area. Using size distributions we analyzed demographic patterns of 10 dominant tree species (pine, spruce, hornbeam, linden, maple, black alder, poplar, elm, oak, birch) in the main forest types. The change from a dominance of coniferous towards deciduous species was observed. These changes occurred throughout the area irrespective of forest type. At present, pine and spruce have been restricted to one forest type, whereas hornbeam has expanded in all forest types. The observed changes in tree species composition coincided with shifts in conservation regimes. Despite the indirect role humans played during the last 200 years in shaping the BPF structure, the tree species richness has been constant during the study period suggesting that diverse systems are more resilient and may adapt to changes in the environment.

P2.56 Cigliano, John A.*; Dewey, Sarah; Duffey, Christine; Cedar Crest College; *jaciglia@cedarcrest.edu*

Possible Self-Recruitment of Queen Conch (Strombus gigas) in the Sapodilla Cayes Marine Reserve, Belize

Queen conch (Strombus gigas) is heavily exploited throughout the Caribbean. Countries, such as Belize, manage this fishery using both traditional fisheries management strategies and marine protected areas. The purpose of this study is to determine the likelihood of self-recruitment in queen conch populations in the Sapodilla Cayes Marine Reserve (SCMR) in Belize. Understanding larval dispersal patterns and population connectivity is critical for the effective use of spatially-explicit management strategies. Plankton samples were collected during peak reproductive season (2006, 2007, and 2008) over queen conch nursery habitats and the fore-reef of associated reef cuts. Queen conch veligers were measured (total length) and assigned to one of four size classes: 150-450Î¼m (Stage I), 451-650Î¼m (Stage II), 651-950Î¼m (Stage III), and 950-120Î¼m (Stage IV). The presence of early stage veligers over nurseries and a lack of late stage veligers from associated deep-water sites would indicate a local source for veligers. Analysis is continuing but so far all veligers from one nursery (n=29, mean= 484.73Â±13.1Î¼m) and the associated deep-water site (n=3, mean= 323.00Â±91.7Î¼m; sampled in 2006) are either stage I or II. Based on published growth curves, 24% of the veligers were 5 days old or less with the remaining veligers between 6-8 days old. Therefore, it is likely that self-recruitment is a significant source of recruits for queen conch populations in the SCMR.

22.8 Clare, S.; University of Alberta; *sclare@ualberta.ca*

Towards an ecosystem-based wetland compensation policy for Alberta

The premise of compensatory off-set wetland policies is that habitat loss can be mitigated through the creation, restoration, or protection of habitat that is equivalent to that which was lost. Many jurisdictions in North America use compensatory off-set policies as a means for managing wetland losses; however, the primary challenge of successfully implementing these policies is the selection of appropriate compensation sites. Despite a no net loss policy paradigm and a general consensus that replacement of wetland value and function should guide compensation policies, there is limited understanding of how to identify, combine, compare, value, and aggregate the ecological, social, and economic values and functions of wetlands across different spatial and temporal scales. Using data from a series of semi-structured interviews and written surveys with key policy actors in the United States and Canada, the implementation of wetland off-set programs in various jurisdictions is compared to identify which wetland characteristics and/or values are most commonly used by regulators to select compensation sites. Further, the practical and administrative challenges of achieving wetland site equivalency are identified. Preliminary results indicate that the majority of jurisdictions use wetland area and/or wetland type as the primary criteria for evaluating site equivalency, and that land availability is a primary driver in the selection of compensation sites. These results suggest that wetland compensation is currently being considered in very narrow terms, which may result in significant loss of wetland values and functions at various scales, despite existing policy efforts to mitigate these losses.

SY71 Clark, Douglas*; Gailus, Jeff; Gibeau, Mike; School of Environment & Sustainability, University of Saskatchewan, Saskatoon, SK, Canmore, AB, Parks Canada, Mountain National Parks, Lake Louise, AB; *David.Mattson@nau.edu*

Conservation of Alberta's grizzly bears: An Explanatory Hypothesis for a Wicked Problem

Grizzly bears have declined in Alberta to roughly 600-800 animals restricted to the western margins of the province. This decline has continued during recent decades because of low fecundity and recruitment, habitat fragmentation, and unsustainable levels of human-caused mortality. A moratorium on sport hunting and a Recovery Team were enacted by the provincial government in the early 2000s in the midst of public controversy. The Recovery Team was disbanded by the government after adoption of a recovery plan, but without commitment to any recovery actions. Government officials have justified inaction by calling for more science, discounting existing science, not releasing science, or uncritically invoking local knowledge. We hypothesize that current problems arise from the convergence in Alberta of: (1) the prevalence of scientized policy and politicized science; (2) the chronic tendency for political elites to serve wealth elites; (3) the subtle corrupting influences of wealth concentrated in the hands of large corporations in the timber, mining, and petroleum sectors; (4) the long-standing political dominance of those with dominionistic and utilitarian worldviews; (5) the exacerbating effects of a parliamentary system; (6) conformity and high levels of trust in government; and (7) lack of strong conservation policies.

SY41 Clark, J.A.*; Bricklin, R.; Chan, O.; Ross, J.; Farnsworth, A.; Fordham University , Cornell University; *jaclark@fordham.edu*

Tracking Birds Migrating at Night through an Urban-rural Corridor and Quantifying the Effects of Light and Noise Pollution

Many migratory bird species are in serious decline. Understanding how birds assess and use increasingly large, brightly lit, and noisy cities as they travel through urban landscapes and encounter tall buildings, towers, and aircraft is essential to their conservation. However, little is known about how birds evaluate obstacles presented by cities during migration, which generally occurs at night and is confounded by ubiquitous light pollution. We test a novel approach to tracking birds migrating through an urban-rural corridor and quantifying the effects of light and noise pollution on such migration. We recorded nocturnal flight calls at multiple sites along an urban-rural corridor from New York City north and simultaneously collected data on measures of light and noise. Some studies suggest birds are drawn to brightly lit areas and that bird density is artificially increased in cities. Consistent with these studies, we documented more nocturnal flight calls in brighter, noisier locations than in nearby darker, quieter green spaces. These higher calling rates may also reflect increased confusion of birds in noisy urban environments.

P1.55 Clark, Melissa A*; Smith, AM; Gore, ML; Nelson, MP; Lyman Briggs College, Michigan State University, USA, Tourism Research Unit, Monash University, Australia, Department of Fisheries and Wildlife; School of Criminal Justice, Michigan State University, USA, Lyman Briggs College; Department of Fisheries and Wildlife; Department of Philosophy, Michigan State University, USA; *clarkme4@msu.edu*

Should the wolves of Isle Royale be genetically rescued? Factors influencing individual support for intervention.

Isle Royale is a small (544 km2) National Park and designated wilderness area in Northern Lake Superior, USA. The island's inbred population of wolves is suffering from morphological deformities such as asymmetrical vertebrae. Understanding how stakeholders perceive their relationship to, and management for, designated wilderness areas can inform the debate about whether or not the wolves of Isle Royale should be genetically rescued. We used content analysis to characterize posts (n = 147) responding to the question "Do the wolves of Isle Royale need genetic rescue?" This research focused on attributions of responsibility for remedying the current situation and whether or not the poster mentioned previous human activities impacting Isle Royale (e.g. climate change). We detected a positive relationship between posts that mentioned previous human interference and attributed responsibility to humans, r = 0.179, n= 147, p = 0.030. If the ascription of management authority to humans increases, it may detract from the concept of wilderness as a primeval place where nature is responsible for managing itself. Additionally, we cannot assume that this concept of wilderness is held by the posters, who may believe humans are a part of nature. Further research is needed to understand implications for ISRO wolf management and the management of genetically isolated wildlife populations.

P1.151 Clason, A.*; Macdonald, S.E.; Haeussler, S.; University of Alberta, Bulkley Valley Research Centre, University of Alberta, Bulkley Valley Research Centre; *aclason@ualberta.ca*

Ecosystem change under cumulative stress and disturbance: Vulnerability of whitebark pine ecosystems in NW British Columbia

The response of forest communities to multiple disturbances may indicate the resilience of a system to change. Whitebark pine (Pinus albicaulis) is currently listed as a threatened species due to its exposure to ongoing stresses and disturbances. We examined P. albicaulis ecosystems at the northern edge of its range in the Coastal mountains of British Columbia, Canada. Study sites surveyed in the 1970/80's were re-visited in 2007/09 to quantify changes in overstory and understory vegetation over this time period. Trends in two P. albicaulis ecosystem types (â Moderately dry/poor' and â Dry/poor') were compared to a reference (â Fresh/medium') non-whitebark pine ecosystem. Results indicate a shift in the overstory of â Dry/poor' whitebark pine ecosystems towards a composition more similar to â Fresh/medium' ecosystems over time, while the understory did not change. The overstory in â Moderately dry/poor' ecosystems had not changed significantly, but understory composition became more variable over time. P. albicaulis continues to regenerate in both whitebark pine ecosystems, however it constitutes a significantly higher proportion of regeneration in â Dry/poor' ecosystems. The persistence of disturbance agents and stressors targeting P. albicaulis will further decrease its' abundance in the future and continue to threaten these rare ecosystems. Our conclusions indicate that restoration efforts for P. albicaulis in this study area should be focused in â Dry/poor' ecosystems.

SY72 Clevenger, Anthony P; WTI-Montana State University; *apclevenger@gmail.com*

Advances in Road Ecology - Mitigating Continental Bottlenecks: How small-scale mitigation has large scale impacts

Maintaining and restoring landscape connectivity is a central priority for wildlife conservation. Roads represent one of the most extensive causes of habitat fragmentation on the planet today. Over the last decade, transportation and land management agencies have shown a growing interest in mitigating the negative effects of roads and implementing road mitigation schemes in transportation planning. Coincidentally, landscape-scale initiatives are underway to protect wildlife migration corridors and crucial wildlife habitats in the Western United States. Identifying key conflict areas between transportation and ecological networks is critical in conserving connectivity of wide-ranging species. Yet a functioning regional corridor network requires effective measures and landscape permeability where these two networks meet. Measures designed to mitigate barrier effects of roads needs to enable demographic and genetic connectivity to sustain viable populations in problematic transportation corridors. We draw upon examples from local-scale research focused on mitigating transportation corridor effects on animal movement that are being adapted by transportation and land management agencies to guide projects and make them more cost-effective. We discuss an emerging framework for developing practical guidelines to meet transportation standards and performance goals that encompass varying levels of biological organization and ecosystem concerns.

SY76 Cobb, T.; Royal Alberta Museum; *tyler.cobb@gov.ab.ca*
Postfire salvage logging, saproxylic beetles and soil nutrient dynamics in boreal mixedwood forests
In North America, pressure to recoup economic costs of wildfire by salvaging burned timber is increasing, despite insufficient understanding of the ecological consequences of this practice. We examined saproxylic beetle assemblages in recently burned, logged and salvaged boreal mixedwood sites in north-central Alberta, Canada. Species richness was lowest in salvage logged sites and species composition was altered more by salvaging than by either wildfire or harvesting alone. Wood-boring beetles, like the white-spotted sawyer (Cerambycidae: Monochamus scutellatus), were among those species most heavily impacted by salvaging suggesting that this group might be of greatest conservation concern. In addition, results from both field and laboratory experiments indicated a strong link between the white-spotted sawyer and soil nutrient dynamics in burned sites. Taken together, these findings indicate that the combined effects of wildfire and harvesting on the same sites may be synergistic for saproxylic beetles and that these effects may have serious ecological consequences in forests recovering from wildfire.

SP7.13 Coffey, EE*; Froyd, CA; Willis, KJ; University of Oxford, Univeristy of Oxford; University of Bergen; *emily@queuefull.net*
When is an invasive not an invasive? Macrofossil evidence of doubtful native plants species in the GalÃ¡pagos Islands
The GalÃ¡pagos Islands are globally renowned for their ecological value and as a world symbol of scientific discovery; however this unique region currently has numerous ecological threats towards its native species. One of the threats is the detrimental impact of approximate 550 non-native plants introduced over that last 500 years of human presence in the archipelago. In addition to these species with known arrival method, there are 62 vascular plants that have been classified as â doubtful natives', where native status remains unclear. To help address the questions of origins regarding these doubtful-natives and their impact on highland ecosystems over the past 500-1000 years, we analyzed plant macrofossils in sedimentary records. Appropriate species' classification (native or introduced) was determined using baseline data of species presence on the islands. We determined six plants (Ageratum conyzoides, Solanum americanum, Ranunculus flagelliformis, Brickellia diffusa, Galium canescens, Anthephora hermaphrodita) once considered doubtful-natives or introduced are actually native to the GalÃ¡pagos flora. The use of long-term historical baseline data is a valuable tool that can be directly applied to conserving and restoring the native biodiversity in GalÃ¡pagos.

SP1.13 Cole, HA*; Bergamini,A; Swiss Federal Research Institute WSL; *heather.cole@wsl.ch*
Natural history data for species distribution modelling: regional effects of georeferencing error on model success
Natural history data can be an important data source for species distribution modelling (SDM). However, with older records, this data often lacks precise location information. With the extensive number of natural history records available for the flora of Switzerland, it is essential to determine their value for SDM. If a certain level of error in a biogeographical region can be identified as having insignificant effects on model performance, then the appropriate records can be included. To investigate their effects on model success, four levels of error (50m, 100m, 200m, 500m) were artificially added to existing, precisely located, systematic presence-absence data in Switzerland's Alps and Plateau regions. Species group (bryophyte; lichen; fungi; herb; woody) and modelling technique (boosted regression tree; generalized linear model; maximum entropy) were included as additional factors. All levels of error had negative impacts on model success in both regions, however overall success was higher in the Alps. Among the additional factors, models of woody species and models generated with boosted regression trees were most successful. Our results show that imprecise natural history records may be included into species distribution models with minimal negative effects on performance. We also show that biogeographical regions should be taken into account when modelling over diverse landscapes. Future SDM endeavors should carefully consider these factors for more effective models.

SP5.10 Colla, SR*; Packer, L; York University; *scolla@yorku.ca*
The rapid decline of a previously common native pollinator in North America
Pollinator declines have recently become a significant conservation issue globally. The potential cascading effects of these declines in agriculture and native ecosystem sustainability has brought much attention from the public, policy makers and the media. However, in North America our baseline data on native pollinator populations has thus far been lacking. Here, I will summarize what is known on the decline of Bombus affinis (The rusty-patched bumble bee) using museum records, recent surveys and GIS analyses. This species was previously one of the most common bees throughout eastern North America and is currently up for listing by COSEWIC due to a dramatic decline over the past 20 years. The decline of this species is likely due to multiple stressors including pathogen spillover, habitat loss and climate change. In particular, this species may be more vulnerable to threats compared to other bees because of its narrow climatic niche. Recommendations for the conservation of this and other native bee species based on these findings will be discussed.

P1.152 Collins, L; University of Wollongong; *lc91@uow.edu.au*
Assessing the Impact of Fire Frequency, Severity and Topography on Hollow Occurrence in Trees and Coarse Woody Debris
Urbanisation has drastically altered the ecology of temperate eucalypt forests of eastern Australia. Anthropogenic pressures stemming from urban areas have resulted in an increase in sources of planned and unplanned fire, leading to increased fire occurrence. Frequent fire has the potential to alter biotic and abiotic components of ecosystems, although impacts may vary spatially due to underlying topographic influence on fire severity. This study examined the effect that fire frequency, severity and topography have on the presence and abundance of hollows in fallen coarse woody debris (CWD) and standing trees, an important resource for many species of fauna. A total of 684 logs and 585 trees were randomly selected across 30 sites, stratified by fire frequency and topographic position (gully, ridge). Fire frequency was categorised as â ¤2 (low) or â ¥4 (high) fires over a 26 year period. Generalised linear mixed models were used to analyse data. Results indicate that hollow occurrence in CWD was greater in the low fire frequency treatment. Fire frequency had no effect on hollow occurrence in trees, while increasing fire severity had a negative effect. The impact of fire frequency did not vary with topographic position. Models indicate that size and condition of CWD and trees were more influential drivers of hollow occurrence than fire. Expected changes to fire regimes may lead to a decline in hollow availability, potentially having adverse effects on biodiversity.

SY10 Connolly, C.; Wildlife Conservation Society and Imperial College London; *cconnolly@wcs.org*
Institutional Complexity and Challenges for design of payments for ecosystem services in Central Africa: Experience from a watershed in Gabon
The concept of payments for ecosystem services (PES) is still very novel in Central Africa and there are very few examples of operational schemes across Africa. In Gabon, WCS is working with Government partners on a new PES initiative aiming to establish a sustainable financing mechanism to ensure long-term protection of the high conservation value and economically important MbÃ© watershed. The purpose of this presentation is to document different steps taken in designing a PES project for the MbÃ© watershed that will remunerate the upstream land managers for maintaining their land-use practices, thus securing the continued provision of a year round supply of high quality water to the downstream users. Some of the early challenges that have been faced are the lack of technical capacity for PES in Gabon, the lack of existing data available and the institutional complexity. We employed a stakeholder-driven participatory process to design a project that aims at removing some of these barriers and challenges. Key focus areas of the project include: working to strengthen the enabling environment and capacity building.

SP7.3 CONRAD, SUZANNE, M*; Luzadis, Valerie, A.; SUNY College of Environmental Science and Forestry; *smconrad@syr.edu*
Assessing Private Landowner and Land Manager Knowledge of and Attitudes Toward Invasive Species in Adirondack Forests
Due to the high number of non-native invasive species in New York State, the Adirondack Park faces new challenges to managing forestland for biodiversity. Although much attention has been given to the management of non-native invasive species on public lands across the U.S., little recognition has been given to the importance of incorporating private landowners in management schemes. To be successful, regional invasive species management plans must incorporate the values of all stakeholders, particularly in mixed public-private areas such as the Adirondack Park. Since little is known about the attitudes of landowners and land managers towards non-native species, a survey was developed and implemented to assess knowledge of and attitudes towards invasive species of both private landowners and land managers in the Adirondack Park. The results of this study will enhance regional invasive species management plans by reflecting the views and values of stakeholders and will provide a survey template that can be applied to other mixed-ownership forested regions.

SY23 Cooke, BR; RMIT University; *ben.cooke@rmit.edu.au*
A review of the social dimensions of landholder participation in private land conservation programs
To address the global decline of biodiversity, public land conservation reserves must be supplemented with conservation measures that target private land. A primary mechanism for conserving biodiversity on private land is the use of designated programs to facilitate the protection and enhancement of habitat by private landholders. Many different programs exist, utilising a spectrum of legally binding, non-binding and market-based policy instruments. In the design and implementation of private land conservation programs, the role of conservation agencies as policy-makers, and landholders as program adopters, is clearly delineated. This disconnect can lead to inaccurate assumptions about the social context into which conservation programs are delivered, producing policy which is not cognisant of the influences on landholder decision-making for program adoption. This review will demonstrate that the motivations of landholders for positive conservation practices can be influenced by factors like; perceived legitimacy of policy interventions and policy development processes, intrinsic conservation motives, trust in prominent local identities and government agencies, and the perceived equity of â public good' conservation works on private land. Private land conservation occurs in an unavoidably social context, recognising the potential influence of this context on decision-making and conservation outcomes can be critical for successful policy design.

21.4 Cooke, HA*; Hannon, SJ; University of Alberta; *hcooke@ualberta.ca*
Is structural retention in aggregated harvests an effective long-term, regional strategy for conserving old boreal forest cavity users?
In landscapes managed for forestry in the boreal plains, targets for old forest conservation are achieved through protected areas, reductions in harvest volume and extended rotation periods. Structural retention is an important strategy for conserving old forest species within harvested landscapes in the short term however it may also contribute to a regional conservation strategy. Cavity-using vertebrates associated with old upland forest are conserved in large (1000s ha), spatially-aggregated harvests when 20% of the mature and old forest is retained in patches. However, the value of this strategy over the long-term and at a regional scale is unknown. For a 278,000-ha landscape in northeast Alberta, we simulated 150 years of forest succession and harvest for four aggregated harvest scenarios that varied in retention level (0-20%). The greatest area of old forest was conserved in the 20% retention scenario however significant amounts of old forest were lost in all scenarios. As well, greater conservation of old forest was associated with increased harvest of mature stands and greater fragmentation of old forest patches. No retention strategy consistently conserved more habitat for Yellow-bellied Sapsuckers, Black-capped Chickadees or Northern Flying Squirrels compared with aggregated alone. More Pileated Woodpecker habitat was lost from the 20% scenario because suitable forest patches were too small to accommodate their home range. For all focal species, losses of habitat in all scenarios ranged between 30 and 90%. While structural retention is critical for retaining old forest species in regenerating stands in the short term, additional long-term strategies are needed for conserving old forest species regionally.

SY28 Cooley, H.; Idaho Department of Fish & Game; *hilary.cooley@idfg.idaho.gov*
Effects of Hunting on Cougar Population Demography
Many wildlife species are managed based on the compensatory mortality hypothesis, which predicts that harvest mortality (especially adult male mortality) will trigger density-dependent responses in reproduction, survival, and population growth caused via reduced competition for resources. We tested the compensatory mortality hypothesis on two cougar (Puma concolor) populations in Washington, USA (one heavily hunted and one lightly hunted). We estimated population growth, density, survival, and reproduction to determine the effects of hunting on cougar population demography based on data collected from 2002 to 2007. We found no differences in rates of maternity or natural mortality between study areas, and kitten survival was lower in the heavily hunted population. We rejected the compensatory mortality hypothesis because vital rates did not compensate for hunting mortality. Heavy harvest corresponded with increased immigration, reduced kitten survival, reduced female population growth, and a younger overall age structure. Light harvest corresponded with increased emigration, higher kitten survival, increased female population growth, and an older overall age structure. Managers should not assume the existence of compensatory mortality when developing harvest prescriptions for cougars.

SY65 Cornick, LA; Alaska pacific University; *lcornick@alaskapacific.edu*
Coastal zone development and conservation of Cook Inlet beluga whales
The Cook Inlet population of beluga whales has declined by over 50% since the mid-1990's, and is listed as Endangered under the US Endangered Species Act and as Critically Endangered on the IUCN Red List. Recent data also indicate a significant range contraction into areas with the highest levels of human disturbance and coastal zone development. The population is geographically isolated, making immigration or emigration unlikely. Therefore, conservation and recovery of this species hinges on careful management and cooperation among a diverse set of stakeholders. Interested constituencies in the area include Alaska Native subsistence users, the tourism industry, local environmental groups, local water treatment facilities, the Port of Anchorage, the US military and the oil and gas industry. Thus far cooperation has not been the model, with lawsuits in the works by the State of Alaska to reverse the listing and challenge the proposed critical habitat designation. If, however, the relevant stakeholders could be brought to the table to engage in a meaningful Marine Spatial Planning exercise, positive outcomes could prevail that would facilitate both the conservation and recovery of the Cook Inlet beluga whale and the responsible coastal zone development of Alaska's population center. This presentation will suggest a way forward to that end.

SP8.2 Cosmas .L.K; University For Development Studies; *cosmasworld@gmail.com*
Forest Conflicts' Influence on Local People's Livelihoods: A Case of Conflicts between Timber Companies and Farmers in the Mankranso District of Ghana.
Off-reserves in Ghana provide an important source of timber resources for the wood industries and also livelihood support to forest fringe communities. However, over the past decades, there is overwhelming evidence of a decline in the maximum utilisation of forest off-reserves due to several factors. The management of off-reserves is faced with contested roles of the formal and informal institutions, both claiming access to timber and non-timber forest products (NTFPs), land and benefit-sharing rights. The institutional changes in the off-reserve areas have contributed to forest livelihood conflicts with nagging effects and deforestation through chainsaw operations and farmers' willingness to destroy trees in the off-reserve communities. This thesis describes both the formal and informal institutions in the context of the study area and how they impact forest conflicts dealing with crop damage compensation, access rights, benefit-sharing and land tenure disputes. The Sustainable Livelihood Framework by DFID in 1999 is used to measure the influence of forest conflicts between timber companies and farmers and the impact of these conflicts on the livelihoods of the farmers in the off-reserve area of the Mankranso District. The findings from the research show that forest conflicts have impact on social capital, natural capital and financial capital of the farmers and is concluded with a policy reform recommendation to secure farmers' access, tenure and benefit rights for a sustainable collaborative forestry management for the off-reserve areas of Ghana.

P1.126 Costall, JA*; Death, RG; Institute of Natural Resources, Massey University, New Zealand; *jesscostall@gmail.com*

The Recovery of Forest Floor Invertebrate Communities and Ecological Processes Following Livestock Exclusion from Rural New Zealand Forest Fragments.

In New Zealand much of the remaining native forest exists as small, privately-owned fragments embedded in agricultural landscapes. In many regions, such as the central Waikato where

SY61 Cote, IM; Simon Fraser University; *imcote@sfu.ca*

Does Protection Increase the Resilience of Marine Habitats to Climate Change? Insights for Canadian MPAs

Resilience - the capacity of an ecosystem to absorb disturbance without shifting to an alternative state and losing function and services - has become a central concept in the management of natural ecosystems. Many current management actions aim to alleviate local stressors in an effort to increase ecosystem resilience to global climate change. Such a management philosophy is premised on the belief that eliminating local drivers of ecological change will increase the ability of an ecosystem to resist future climate disturbances, its ability to recover from such disturbances, or both. Marine reserves or no-take areas, the most popular form of spatial management for marine habitats, are widely thought to have the potential to increase marine ecosystem resilience, but do they really? In this talk, I review briefly the potential impacts of climate change on various marine habitats. I then summarise evidence for the idea that local protection can alleviate the impact of climate change on marine ecosystems. Because the majority of the evidence stems from studies of tropical habitats - coral reefs in particular - I discuss the relevance of the findings for more northern latitudes.

SP6.8 Courter, JR*; Johnson, RJ; Hubbard, KG; Clemson University, University of Nebraska- High Plains Regional Climate Center; *jcourte@clemson.edu*

Optimizing Bird Conservation and Function on Sustainable Farms Using a Yardstick of Temperature Response Across Trophic Levels

A major global issue is producing food and fiber for growing human needs while conserving ecosystem components including birds and other species that contribute important ecosystem services such as pest suppression, pollination, and value to bird watching. Decision tools are needed to facilitate mutual benefits between farming and birds, especially during critical life cycle stages. â Growing degree-days (GDD)' is a concept familiar to farmers and based on the principle that accumulated heat units can more accurately predict the onset of insect and plant development stages, independent of calendar date. Given the importance of insects and plants as food sources for birds, we correlated historical GDD data to historical arrival and nesting dates of birds in selected areas across the United States. Preliminary results indicate that GDD can be used to track climate change over time and predict annual events in some birds. Given climate change projections, an uncoupling between birds and their food resources (insects to feed young) may be occurring that could hinder important pest suppression functions of birds in agroecosystems. As such, GDD may serve as a yardstick to assess responses to temperature change across predator-prey (biological control) food webs.

P2.188 Craigie, I.; University of Cambridge; *idc28@cam.ac.uk*

Protected area performance for African mammals is primarily related to defensibility from humans therefore bigger is not always better

Protected areas are the cornerstone of global conservation efforts and yet their performance in maintaining populations of their key species remains poorly understood. We address this gap using a new database of 595 population time series for 74 species of large mammals in 82 protected areas. The direction and gradient of population change was calculated for each population time series. Then these gradients were modelled using linear mixed effect models. The explanatory variables for the modelling included information on the protected areas, the species life history traits, the human populations around the park and the country. The results of the modelling show that the protected areas that best maintained their mammal populations were the smallest ones with the least humans locally, and that the largest species has the most positive population gradients. These findings contradict conventional wisdom on protected area performance but can be explained. When human hunting is the chief threat present the larger protected areas are disadvantaged by being harder to patrol and defend from poachers. Likewise, it is easier for hunters to target smaller bodied species where the chance of detection of poaching events by the authorities is lower. These results imply that protected area size needs to match the resources available for protection when the threat is human hunting, bigger is not always better.

P2.5 Crawford, L.; Desjardins, S; Keyghobadi, N*; University of Western Ontario; *lcrawfo6@uwo.ca*

Genetic structure analysis of an endangered population of the Mormon metalmark butterfly (Apodemia mormo) using amplified fragment length polymorphisms (AFLPs)

The British Columbian (BC) population of the Mormon metalmark butterfly, Apodemia mormo (Felder, 1859) is considered at-risk, yet its protection to date has been hindered by a general lack of knowledge surrounding the butterfly's basic habitat requirements, dispersal capabilities and population structure. In this study we investigated the genetic structure and diversity of the BC population of the Mormon metalmark using amplified fragment length polymorphisms (AFLPs) generated from non-destructive samples of butterfly wing tissue. We found that the majority of the total genetic variance was partitioned within sub-populations, however sites which were geographically isolated (>4km from their nearest neighbour) demonstrated significant genetic differentiation. These results suggest that distances greater than four kilometres are beyond the dispersal capabilities of this species. Overall, the population demonstrated a significant pattern of isolation-by-distance, indicating that dispersal occurs primarily between nearest-neighbouring sub-populations. This information will contribute to efforts to predict future population trends and develop a recovery strategy for this species. As well, the successful development of AFLPs from wing tissue and the use of the technique to assess genetic structure in an endangered butterfly population have validated the method as a valuable tool for conservation research.

SP5.9 Cristescu, Bogdan*; Boyce, Mark S.; University of Alberta; *cristesc@ualberta.ca*

Five Focal Topics In 21st-Century Ecology And Their Relevance To Conservation Science

Conservation challenges faced by the world are unprecedented, complex and multifaceted. The array of challenges makes it daunting to prioritize key issues to be addressed in ecology and conservation research. Building on a literature review on recent advancements in ecology and conservation, as well as on one hundred recently published questions of importance to biodiversity conservation, we propose 5 topics for 21st century ecology that have major conservation implications. The topics address ecological concepts and processes from individual to ecosystem level that dictate global patterns of species distribution and abundance. Movement of organisms is a key topic because movement integrates ecological processes across landscapes and scales. Individual variation is another priority topic, reinforced by recent evidence on animal personality, with particular application in the conservation of rare species. From an ecosystem perspective, two topics with profound conservation implications relate to understanding trophic dynamics, and invasiveness as an ecological attribute. In today's changing climate, better information on ecosystem carbon dynamics is central to developing strategies to create links between carbon sequestration and conservation. To address these issues will require cross-disciplinary ecological research under the overarching guidance of conservation ecology.

SY13 Crooks, KR*; Theobald, DM; Rondinini, C; Boitani, L; Colorado State University, Sapienza Universit di Roma , Sapienza Universit di Roma ; *kcrooks@cnr.colostate.edu*

Global mammal connectivity: opportunities and threats

According to the 2009 IUCN Red List of Threatened Species, 25% of the world's mammals are threatened with extinction, and habitat loss and degradation are the primary threats globally. As habitat is lost, the remaining patches often become progressively smaller and more isolated through the process of habitat fragmentation, further threatening mammal populations. We used existing high-resolution distribution and habitat suitability models of the world's mammals to explore the connectivity of natural habitat for a select set of focal species. We applied a novel multi-scale, integrated landscape metric to measure the pattern of natural areas - or conversely degree of human modification - within species ranges. The natural landscapes metric provides a relatively simple, robust measure of land cover modification associated with human activities. We then measured the connectivity of the remaining suitable habitat for each of the selected species. Our approach can help inform how landscape context affects the degree to which configuration of habitat and declining connectivity threatens the world's mammals, and helps to identify opportunities to mitigate such threats.

P2.71 Crooks, KR*; Bevins, SN; Tracey, JA; VandeWoude, S; Colorado State University; *kcrooks@cnr.colostate.edu*

The effects of urban fragmentation and landscape connectivity on disease prevalence and transmission in North American felids

The objective of this collaborative study is to investigate the effects of urbanization and landscape connectivity on disease dynamics in North American felids, including bobcats, puma, and domestic cats in California, Colorado, and Florida. Bobcats and pumas are sympatric in these regions, are susceptible to many of the same diseases, and at risk of infection with domestic cat pathogens. To date, we have collected samples from over 1000 wild and domestic felids, and have identified variation in seroprevalence that maps to region and species. We have recorded unexpectedly high levels of exposure to plague in pumas and bobcats, particularly in plague-endemic regions in Colorado, suggesting that serosurveys of wild felids could be early indicators of regional plague activity. We have also developed an agent-based computer simulation model, motivated by bobcats in southern California, which suggests that movement behavior is a major factor in the spread of disease and the effects of movement can be counter-intuitive. Ongoing studies include using Feline Immunodeficiency Virus (FIV) as a genetic marker for detecting genetic structure in urban landscapes, and GPS telemetry and remote camera surveys of felids to assess the impacts of urbanization on movement patterns and contact rates. These efforts will allow us to gain a better understanding of how urban fragmentation and landscape connectivity impact disease transmission in felids.

6.6 Crosmary, W-G*; ChamaillÃ©-Jammes, S; Mtare, G; CÃ´tÃ©, SD; Fritz, H; DÃ©partement de Biologie, UniversitÃ© Laval, Canada, CNRS- "Centre d'Ecologie Fonctionnelle et Evolutive", UniversitÃ© de Montpellier II, France, Zimbabwe Parks and Wildlife Management Authority, CNRS-UMR 5558 "BiomÃ©trie et Biologie Evolutive", UniversitÃ© Lyon 1, France; *william.crosmary.1@ulaval.ca*

Human-elephant interference may promote densities of a are antelope in elephant-dominated African savannas

The ongoing increase of human populations in sub-Saharan Africa may impact wildlife, especially around protected areas. In the last two decades, elephant (Loxodonta africana) densities have remarkably increased in protected areas of Southern Africa. Concerns have been raised that elephants may be increasing at the expense of other herbivore species. Consequently, the fate of rare ungulate species in the savannas either disturbed by human or dominated by elephants, needs to be assessed. We used long-term aerial censuses conducted over the Hwange Complex, a gradient of human-disturbance and elephant densities in the North Matabeleland of Zimbabwe, to investigate the spatial variations of sable antelope (Hippotragus niger) densities concomitantly with environmental covariables such as water-surface availability and vegetation. Sable antelope densities were positively correlated with surface-water availability, but declined with increasing elephant densities. Human disturbance did not directly influence sable antelope densities, but elephant densities responded negatively to increasing human disturbance. This result suggested an indirect effect of human disturbance on sable antelope densities modulated by the avoidance of human-disturbed areas by elephants. Our study provides an example on how the strong influence of a "keystone" species over an ecosystem may be modulated by human disturbance.

SY51 Cross, MS*; Hilty, JA; Tabor, GM; Lawler, JJ; Graumlich, LJ; Berger, J; Wildlife Conservation Society, Center for Large Landscale Conservation, University of Washington, University of Arizona, University of Montana; *mcross@wcs.org*

Linking climate change science to connectivity conservation

Maintaining and restoring connectivity across landscapes is an existing conservation tool that could reduce species extinction by facilitating species movements in response to climate change. Increasing connectivity between protected areas is therefore one of the most commonly cited strategies for long-term biodiversity conservation, yet there have been few detailed discussions of exactly what connectivity requirements will look like as climate changes, and how to implement that strategy on the ground. In this presentation, we will discuss the definition of connectivity for addressing wildlife responses to climate change and compare it to connectivity needs under current conditions. We will also explore options for applying the best available climate change science to identify, prioritize and protect connectivity as a tool for facilitating wildlife conservation in light of climate change. We argue that an iterative process of identifying current connectivity needs, anticipating how those needs may change in the future, monitoring how those needs are changing, and re-focusing conservation attentions as necessary, will enhance our ability to protect both current and future connectivity needs for wildlife.

P1.149 Csuti, B*; Morzillo, AT; Hemstrom, MA; Ekman, LM; Wales, BC; Department of Forest Ecosystems and Society, Oregon State University, Corvallis, OR 97331, Department of Forest Ecosystems and Society, Oregon State Univeristy, Corvallis, OR 97331, USDA Forest Service, Pacific Northwest Research Station, Forestry Sciences Laboratory, Portland, OR 97208-3890, USDA Forest Service, Pacific Northwest Research Station, Forestry Sciences Laboratory, Portland, OR 97208-3890, USDA Forest Service; *Blair.Csuti@oregonstate.edu*

Integrated priority areas for fuel treatments in the western United States

A century of fire suppression has resulted in build-ups of dense vegetation (i.e., fuel) on millions of acres of forestland in the western United States. Many of these forests may benefit from fuel reduction treatments such as mechanical thinning or prescribed fire. Possible benefits of fuel reduction treatments include improving forest health and resiliency, restoring certain types of wildlife habitat, and reducing the risk of uncharacteristically intense wildfire. Fuel reduction treatments, however, are often undertaken with a piecemeal approach that fails to consider other forestland management objectives over broader landscape and temporal scales. Our objective is to compare different forestland management approaches and evaluate how each might influence future fuel conditions, key wildlife habitats, natural disturbance regimes, and economic potentials of forests and woodlands in Arizona, New Mexico, Oregon, and Washington. Our analysis builds on VDDT (the Vegetation Dynamics Development Tool), a modeling approach currently used in the study area. Results will be summarized to watersheds (5th code hydrologic units), ownership classes, land allocations, and biophysical environments. Results from regional studies using this methodology in northeast Oregon provide direction for changes in forestland management practices that may restore forest characteristics to those found under natural disturbance regimes.

SP1.5 Culbert, PD*; Albright, TA; Rittenhouse, CD; Flather, CH ; Pidgeon, AM; Radeloff, VC; University of Wisconsin-Madison, USDA Forest Service; *pdculbert@wisc.edu*

Modeling Nationwide Patterns of Avian Biodiversity: The Influence of Habitat Structure

Avian biodiversity is under great threat, primarily from human influences. With limited resources for habitat conservation, the accurate identification of high-value bird habitat is crucial. Existing biodiversity maps either cover small extents or employ coarse resolution. Our goal was to model nationwide patterns of avian biodiversity with high spatial resolution. One major factor known to influence avian biodiversity is habitat structure. We evaluated the performance of the 2001 National Land Cover Database and the National Biomass and Carbon Dataset 2000 as measures of habitat structure for the prediction of avian diversity. We calculated the proportion of different land cover classes and mean and standard deviation of estimated vegetation height for ~2,000 Breeding Bird Survey routes across the US. Both NLCD and NBCD were effective in explaining the variation in avian species richness. For forest birds and grassland birds, the mean of estimated canopy height alone yielded R^2 values of 0.31 and 0.34 respectively. Multivariate models of forest and grassland bird richness yielded R^2 values of 0.45 and 0.45 respectively. Measures derived from land cover classification and canopy height estimates are a useful method for characterizing habitat structure. Our models thus facilitate efficient fine-resolution mapping of avian diversity and the identification of biodiversity hotspots at scales that are relevant for land management.

P2.116 Cullman, G.C.; Columbia University; *gc237@columbia.edu*

A forest is not an elephant: Towards a holistic understanding of forests from multiple disciplines

What is gained and what is left out by using methods from different disciplinary traditions to characterize forests? Like the proverbial blind men describing the elephant, single-discipline approaches to understanding complex systems like forests can describe only a part of the whole. By using diverse methods, conservation practitioners and researchers hope to be able to get a more holistic understanding of forests. Unfortunately, the forest as seen through the lens of one discipline may be difficult to reconcile with that of another, causing confusion and conflict rather than a single, more powerful understanding. Global implementation of policies to reduce greenhouse gas emissions from deforestation and forest degradation (REDD) presents an opportunity to develop a multidisciplinary framework capable of embracing multiple perspectives. A reductionist understanding of forests solely as carbon storage and capture systems could be one consequence of REDD implementation. In order to meet international commitments to the protection of indigenous and local land rights and to biodiversity conservation, however, REDD implementation must draw upon diverse understandings of forests. This review considers which combinations of methods to characterize forests may be more or less effective for REDD project implementation and management.

12.6 Curtis, JMR*; Naujokaitis-Lewis, I; Rosenfeld, J; Arcese, P; Shepherd, P; Pacific Biological Station, Fisheries and Oceans Canada, University of Toronto, British Columbia Ministry of Environment, Centre for Applied Conservation Research, University of British Columbia, Parks Canada ; *janelle.curtis@dfo-mpo.gc.ca*

Use of population viability analysis to set interim population and habitat recovery targets for data-poor species at risk

Delays in critical habitat designation jeopardize recovery and underscore the need for setting interim population and habitat recovery targets. Our goal was to identify rules of thumb on the amount and spatial configuration of habitat recommended for recovery of data-poor species. We summarize results from 45 models of spatially structured populations from species that vary taxonomically and in life history. We used Bayesian methods to estimate and characterize the uncertainty in the minimum number of populations, initial population size, and habitat carrying capacity required to achieve a range of recovery goals. We also estimated the optimal distance among habitat patches. Advice to managers would vary according to recovery goal, desired probability of success, and population trend (stable or declining). For example, the median amount of habitat predicted to maintain persistence probabilities of 0.9 over 100 years (IUCN Vulnerable listing threshold) would support ~8200 adults in 35 subpopulations exhibiting stable or positive growth, but ~29,000 adults for declining species. A more precautionary threshold of 0.95 over 100 years would support recommendations to protect sufficient habitat for at least 9600 adults. We found no correlation between habitat needs and 8 life history variables, but optimal habitat configuration was related to dispersal distance. For data-poor species, interim targets for habitat protection should enhance species' recovery and reduce management uncertainty.

SY7 Czech, B; Center for the Advancement of the Steady State Economy; *brianczech@steadystate.org*

Political Developments Toward a Steady State Economy

As with many movements toward policy reform, the movement toward a steady state economy has an academic origin and phase. For the past several decades, the steady state economy has been hitched to the wagon of ecological economics, which at most universities must be pulled through a landscape of neoclassical economics and business schools. Some wagons have sunk in the mud, but more are getting to higher ground. Also, in recent years the steady state economy has been finding an academic "home away from home" in numerous natural resources departments and schools where the steady state economy is readily identified as a requirement for resource conservation and ecological integrity. Concurrently with these developments in academia, there have been nascent political efforts toward a steady state economy and even economic degrowth. As is common with new, complex challenges for public policy, steady-state politics are yet in the position-taking or coalition-building phase, which precedes electoral politics and policy reform. Such efforts have included the formal adoption of positions and resolutions on economic growth by professional societies and other organizations, formal support for such positions by prominent individuals, and formal endorsement of positions by non-governmental organizations and even some business firms. The resulting, loose-knit coalition has helped to empower a small number of political parties and candidates to develop steady-state political planks, and to defuse the fallacious "win-win" growth-conservation rhetoric of other politicians. On all fronts, the movement toward a steady state economy is growing and intensifying in the context of climate change, supply shocks, and financial crises.

SY26 Dalerum, F*; Somers, MJ; Kunkel, KE; Cameron, EZ; Centre for Wildlife Management and Mammal Research Institute, University of Pretoria, Centre for Wildlife Management, University of Pretoria, WWF Montana, Mammal Research Institute, University of Pretoria; *fredrik.dalerum@zoology.up.ac.za*

Functional diversity of continental carnivore guilds; implications for conservation and management of our remaining large predators

The link between species richness and ecosystem function has emerged as a key question for conservation biology, and recent work highlights that the structure of species assemblages may be as important as their species richness. Large carnivores may be important ecosystem components but are extinction prone due to small populations, slow growth rates and large area requirements. Consequently, many assemblages of large carnivores have been depleted, and many populations have been reduced to population sizes too small for for them to form functional units. We evaluated depletions in continental carnivore guilds since the late Pleistocene, and use these results in combination with a functional analysis of contemporary carnivore guilds to synthesize recommendations for carnivore conservation and restoration. Recent extinctions have lead to both taxonomic and functional depletions in North America, South America, and Australia. In Eurasia, the assemblage is fragmented and not locally intact. It is only in Africa that we find relatively intact assemblages of sympatric carnivores. We argue that global priority must be given to restore sympatric assemblages of Eurasian carnivores and to retain the sympatric but depleted assemblages in North and South America. We emphasize the need to evaluate the ecological effects of carnivore reintroductions and conservation programs, and that local efforts must prioritize species with little functional overlap with locally present species.

23.3 Dalziel, BD*; Ellner,SP; Cornell University; *ben.dalziel@gmail.com*
Estimating the historical migration patterns of woodland caribou using movement models and stable isotope data
Many animal populations migrate to compensate for seasonal fluctuations in their resources. Two important questions related to migration are (1) how migration patterns emerge from small-scale movement decisions made in response to local environmental conditions and (2) how stable migration patterns and, by extension, migratory populations, are to increases in environmental variability due to climate change. We modeled the movements of migratory caribou (Rangifer tarandus) using basic consumer-resource equations which assumed that caribou moved toward nearby resources but had no knowledge of the landscape as a whole. Resource regrowth rates were linked with temperature, fluctuating seasonally and according to latitude. Without large-scale knowledge of the landscape the model still predicted cohesive migration patterns. However these patterns destabilized as environmental variability increased. In order to test these predictions in the field, we used the model to predict the isotope ratios for H and O in caribou hair as a function of their movement path. Comparing the isotopic signatures of historical hair samples with the predictions of migration models may allow us to learn about the long-term response and viability of migratory populations to climate change.

SA1 Darling, Emily*; McClanahan, Tim; Cote, Isabelle; Simon Fraser University, Wildlife Conservation Society; *edarling@sfu.ca*
All stressed out? Cumulative impacts of fishing and coral bleaching on Kenyan reefs are additive or antagonistic, not synergistic
A challenge for conservation science is predicting the impacts of co-occurring human activities on ecological systems and the goods and services they provide. Multiple anthropogenic stressors impact ecosystems globally and are expected to jeopardize their ecological functions and the success of conservation and management initiatives. The possibility that two or more stressors interact synergistically is of particular concern, but such non-additive effects remain largely unidentified in nature. A long-term dataset of hard coral cover from Kenyan reefs was used to examine the independent and interactive effects of two stressors: fishing and a temperature anomaly in 1998 that caused mass coral bleaching and mortality. While both stressors decreased coral cover, fishing by 51% and bleaching by 74%, they did not interact synergistically. Instead, their combined effect was antagonistic or weakly additive. The observed non-synergistic response may be caused by the presence of one dominant stressor, bleaching, and co-tolerance of coral taxa to both bleaching and fishing stressors. The finding that the impacts of fishing and bleaching are not synergistic is hopeful news given future predictions for coral reefs. However, our results also suggest that marine reserves may not provide corals with a refuge from climate change.

SY68 Darveau, M.; Ducks Unlimited Canada & Laval U.; *m_darveau@ducks.ca*
Quebec boreal case study: science, conservation and policy achievements
The boreal ecosystem of eastern North America is often considered a low priority for waterfowl conservation at a continental scale because of presumed rarity of wetlands, waterfowl, and threats to them. In 2003, Ducks Unlimited initiated a boreal conservation program in Quebec, where forested landscapes, taiga and tundra total 1 million kmÂ². Initial science efforts were devoted to wetland mapping, waterfowl-habitat studies and development of predictive models of waterfowl occupancy. Concurrently, we adapted existing conservation planning approaches to riparian areas (dual planning with terrestrial and aquatic components). Key results include: a quantification that wetland and deepwater habitats on average cover 25% of forested landscapes ; evidence that streams and ponds are primary habitats for waterfowl in these landscapes; evidence that human settling is detrimental to some boreal species and beneficial to the invasive mallard; and indications that riparian management should be hydrosystem-based. These findings have influenced current regulations and policies in Quebec's forests and have given us a foundation with which to engage in broader conservation planning efforts within the Quebec government initiated "Plan Nord", which offers an unprecedented opportunity for conservation and sustainable development to proceed in concert to conserve half of northern Quebec (50% of 1.2 million kmÂ²).

SY65 Darwall, WRT*; Holland, RA; Smith, KS; IUCN, International Union for Conservation of Nature; *william.darwall@iucn.org*
Africa\'s Important Sites for Freshwater Biodiversity
While freshwater habitats cover less than 1% of the world's surface, they provide a home for 7% (126,000 species) of the estimated 1.8 million described species, including a quarter of the estimated 60,000 vertebrates. Despite their clear values to people through provision of many services, freshwater systems and the species they support are often ranked as being the most threatened of all systems worldwide. Identification of a network of sites critical for the conservation of freshwater species is an important first step towards halting loss of species. We present here the first stage in the process for identifying such a network of sites across continental Africa. The network of sites is developed using new data for the status (IUCN Red List) and distribution of all known freshwater fishes, molluscs, odonates, crabs and selected families of aquatic plants. The approach follows that employed for the identification of Key Biodiversity Areas (KBAs), as adapted to freshwater systems. River and lake sub-basins supporting species which meet the site selection criteria are identified and mapped as Candidate Freshwater KBAs. These Candidate KBAs will be presented for subsequent stakeholder review in order to rationalise boundaries and develop management recommendations.

SY31 Dau, Jim; Alaska Department of Fish and Game; *jim.dau@alaska.gov*
Status and management of caribou in Alaska
About 28 barren-ground caribou (Rangifer tarandus granti) herds, ranging from several hundred to almost 500,000 animals, are currently recognized in Alaska. Of 9 large herds, 6 have declined since 1985, 1 intensively managed herd has been stable and 2 are increasing. Historically, most Alaskan herds have only received basic population monitoring which limits our understanding of proximate and ultimate causes of changes in abundance. Where conducted, studies have shown that range condition, predation and human harvests affect caribou numbers, and disease appears to impact environmentally stressed herds. Recently, warm summers and winter icing events may have negatively impacted some herds. Alaska is a patchwork of land ownership resulting in varied policies, management objectives and regulations related to resource use. This hinders implementation of consistent, comprehensive caribou management and resource development strategies at the scale of individual herds, and statewide. For hunters and associated businesses, it creates confusing caribou harvest regulations. State and federal agencies manage wildlife for multiple sustained uses; however, each regulatory system identifies subsistence as the priority use of caribou. Cooperative management groups comprised of diverse stakeholders are attempting to bridge administrative boundaries and facilitate management of some Alaskan caribou herds and associated ecosystems.

SY45 Davidson, Ana*; Hamilton, Marcus; Boyer, Alison; Brown, James; Ceballos, Gerardo; Universidad Nacional AutÃ³noma de MÃ©xico, University of New Mexico, Yale; *davidson@unm.edu*
Multiple Ecological Pathways to Extinction in Terrestrial and Marine Mammals
As human population and resource demands continue to grow, biodiversity conservation has never been more critical. About one-quarter of all mammals are in danger of extinction, and As human population and resource demands continue to grow, biodiversity conservation has never been more critical. About one-quarter of all mammals are in danger of extinction, and over half of all mammal populations are in decline. A major priority for conservation science is to understand the ecological traits that predict extinction risk, and the interactions among those predictors that make certain species more vulnerable than others. Using a new database of about 4,600 mammal species, we use decision tree models to quantify the multiple interacting factors associated with extinction risk. We show that the correlates of extinction risk vary widely across mammals, both terrestrial and marine, and that there are unique pathways to extinction for species with different lifestyles and combinations of traits. We find that risk is relative, and that all kinds of mammals, across all body sizes, can be at risk depending on their specific ecologies. Our finding that many small species are also at high risk is consistent with the growing recognition that risk in the current extinction crisis does not scale simply with body size. Our results increase understanding of extinction processes, generate simple rules of thumb that identify species at greatest risk, and highlight the potential of decision tree analyses to inform conservation efforts.

SP9.4 Davis PZR; Parent MS*; Bakary G; Anasse F; Poonian CNS; Community Centred Conservation (C3), C3 Madagascar and Indian Ocean Islands Programme, Centre National des Recherches Oceanographiques, Madagascar, INRAPE, Comoros; *maryse@c-3.org.uk*
Novel, Low-Cost Research Methods for Effective Dugong Conservation in Developing Countries
The dugong (Dugong dugon) is a wide-ranging species that can migrate over distances exceeding 600km. To date, costly methods such as aerial surveys or the use of tracking devices have been used to assess the status and distribution of dugong populations over large spatial scales. However, some of the world's most endangered dugong populations are located in developing countries that often lack the technical and financial capacity to conduct such studies. We have field-tested and refined novel low-cost methods to rapidly assess the status and distribution of dugongs in northern Madagascar and the Comoros where focused research and effective management are urgently required to halt the rapid decline of the species. Our work consisted of three components: 1) questionnaire surveys with fishers and in-depth interviews with key informants, such as professional dugong hunters; 2) dugong habitat mapping, using remote sensing techniques and local knowledge to identify key seagrass areas for in-depth surveys 3) examination of historical records and anecdotal accounts dating as far back as the 16th century to assess the historical decline of the species and the changes in habitat availability over time. Results from the combined methods revealed past and present dugong hotspots and feeding areas to prioritize conservation efforts in key areas. Historical records corroborate and validate information gathered from surveys and highlight the importance of the shifting baselines concept in assessing populations of endangered marine species. This work has been supported by the Conservation Leadership Programme, Convention on Migratory Species, Rufford Small Grants Foundation, PADI Foundation, Sea World Busch Gardens Conservation Fund and Mohamed bin Zayed Species Conservation Fund

24.6 Davis, RA*; Scott, R; Stojanovic, D; Barrett, G; Stock, W.; Finn, H; Burbidge, A; Valentine, L.; School of Natural Sciences, Edith Cowan University, Birds Australia and School of Natural Sciences, Edith Cowan University, Birds Australia and Australian National University, Department of Environment and Conservation, Western Australia, Biology and Environmental Science, Murdoch University; *robert.davis@ecu.edu.au*
A slow fade to extinction: recovering Carnaby's Cockatoo - a generalist species subject to multiple threats.
Carnaby's Cockatoo (Calyptorhynchus latirostris) is a large, gregarious, generalist parrot endemic to Western Australia where it is threatened by habitat loss and fragmentation throughout its range. It is a migratory species utilizing breeding and non-breeding habitats hundreds of kilometres apart. The ability of managers to respond to threats is hampered by lack of knowledge of the species' movements and habitat preferences. Breeding sites in agricultural regions are being lost due to hollow competition and non-breeding habitat for this species encompasses the heavily urbanized capital city of Perth and its hinterland. Here rapid and ongoing loss of vegetation for housing has caused significant loss of feeding and roosting habitats. Carnaby's Cockatoo has adapted to preferentially feed on non-native plantation pine which is energetically more favourable and where it also roosts. However, research indicates major future impacts since plantation pines are scheduled for progressive removal. Current legislative frameworks deal poorly with these threats primarily because federal conservation legislation fails to address cumulative impacts or identify critical habitat. There is also ongoing state-federal conflict regarding impact assessment policy and procedures. We believe that Carnaby's Cockatoo provides a powerful model for investigating the conservation challenges of widespread, generalist species that are slowly fading out due to multiple threats.

SY73 Davis, S.K.; Canadian Wildlife Service; *stephen.davis@ec.gc.ca*
Status and Trends of the Prairies in Canada
The Prairie Ecosystem of Canada represents the northernmost extent of the Great Plains of North America. The ecosystem is comprised of mixed-grass prairie in the western portion of the country and tallgrass prairie to the east. Approximately 30% of the mixed-grass prairie and

SP2.8 Dawe, KL*; Boutin, S; Department of Biological Sciences, University of Alberta; *kdawe@ualberta.ca*
Range expansion of white-tailed deer (Odocoileus virginianus): climate change and land use
White-tailed deer have expanded their range into northern boreal habitats, which are atypical for this species, and are already having negative effects on the novel communities. Northern ungulates rely on stored body fat to survive winter, a period of net energy loss due to deep snow, cold temperatures, and limited forage intake. Warmer, shorter winters with less snow may increase northern deer survival by decreasing energy loss; however, land use increases forage abundance, which may increase survival by improving fat stores. To differentiate land use from climate effects, it is necessary to show biologically relevant changes in climate patterns. We develop a method to calculate a well described winter severity index using snow water equivalent rather than snow depth data, to capitalize on available climate data sets with broad temporal and spatial coverage. We then apply this index to historical deer data from across Alberta. Results suggest increases in white-tailed deer as winter severity decreases; however they are conditioned on spatial and temporal scale, as proximate effects of land use are also evident.

SP8.1 Dayer, AA*; Broussard Allred, S.; Stedman, R.; Cornell University; *aad86@cornell.edu*
Canaries in the coalmine: Birds as indicators and motivators for private landowner habitat management
While birds have achieved policy and research relevance as indicators of environmental change, limited research has explored the value of the "canaries in the coal mine" for lay audiences. Birds likely motivate and serve as indicators for private landowners undertaking habitat management practices on their land. We explored the role of birds, as compared to other wildlife or priorities, in encouraging private lands conservation in New York-specifically early successional habitat (ESH), which is considered to have low aesthetic and financial value. With changing land use practices and suppression of natural disturbance, ESH and related species are in decline in New York. Historically, ESH was prevalent in the state, but now, its quality and maintenance depends upon management. Given that 77% of New York's forest lands are privately owned, the existence of adequate ESH hinges on private landowners' activities. We conducted in-depth interviews with landowners who are managing for ESH to learn why they are undertaking such management, whether they are seeing expected results, and how they are measuring success. We also considered the types of birds, if any, that motivated landowners and kept them engaged. We found that landowners were undertaking this management largely for wildlife benefits (birds as well as mammals), differed in wildlife species goals depending on their recreational activities, and noted changes in wildlife populations without structured monitoring.

SP6.9 Dayer, Ashley A*; Couturier, Andrew; Easton, Wendy; Rosenberg, Kenneth W; Cornell University, Bird Studies Canada, Environment Canada, Cornell Lab of Ornithology; *aad86@cornell.edu*
Necessity for Tri-national Action for Bird Conservation: Protecting the Migration Spectacle and Unique Role of the Boreal Avian Nursery
Canada, Mexico, and the continental United States share 882 native landbird species. The great abundance and variety of our bird life provides immeasurable ecosystem services and serves as an indicator of changes to our environments. Facing unprecedented loss of bird populations and the imminent threat of extinction for many species, Partners in Flight Science Committee undertook a vulnerability assessment for the landbirds that regularly breed in the three countries. The assessment highlights the loss of bird diversity and habitats of greatest concern, the loss of a shared spectacle as common birds continue to decline, and the need for trans-boundary action. More than 200 species, and 80% of individual landbirds, rely on habitats in all three countries. Birds shared among all three countries are particularly well-represented in boreal forests during the breeding season and in Mexican forests in winter. These same forests provide year-round habitats for 70% of continental-concern species. The linkages among birds and habitats compel us to work internationally, to reinforce partnerships, and to develop new mechanisms for conserving both migrants and residents. We can achieve our goals to protect, restore and enhance populations and habitats of our birds, but the window is rapidly closing. Conserving our shared birds will require a continental, and ultimately hemispheric, perspective and a commitment to international cooperation.

P2.67 de Blois, S; Liston, A*; Plant Science and the McGill School of Environment, McGill University; *alexandra.liston@mail.mcgill.ca*

Temporal patterns of forest herb dispersal through hedgerow corridors within agro-ecological landscapes of southern Quebec, Canada

Forest fragmentation is considered to be a main cause of the worldwide and Canadian decline in biological diversity. The existing threat of fragmentation to flora biodiversity in Quebec, Canada, is exacerbated by climatic changes that shift suitable environments northward, away from species' current ranges. It is critical to evaluate the potential of plant species, exceptionally those restricted to forest environments, to migrate northward as an adaptive range shift to climate change. This research examines the temporal patterns of dispersal of forest herb species through corridors within agro-ecological landscapes of southern Quebec, Canada. We hypothesize that: 1) similarity in species composition between mature forests and corridors will increase with time, suggesting dispersal and recolonization and; 2) traits of forest herb species such as dispersal mode, flowering phenology, seed mass, etc. are related to species temporal patterns of dispersal through corridors. Data was subjected to Linear Regression and Redundancy analysis, to examine variance in species composition between forests and corridors over time. To explore associations among species traits and the environmental conditions of sites, Fourth- corner analysis was utilized. Our results provide insights on species that may be threatened by fragmentation and climate induced range shifts within agro-ecological landscapes. This study contributes to a larger research consortium whose purpose is to evaluate the state of biodiversity in Quebec in the context of a changing climate, and inform adaptation and mitigation strategies for biodiversity conservation.

P2.58 de Fontaubert, Charlotte*; Spalding, Mark; IUCN-US, The Ocean Foundation; *cdefontaubert@gmail.com*

Ocean Altering Projects to Mitigate Climate Change: Costs, Benefits and Mechanisms for Conflict Resolution

As the expected effects of climate change have become better understood, the need to initiate projects involving renewable energy has become more widely accepted. Such projects are becoming more common in marine and coastal ecosystems, leading to user-conflicts between those who may want to increase the level of renewable energy available, and others who are more conscious of the risks these projects may pose to fragile ecosystems, particularly in the coastal area. In the absence of a clear mechanism for conflict resolution, the decision to authorize such projects is often taken in a haphazard fashion, with little regard for their relative costs and benefits. This article discusses the challenge of balancing local impacts against global benefits. The nature of the conflict is described and the stakeholders are identified, along with their interests. Several options for possible conflict resolution are then discussed and a new type of conflict resolution mechanism is identified as necessary to balance the conflicting needs of global and local environments.

22.6 de Moura, AS*; Mesquita, B; Joaquim Nabuco Foundation and Federal University of Pernambuco, Joaquim Nabuco Foundation; *alexandrina.sobreira@gmail.com*

Economic instruments for Environmental Management in Brazil

Environmental policies involve three main aspects to the analysis of conflict resolution around the use of natural resources. Environmental management stands out as the first aspect related to the way government conducts the administrative and regulatory process. The second aspect is the decision-making process that reflects the democratic character and efficiency of decision making. The latter aspect refers to the policy tools used by government to implement the policies. The Brazilian environmental policy -established by law in 1981- uses instruments of command and control, stressing a regulatory apparatus with a focus on polluting activities. In this case, the government determines the norms which should be obeyed by the citizens. There are however limits to the effectiveness of these controls due to the difficulties of enforcing the law. Given the difficulties of environmental preservation stemming from these commands, public authorities have adopted economic instruments that affect costs and benefits of economic agents. These instruments are based on the polluter pays principle or through taxes or financial aid. In the context of economic instruments, Brazilian government has implemented two mechanisms that are discussed in this work. The first is a system of compensation that seeks to reduce the environmental liabilities, that is, costs and liabilities relating to activities of entrepreneurs who must maintain a balance between the damage caused and environmental assets (property and rights). There is a progressive legislation to be applied for environmental policy to be favored by that instrument. The second aspect to be addressed is related to the Ecological Value Added Tax. A federal law allows states to establish a policy to induce the municipalities to protect biodiversity, process solid waste and to provide incentives for local Agenda 21. In Brazil, twelve states have adopted this mechanism which has enabled the implementation of environmental policies. The work is based on a comparative research conducted by the authors considering the interface between the national environmental policy and its implementation in three states in Brazil

P2.150 Delgadillo, J.*; CantÃº, C.; GonzÃ¡lez, F.; Estrada, E.; Michael, S.; GarcÃ–a, J.; MartÃ–nez, E.; Resendiz, C.; Facultad de Ciencias Forestales, UANL, Linares, Nuevo LeÃ³n, University Biological Resources Division US G, Instituto de BiologÃ–a, UNAM, MÃ©xico, D.F.; *jonasvi69@hotmail.com*

A Conservation Approach to Wildlife Management Units (UMA) of Northeast Mexico

We assessed wildlife management units (UMA, according its initials in Spanish) of northeast Mexico to determine their contribution representing natural vegetation types, using Gap methodology. Northeast Mexico includes 59 natural vegetation types, 34 of them in primary condition. In northeast Mexico, 86% of 2,073,900 ha natural vegetation correspond to five vegetation types: rosetophilous arid scrub, microphilous arid scrub, tamaulipean thorn scrub, natural grassland, and mesquite land. In protected areas (PA) of northeast Mexico six vegetation types in primary condition are under-represented, however, two of them: mangrove and crasicaule arid scrub are represented in UMA above national average protected coverage (12%). Through a detrended canonical correspondence analysis (DCCA) we determined correlations between UMA and environmental variables, finding that white-tailed deer (Odocoileus virginianus) and collared peccary (Tayassu tajacu) are the most important hunting species. Moreover, black-tailed jackrabbit (Lepus californicus) and cotton-tailed rabbit (Sylvilagus spp.) are also relevant hunting species because great amount of used animals in northeast Mexico UMA. We concluded that UMA cover some vegetation gaps of PA system of northeast Mexico. Moreover, UMA include tamaulipean thorn scrub an endemic vegetation type to northeast Mexico and southern Texas which is under-represented in current PA system.

P1.118 Delgado, M.M.*; Penteriani, V.; EstaciÃ³n BiolÃ³gica de DoÃ±ana, C.S.I.C.; *penteriani@ebd.csic.es*

Breeding Areas Versus Temporary Settlement Areas: A Lesson For Conservation Biology

The dispersal behaviors and patterns of floaters are crucial elements in conservation biology. For species needing recovery plans, an accurate knowledge of dispersal behavior can be a key factor of conservation success. Because the areas where dispersers settle are unknown or difficult to detect, fewer efforts are typically devoted to the conservation of these sites compared to breeding territories; however, this can decrease the effectiveness of conservation plans and action. Population studies, analyses of population viability and extinction risk assessments that ignore the dynamics of dispersers within settlement areas may fail to understand how and why animal populations decrease, and may support inappropriate or ineffective conservation action. Dispersers may frequently use areas in which high levels of anthropogenic disturbance result in high mortality rates; moreover, settlement areas can look very different from breeding areas. Thus, while apparently low-value areas are not typically considered in conservation plans, they may be inhabited by the majority of floaters waiting for breeding opportunities. As a result, human and economic efforts are wasted in locations other than those in which conservation measures are really necessary. In fact, declines in breeding population size could divert attention from critical problems in the floater pool. By integrating information from both theoretical simulations and empirical studies on birds of prey and owls, we show the crucial link between the floating and breeding fractions of animal populations, as well as the importance of disperser's settlement areas for population dynamics, stability and persistence.

SY12 DellaSala, Dominick A; National Center for Conservation Science & Policy; *dominick@nccsp.org*

Upholding scientific integrity in the case of the threatened northern spotted owl (Strix occidentalis caurina)

the northern spotted owl is the symbol of old forests in the Pacific Northwest, USA. The owl was listed as threatened in 1990 due to destruction of its old forest habitat and a lack of sufficient regulations. For over a decade, the Northwest Forest Plan (NWFP), a global model in landscape conservation, served as a de facto recovery plan. Lawsuits by the timber industry in 2001 prompted proposals by the Bush administration to weaken protections under the NWFP; additional lawsuits by conservation groups in 2003 triggered development of an owl recovery plan but the plan proposed additional reductions in habitat protections. Testimony by scientists during Congressional hearings in 2006-2008 and a report by the investigative branch of the federal government in 2008 documented political interference in the owl recovery plan and dozens of endangered species decisions by the Bush administration. Legal challenges and scientific scrutiny of these proposals eventually led to their withdrawal by the Obama administration. This talk focuses on the role played by scientists, peer review, and conservation groups in uncovering political interference in the recovery of a threatened species. Throughout this process, peer review was pivotal in demonstrating the importance of best science in endangered species decisions.

SY72 DellaSala, Dominick A.*; Koopman, Marnie; Nauman, Rich; Barr, Brian; Spivak, Randi; Leonard, Jessica; National Center for Conservation Science & Policy; *dominick@nccsp.org*

Adapting western USA landscapes to climate change: the climate commons

Increasing land-use pressures combined with climate-change stressors present unprecedented challenges to land managers in the Western USA. Climate change strategies on federal lands, for instance, have focused largely on adaptive management approaches while those on nonfederal lands have been largely stakeholder driven and locally based. Here, we present some general principles for managers to respond to the challenges of climate change based on fundamentals of conservation biology, adaptive management, and stakeholder involvement. On federal lands, this includes protecting roadless areas as climate refugia and carbon stores in old forests as climate change mitigation, reducing stressors from multiple land-uses, and maintaining properties that allow species, and, in aggregate, ecosystems to resist and rebound from disturbance. On nonfederal lands, we present case studies from several basins in Oregon and California designed to develop broadly supported strategies for climate change at the local level. We argue that land management must shift from the "tragedy of the commons approach" of the 20th century to a "climate commons" whereby land managers and local communities use best science to prepare natural and human systems for climate change. Investing now in climate change planning will reduce substantial economic and ecological costs later from run-away climate change.

P2.201 DeMeo, T; Bormann, B; Evers, L; Barbour, J; Fay, Brett; Seesholtz, D; Buttrick, S; Lehmkuhl, J*; US Forest Service, Bureau of Land Management, US Fish and Wildlife Service, The Nature Conservancy; *jlehmkuhl@fs.fed.us*

Brokering Novel Solutions for Hot Forest Management Issues: The Pacific Northwest Consortium For Fire Science Delivery

We need better ways to deliver the science we do have, develop the science we don't have, and get science to affect real outcomes on the ground. The amount of new science on fire, fuel management, and forest restoration is overwhelming for managers to deal with effectively. Information is often conflicting, fragmented, not site-specific, or difficult to interpret. Time is scarce. Scientists tend to focus narrowly on ecological questions, are often poor in delivering timely and pertinent results, and often have few incentives to apply science in site-specific settings. Federal, state, university, and private partners, researchers and managers, are developing the Pacific Northwest Consortium for Fire Science Delivery as a neutral broker to tackle those issues and facilitate effective science-based management of the fire-prone forest and rangeland ecosystems of Oregon and Washington. A community of practice will create a "virtual learning community" to foster the delivery and sharing of knowledge via interactive web networking and training programs. An adaptive management process is being developed to select and implement projects that use current science and test alternatives, ensuring that we learn better from management and that differing scientific or societal views are accommodated. We plan to fully begin work in Spring 2010.

SY15 Dempsey, Jessica; University of British Columbia; *jdempsey@interchange.ubc.ca*
Assessing the risks of ecosystem change for financiers and insurers: the future of conservation?
Risk is a dominant lens for corporate and financial decision-making. Several international initiatives - including the World Economic Forum, host of the annual infamous meeting in Davos, Switzerland - aim to constitute present and future biodiversity and ecosystem service change as material risks to the â bottom line' calculations of investors and insurers. Incorporating measures of biodiversity loss and ecosystem services into financial risk analysis is a new approach for conservation policy and practice, and is worthy of further consideration. Towards this, my paper explores the following questions: how are biodiversity and ecosystem services are being brought into financial models and decision-making? And how are these approaches changing corporate, financial, and conservation practices? My research includes an analysis of the methodologies proposed to determine biodiversity and ecosystem service risk, and an assessment of the challenges faced in creating new objects of risk calculation. It also based on interviews with the proponents of such approaches from various sectors - finance, business, non-profits, and the United Nations. Bringing biodiversity and ecosystem services into risk analysis faces serious difficulties, particularly related to establishing quantification metrics that work with existing financial methodologies. Furthermore, it is unclear how this particular approach will mesh with the increasing focus on democratic and participatory conservation practice, as the types of spaces, species, and services prioritized under such a risk framework are those linked to protecting the material health and well-being of corporate and financial institution profit.

10.3 Denis, Jean-FranÃ§ois*; Dr De Blois, Sylvie; Mcgill;
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Invasion dynamics of common reed in freshwater wetlands
North America is currently experiencing an increase in rates of invasion by exotic species. Common reed (Phragmites australis) is an introduced species damaging wetland habitats. Its tolerance to a wide range of environmental conditions allows it to invade disturbed areas and to create monotypic stands that affect ecosystem functions and local biodiversity. Furthermore, native haplotypes of the reed are now subject to competition pressure induced by this aggressive invader. Knowledge about reed dynamics in freshwater wetlands of North America is still fragmentary. Our objectives were 1) to assess the invasion dynamics of two reed haplotypes (M, F) at population level; 2) evaluate impact of invasive haplotype M on the other haplotype and 3) to quantify the effects of reed on plant communities. 18 permanent plots adjacent to reed populations and non-invaded at t0 (9 exotics, 9 natives, 3 habitats) were monitored for 3 years. 5 transects each containing 11 plots at zone of contact between the haplotypes were also monitored for 3-4 years. Results suggest that haplotype M spreads faster, especially in disturbed areas. Haplotype M competitive value seems higher than its native counterpart and is affecting floral community structure. Haplotype M will most likely lower local value of biodiversity.

P2.2 Dennenmoser, S*; Rogers, SM; Vamosi, SM; University of Calgary;
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CRYPTIC GENETIC DIVERSITY IN FRESHWATER FISH UNDER CLIMATE CHANGE: NOT YET DISCOVERED, BUT ALREADY THREATENED?
The presence of unrecognized cryptic species may lead to an over-estimate of population size and genetic diversity and, subsequently, to an under-estimate of extinction risk in cases of habitat disturbance or rapid environmental change. We conducted a phylogeographic analysis using mitochondrial and nuclear DNA to explore demographic history, population genetic structure and the occurrence of putative cryptic species in a widely distributed northern temperate freshwater fish, the prickly sculpin (Cottus asper) in British Columbia and Alberta. Preliminary results indicate a complex pattern of at least four genetic lineages, with southern coastal and inland populations being highly divergent from each other. Furthermore, genetic diversity in the western Peace River region was significantly low and may reflect a bottleneck caused by habitat disturbance or a founder effect due to recent, post-glacial range expansion. These four lineages may be representative of genetically distinct groups that may have diverged in glacial refugia during the Illinoian and Wisconsinan Pleistocene glacial maxima. Overall, these results suggest that populations of C. asper represent a species complex and highlight the importance of disentangling historical from environmental effects on genetic diversity when undertaking conservations efforts aiming to preserve the genetic integrity of the evolutionary processes that generate biodiversity and allow adaptation to global change.

SP8.5 Develey, P.F.*; Luiz, E. R.; BirdLife/SAVE Brasil ; *pdeveley@uol.com.br*
Engaging Local People as a Strategy for Bird Conservation: Local Pride in Brazil's Atlantic Forest
The participatory process to build conservation strategies is crucial to achieve concrete results, since local people are active players in managing the environment around them. Here we present the results of a five-year conservation program in the Boa Nova region, Northeast Brazil, with the purpose to raise awareness in the local community and to change the way it interacts with the natural environment. Despite the region's biological importance (396 bird species, 14 globally threatened) Boa Nova is under the same intense pressure as most of the remnants throughout the Atlantic Forest region. Considering educational activities, we have promoted 125 talks for children, teenagers and adults from urban and rural areas with a total public of 3000 people. The main theme of all talks was the environment, the area's unique biodiversity and the importance of best practices to preserve the local natural resources using the Slender Antbird as a flagship species. We have also established a group comprised of 28 landowners resulting in the private protection of 2010 hectares of forests. Presently, the Slender Antbird has been adopted as a symbol of Boa Nova and environmental protection is part of the culture of the city. One important lesson from this project was learning the importance of having a key person inserted in the local community, experiencing the local reality and deeply understanding the environmental, social and cultural characteristics of the region.

SY73 Dextrase, A.J.; Ontario Ministry of Natural Resources; *alan.dextrase@ontario.ca*
The Mixed Wood Plains Ecozone - Status, Trends and Stressors
The Mixed Wood Plains of Ontario and QuÃ©bec is Canada's smallest and southernmost terrestrial ecozone. Despite its small size, the ecozone is home to 53% of Canada's human population and the population is growing at a higher rate than in the rest of the country. Species diversity is high, and the region supports a large proportion of Canada's Species at Risk. Most of the original natural cover has been lost and much of the remaining natural habitat is fragmented by agricultural and urban developments. Lakes and streams have also been affected by habitat degradation and fragmentation from multiple dams. Less than 2% of the ecozone is in protected areas, but there has been a recent trend towards the securement of private conservation lands and stewardship activities on private lands. In addition to habitat loss and fragmentation, the ecozone has been particularly affected by invasive alien species and pollution. Future threats include the cumulative effects of continued habitat loss and fragmentation associated with the ever expanding human population, the introduction and spread of invasive alien species, and the effects of climate change.

SP4.12 Dey, D.; South Asian Forum for Environment; *safeinch@gmail.com*
Indigenous cultivation in salt infested farmlands as Successful Climate Adaptation Practices in Cyclone Hit deltaic Sunderbans of India
Indigenous rice varieties yielded better production at 3.7 milimhos EC in salt infested farmlands of deltaic Sunderbans compared to HYV that failed to grow in fields with EC above 1 milimhos after saline water intrusion in Cyclone Aaila. Agroenvironmental conservation through integrated climate adaptation, drainage management and soil engineering by developing 5% water body where watertable is high and water moved horizontally and forming corner wells and diagonal drains in secluded plots of 35'X 45' dimensions, where watertable is at 1 m and water moved vertically helped in reducing the top soil EC by 74%. Fertilizer management was integral in adaptation measures, wherein additions of rotten Azolla soup reduced salinity effects on crop. Application of Zn and sufficient N, P, K with organic N as topdressing at critical growth stages prevented salt stress. Basal N proved less efficient on saline and sodic soils where replacement of Na by Ca was mediated through the application of gypsum in reduced P availability in the soil. Germplasm conservation and seed banks have been established to restore indigenous rice varieties like Nonabokra, Getu, Taalmugra, Patnai, Folkosha etc. proved to be better climate adaptation strategy, which was initiated through community participation and partnership.

P2.90 Dhar Amalesh*; Park Andrew ; Kames Susanne ; Research Associate,Center for Forest Interdisciplinary Research, Department of Biology, University of Winnipeg, Assistant Professor,Center for Forest Interdisciplinary Research, Department of Biology, University of Winnipeg, Research Assistant, Center for Forest Interdisciplinary Research, Department of Biology, University of Winnipeg; *amaleshdhar@gmail.com*
Impact of climatic change on tree phenlogy in the North American temperate forest
The available data on climate change over the past century indicating that the global temperature is increasing and it has a major impact on plant phenology as phonological events are strongly responsive to temperature. Scientist from the different discipline were observed changing of different phonological events such as timing of budburst, earlier spring flowering, earlier leaf unfolding, extended of average length of the growing season etc. Different experimental and modeling approaches have been developed to identify the mechanisms behind these changes and to make a precise projections concerning the consequences of climatic change. Here, we will discuss the recent progresses in the field of phonological research in responses to climatic changes in North America and draw a possible conclusion concerning the future tree phenology in the changing climatic condition.

P2.192 Dhar Amalesh; Research Associate,Center for Forest Interdisciplinary Research, Department of Biology, University of Winnipeg; *amaleshdhar@gmail.com*
Status of Endangered Small White Lady's-slipper (Cypripedium candidum) orchid in Canada and its conservation planning
The small white lady's-slipper (Cypripedium candidum) is an attractive endangered prone of extinction perennial orchid that inhabits in open areas of prairie and fen habitats. It occur relatively isolated populations at southern Ontario and southern Manitoba in Canada and eastern and western parts of the U.S.A. Different studies it revealed that there are 8 populations in southern Ontario and 15 populations in southern Manitoba. Among them one population in Manitoba and one in Ontario contain three-quarters of all of Canada's small white lady's slippers whereas rest 13 populations have less than 100 individuals and some of these consist of only a few plants along roadside ditches. The overall most significant risk factors for the viability of the populations are industrial, urban and agricultural development activities, encroachment by invasive weeds and woody plants, hybridization with other lady's-slipper species, inbreeding due to small isolated populations, and illegal orchid collection. For protection and conservation of small white lady's-slipper in field level may require; maintain the currently protected sites, increase the public awareness, control the hybridization with other lady's-slipper, a well defined habitat management strategies and a multi dimensional and institutional approach for implementation of conservation activities.

16.7 Dhar Amalesh*; Balliet Nicole ; Hawkins Chris ; Post Doctoral Fellow, Mixedwood Ecology and Management Program University of Northern British Columbia, Forestry Extension Officer, Mixedwood Ecology and Management Program University of Northern British Columbia, Professor,Mixedwood Ecology and Management Program University of Northern British Columbia; *amaleshdhar@gmail.com*

Regeneration and growth of Lodgepole Pine stands Following Mountain Pine Beetle Attack in Central British Columbia

The mountain pine beetle (Dendroctonus ponderosae Hopkins) epidemic has altered lodgepole pine (Pinus contorta Dougl. Ex Loud. var. latifolia Engelm.) forests to an unprecedented extent in British Columbia. The current infestation of lodgepole pine by the MPB has been estimated at over 10.1 million hectares attacked and around 710 million m3 of mature pine killed to the end of 2007. After an MPB outbreak, advance regeneration typically forms a new canopy and stand; however the time needed is unknown. Stands likely contribute to ecological processes and future timber supply. Assessment of regeneration and growth of residual trees in stands after MPB attack is critical for: forecasting long-term development of attacked stands; selecting stands for growth improving silvicultural treatments; and forecasting impacts to hydrology, habitat, and vegetation types. This work reviews and synthesizes relevant investigations about the regeneration and growth status of MPB attacked lodgepole pine stands in central BC describing species composition and abundance, spatial distribution and overall health. Different investigations revealed that more than 40 % of stands dominated by pine have adequate advance regeneration after MPB attack. In most cases, the distribution of advance regeneration was clumped and species composition varied at stand and landscape levels. Most of the affected area will likely recover on its own and can provide midterm and long-term timber supply, as well as ecological services. However in some cases, effective management of advance regeneration is required following MPB attack to attain desired future stand level conditions and maintain ecological processes.

19.5 DICK, DM*; Hines, EM; Holzman, B; Allen, SG; Department of Geography and Human Environmental Studies, San Francisco State University, 1600 Holloway Avenue, San Francisco, CA 94132 , Environmental Studies Program, San Francisco State University, 1600 Holloway Avenue, San Francisco, CA 94132 , National Park Service, Point Reyes National Seashore, One Bear Valley Road, Point Reyes Station, CA 94956 ; *doridick14@gmail.com*

Abundance and spatial habitat analysis of coastal bottlenose dolphins (Tursiops truncatus) at Turneffe Atoll, Belize.

Abundance estimates and spatial distribution information are critical for management and conservation of coastal small cetaceans, especially in developing countries where coastal human populations are increasing, the impacts of anthropogenic activities are often unknown, and the resources necessary to assess coastal cetaceans are limited. We adapted ship-based line transect methods to small-boat surveys to estimate abundance and spatial distribution of coastal bottlenose dolphins at Turneffe Atoll, Belize. Using a systematic survey design with uniform coverage, 34 groups were sighted during repeated small-boat line transect surveys in 2005-2006. Distance sampling methods estimated abundance at 216 individuals (CV=27.7%, 95% CI=126-370). At least 3 neonatal calves were seen and 26% (n=9) of groups had at least one calf. Over 75% (n=26) of sightings were within sheltered lagoons. Randomization tests showed dolphins occurred closer to mangrove shorelines and atoll openings than would be expected by chance. Turneffe lacks legal protection and development pressures are increasing. The low number of animals and the importance of two coastal features to the dolphins must be considered as the Belizean Government plans a new marine protected area. Conservation actions should: continue monitoring the dolphin population, minimize mangrove removal along shorelines, discourage further development at atoll openings, and prohibit additional development within the lagoons.

SY77 Dieterich, M. ; ILN Singen/University of Hohenheim; *dieterim@uni-hohenheim.de*

Natura 2000 and its implementation - case examples from Baden-WÃ¼rttemberg (Germany)

The EU Conservation Directives (Birds Directive and Habitats Directive) have been considered the most progressive nature conservation legislation on a global scale. In the humans dominated European landscapes, the Directives attempt to integrate strict conservation of species and sites, while leaving options for environmentally sound land-use and development. Reserve designation (Natura 2000 sites) is an important component of the directives. In Germany, Natura 2000 sites cover approximately 14% of the territory. However site designation and listing of species subject to strict protection is only a first step towards effective preservation of the European natural heritage. More challenging is the subsequent implementation of management plans directed at the maintenance or restoration of favourable conservation status of habitat types and species. A state wide survey on the implementation of EU conservation directives was conducted in the Federal State of Baden-WÃ¼rttemberg (Germany). More than 50 local groups of an NGO were surveyed (questionnaires and telephone interviews). Interviews with administrations were conducted (ministry, regional administrations, county administrations). Main deficiencies with the implementation of Natura 2000 include inappropriate impact assessment, lack of implementation of cross compliance regulations as they relate to protected habitat types (e.g. lowland hay meadows), and lack of personal to implement management plans. Successful implementation will require sound standards that are strictly enforced.

SY43 Dieterich, Martin; ILN Singen/University of Hohenheim; *dieterim@uni-hohenheim.de*

The IPBES process - reflections on high quality science at the science - policy interface

Despite the ongoing human-caused mega-extinction and the growing understanding of biodiversity dependent ecosystem resilience in maintaining ecosystem services, the established systems for informing and influencing policy and political processes often fail to provide the needed science-based information. In response, a process towards an Intergovernmental Panel on Biodiversity and Ecosystem Services (IPBES) designed to mirror the IPCC has been launched by European governments. The main problems hampering information flow include that the policy-political process tends to dilute messages perceived as less desirable from a short-term economic and political perspective, and that scientists fail in providing information in a format that is policy-relevant. This is particularly evident for biodiversity functions that in parts are vividly disputed in the scientific literature. In this context, the definition of political targets to halt the loss of biodiversity is a key success (e.g. the Gothenburg target). Within this target there is a need for better integration of scientific information meeting three basic requirements: Independent - not connected to established interests; Credible - knowledge and evidence subject to peer review; and Flexible - able to address a wide range of issues, including freedom to identify emerging topics. This presentation will explore options for steps forward in the IPBES process.

SY7 Dietz, RW; Center for the Advancement of the Steady State Economy; *rob_dietz@steadystate.org*

Using GDP to Indicate Scale and Other Indicators to Indicate Welfare

For years, economists and politicians have wrestled with the concept of rising Gross Domestic Product (GDP) as a measure of progress. Even the father of national income accounting, Nobel laureate Simon Kuznets, warned the U.S. Congress in 1934 that "The welfare of a nation can scarcely be inferred from a measurement of national income." In 1968 Robert F. Kennedy lamented, "Too much and for too long, we seem to have surrendered personal excellence and community value in the mere accumulation of material things." He went on to list a series of ills (e.g., air pollution and highway carnage) that are added to GDP. More recently, the Commission on the Measurement of Economic Performance and Social Progress has added a rigorous and critical analysis to the debate on GDP. GDP is a very useful indicator of the scale of the economy, but a poor indicator of societal well-being and progress. It has become clear that our economic accounts need an overhaul, especially to address declining stocks of natural capital, including ecosystem services and biodiversity. Many other indicators, such as the Genuine Progress Indicator, Ecological Footprint, and Happy Planet Index have been developed to distinguish between increasing economic scale and increasing economic well-being. Given the adage that "we manage what we measure," it is time to supplement GDP, so that we can manage the economy to meet people's needs without undermining the life-support systems of the planet.

P1.76 DIOP, Mamadou *; SAMBOU, Bienvenu; GOUDIABY, Assane; Institut des Sciences de l'Environnement, UniversitÃ© Cheikh Anta DIOP; *mdiopdekmg@yahoo.fr*

The influence of popular believes on the preservation of the natural vegetation resources

Local populations are commonly reproached of being responsible of natural resources degradation of their environment. Trees and forest resources are seen as mere constituents of the nature devoted to the satisfaction of their ecosystem services needs, and must be preserved for that purpose. Only in few societies, the tree and the forest resources are perceived through immaterial functions that flag them as holly areas. In this context, this qualitative study aims to understand the popular believes appended to tree and the forest services and their influence in the preservation of natural resources among the Senegalese rural populations. The results show that several species are feared or sought mystical because there believes that they shelter spirits. Sites are relatively conserved because of these spirits or particular relations which exist between trees and deaths. This contributed to the preservation of some species but such a perception tends to disappear because of numerous ongoing socioeconomic, demographic and ecological transformations. To knocking down this tendency, these faiths must be listed, protected and popularized at the actor\'s of the management of natural resources. Because their disappearance, beyond even of the loss of biodiversity, will cause a collapse of a whole piece of the sociocultural foundations of the communities which live around this forest. Keywords: Senegal, popular beleives, preservation, classified forest, natural resources

SY10 Donlan, C. J.*; Mandel, J. T. ; Wilcox, C; Cundey-Beuno, R.; Pascoe, S.; Tulchin, D.; Advanced Conservation Strategies, McKinsey & Co., CSIRO, The David and Lucile Packard Foundation, CSIRO, Social Enterprises Associates; *jdonlan@advancedconservation.org*

Debt investment as a tool for value transfer in biodiversity conservation

A central challenge in conservation is to create value effectively around local resources that will lead to better environmental stewardship. Historically, conservationists have either used indirect approaches such as the promotion of alternate industries like eco-tourism, or more recently direct approaches, such as land purchases and cash payments. While direct payment programs, through conservation incentive agreements and regular payments for ecosystem preservation, are being trialed in low-income nations, the lack of enforceable property rights and contractual laws can present challenges when trying to influence conservation outcomes in local communities. We suggest an alternative approach - debt-based investment - that capitalizes environmental assets locally and makes that capital available to local communities through collateralized lending, microfinance approaches, and access to affordable financial services. Tying the value of capital in a conservation lending trust to the global value for intact environmental resources will create incentives for local environmental stewardship while providing economic access to what is often a poor community's most valuable asset - intact natural resources.

5.5 Donna J. Sheppard; Axel Moehrenschlager*; Jana M. McPherson; John J. Mason; Conservation Outreach Department, Calgary Zoological Society, Centre for Conservation Research, Calgary Zoological Society, Nature Conservation Research Centre, Ghana; *axelm@calgaryzoo.ab.ca*

Ten years of adaptive community-governed conservation: evaluating biodiversity protection and poverty alleviation in a West African hippopotamus reserve

Although community-based natural resource management has been accused of failing on social, economic, or ecological grounds, balanced assessments are rare. We therefore examine the first 10 years of Ghana's Wechiau Community Hippo Sanctuary using an evaluation framework that considers socioeconomic and ecological outcomes as well as resilience mechanisms. The initiative at Wechiau, which builds on traditional, local taboos against the killing of hippos, has attempted to conserve an imperilled large mammal, protect biodiversity and alleviate abject poverty amidst a bush meat crisis and complex ethnic diversity. We find that the Sanctuary has improved local livelihoods by spurring economic diversification and infrastructure development rates 2-8 times higher than in surrounding communities. Simultaneously, threats to biodiversity have subsided, hippopotamus numbers have remained stable and the Sanctuary's riparian habitats now harbour more bird species than comparable areas nearby. Improved social capital, true empowerment, an equitable distribution of benefits, ecological awareness among the next generation and support for the Sanctuary even amongst community members who were disadvantaged by its creation speak to good long-term prospects. Risks remain, some of which are beyond the community's control, but evidence of socio-ecological resilience provides hope for sustainability. Lessons learnt lead to recommendations for future community-based conservation initiatives.

SY52 Doug Biffard*; Tory Stevens; Nolan Porther; Ministry of Environment, Vancouver Island University; *doug.biffard@gov.bc.ca*

Shoreline Sensitivity and Climate Change Adaptation in the Coastal and Marine Protected Areas of British Columbia

Protected areas managers are facing the reality of climate change. The British Columbia protected area system includes approximately 10,000 km of marine shoreline with associated terrestrial and marine ecosystems. Traditional management approaches assume that many shoreline features are static and enduring. New information is needed to inform a new approach that recognizes the importance of adapting to rising sea level, increasing storm intensity and frequency, changing wind, rainfall, humidity, air temperature and water temperature patterns. Managers require knowledge of the relative sensitivity of shorelines to climate change and an appropriate set of adaptive responses. Our approach independently rates marine and terrestrial segments then spatially combines the ratings to build a map of coastal sensitivity. We used an existing biogeographic land classification dataset, and previously rated sensitivity of coastal and marine feature classes. We then modified the ratings based on slope, exposure and sediments. While the results are informative for any site along the British Columbia coast we focus on the protected areas. Three case studies will be presented that show the range of shoreline sensitivity types and case-specific strategies to avoid maladaptive activities.

P1.15 Doug Macaulay*; Jill Henry; John Hallet; Alberta Agriculture and rural Development, County of Grande Prairie, Alberta Conservation Association; *doug.macaulay@gov.ab.ca*

Riparian Buffers for Habitat Enhancement of Beaverlodge Watershed - Alberta, Western Canada

Prior to European agricultural settlement of the Beaverlodge River watershed (Alberta, Canada) at the turn of the last century, the area contained extensive woodlands and wetlands. However, over the last hundred years, this area has experienced extensive deforestation, wetland drainage, and general habitat degradation. After the deforestation and wetland draining, increased agriculture (including cereal crops and cattle farms); and oil wells, has led to poor water quality, significant riverbank erosion, higher water temperatures and the loss of many native fish species such as the Arctic Grayling (Thymallus arcticus). This species is considered a sensitive species in the Alberta Sustainable Resource Development (2005) report. It is a cool water, sportfish that has significantly declined in the past fifty years. It is now only found in about 40% of its historical range as a result of overfishing, habitat fragmentation caused by activities such as improperly installed road culverts, increased water temperatures due to changes in the climate and detrimental land-use activities. The "Riparian Reforestation and Wildlife Habitat Enhancement" agroforestry project described in this chapter has built awareness of how habitat adjacent to the Beaverlodge River and its tributaries can be restored through tree and shrub plantings and fencing to improve riparian health and wildlife or fish habitat. This three-year project was initiated in 2008 by the Agroforestry and Woodlot Extension Society (AWES) with support from the County of Grande Prairie and the West County Watershed Group, and funding from the Alberta Conservation Association's Grant Eligible Fund. The goal of this agroforestry project was to improve degraded woodlands bordering creeks and rivers in the Beaverlodge River watershed on private lands. The project attempted to show that agroforestry systems such as riparian buffers along with riparian protection can be used as a tool to help improve water quality and fish and wildlife habitat, and reduce the erosion of banks within the Beaverlodge River Watershed. The project worked with landowners in this watershed to replant degraded riparian buffer zones. Overgrazed pastures and cultivated farmland with no trees along these waterways were the primary focus of this work. Our methods included the formation of a planning team, a public awareness campaign to attract participants and educate them on riparian area values, hiring a tree planting contractor and a planting goal of 66,000 trees on 150 acres of private lands. So far, two years of funding were acquired, 13 private landowners have participated, and 44,000 trees have been planted.

21.3 Dowsley, M*; Lemelin, H; Walmark,M; Franz Seibel; Fort Severn First Nation; Lakehead University , Lakehead University, KORI, KORI, Fort Severn First Nation; *mdowsley@lakeheadu.ca*

Scenario planning to explore possible responses to the listing of polar bears as threatened in Ontario

Polar bears (Ursus maritimus), were listed as a threatened species in Ontario in 2009 as a precautionary measure based on the expectation that their sea ice habitat will decline. Both scientific information and traditional knowledge indicate the population is abundant and productive. The uncertainty of population status and appropriate government response can be dealt with effectively through scenario planning. As part of a larger collaborative project involving Cree communities of the Hudson Bay Lowlands, university researchers and the Keewaytinook Okimakanak (KORI) tribal council, we used scenario planning to structure discussions around possible futures for Cree-Polar Bear interactions. We will present information that led to three conclusions. 1. This tool is most effective when participants are familiar with the history and current information associated with the issue. 2. The scenarios were especially helpful in increasing the number of options to be considered and in generating discussions about all options, rather than allowing discussions to be sidetracked by the appeal of one or a few options. 3. Scenario planning allows participants to prepare rational and strategic decisions for all scenarios including those that are initially viewed to have a low probability of occurring. Scenario planning therefore provides a potentially valuable tool in examining resource use options.

P1.14 Draheim, Megan M.*; Rose, Naomi A.; Kruse, Christi A.; Parsons, E.C.M.; George Mason University, Department of Environmental Science and Policy, Humane Society International, George Mason University, Department of Biology; *mdraheim@gmu.edu*

Looking a Gift Horse in the Mouth: Corporate Conservation Education Programs

As school budgets are cut, many teachers are searching for ways to augment their curriculum. Corporations are one source for free educational materials; however, these materials may be biased. We examined the free online materials that SeaWorld provides to educators. We used qualitative content analysis to break the materials into themes and compared SeaWorld's claims with the scientific literature in order to determine their value in a conservation education program. We found that the materials included factual inaccuracies. For example, Sea World generally characterizes the collapsed dorsal fins of male killer whales as "normal;" however, in most wild populations only 1%-5% of adult males have fully collapsed fins, while 100% of captive adult males do. SeaWorld also inaccurately portrays beluga whales' life spans as being half of what the current scientific consensus is by using an analysis that is obsolete. By choosing not to acknowledge the best available scientific information, the quality of its educational content is put into doubt. While some of the content does have educational value, it is presented in such a way as to privilege SeaWorld's corporate goals. Indeed, the material actively promotes its commercial activities. Free conservation educational materials can be an important asset to underfunded classrooms, but educators should be aware of corporate agendas and examine the materials from a critical perspective before incorporating them into their curricula.

SY15 Dressler, Wolfram*; Roth, Robin; University of Queensland, York University; *w.dressler@uq.edu.au*

The Good, the Bad and the Contradictory: Neoliberal Conservation Governance in Rural Southeast Asia

The logic of the market economy increasingly informs the design and outcomes of conservation in the developing world. This paper demonstrates that rather than replace coercive conservation, the current neoliberal turn rearticulates coercive goals by affecting farmer behavior in ways deemed consistent with forest conservation and market-oriented incentives. Case studies from Thailand and the Philippines show how and why the market-based mechanisms driving conservation become manifest in rural areas, pushing local livelihoods toward intensified commodity production. The conclusion asserts that market-based conservation governance may constrain as well as support farmer freedom to pursue particular livelihoods, resulting in contradictory outcomes for neoliberal conservation governance.

P2.210 Drozdovska A.; Kyiv National Taras Shevchenko University; *alminka@mail.ru*

Parnopes grandior (Pallas, 1771) (Hymenoptera: Chrysididae) in Ukraine.

Parnopes grandior (Pallas, 1771) is a cuckoo-wasp (Hymenoptera: Chrysididae) which is a cleptoparasite of digger wasp Bembex rostrata (Linnaeus, 1758). This species is of rare occurrence over the whole territory of Central and Eastern Europe. In some European countries this insect is recorded in the red lists or protected by law (Germany, Poland, Russia, Slovakia). Special researches of this species over the territory of Ukraine were not conducted. We have studied the distribution and ecological features of Parnopes grandior of 8 administrative regions of Ukraine. This species turned to be out widespread over the studied territory, but it is rare one, despite the overall availability of its host Bembex rostrata. The reasons causing this phenomenon are not clear. Therefore, this species needs special attention to monitoring in Ukraine.

P1.192 Dubesky, CM; University College of the North; *cdubesky@ucn.ca*

Wolf Research Possibilities in a Changing Boreal Forest

Consequences of climate change become more apparent, data on severity of impacts in Northern regions and communities is limited due to accessibility. The University College of the North, situated in the "heart of the boreal forest", Is an ideal setting for conservation research opportunities. With expansion of their degree offerings, it is an opportune time to expand partnerships with community stakeholders and to identify research opportunities in those areas. Increased development in the Northern Manitoba region has opened access to these the Boreal Forest, Taiga, Tundra, Transitional, Freshwater and Marine biomes of which Thompson is the hub. Biomes in this region have had little research conducted with the exclusion of the Churchill region which is reachable from Thompson. Conservation and protection of these pristine northern areas will become an area of concern with escalation of development activities. Anecdotal information from Northern regional residents about the noticeable changes in the climate is the only data available at this moment. This data could be the first step for monitoring the changes, that is, it is difficult to state that the climate is changing without data for comparison. To stimulate research interests in this region, one top predator, the wolf, has been selected as anchor species for research. The wolf is a significant animal within many Aboriginal cultures and establishment of a "Wolf Centre of Excellence" has begun within UCN to promote innovative wolf research and provide support for researchers wanting to expand their scope to include these regions. UCN envisions itself as a facilitator and liaison available to researchers interested in conducting research with wolves and other species in the region.

SP8.11 Duguma, LA; Institute of Forest Ecology, University of Natural Resources and Applied Life Sciences Vienna Austria; *lalisa222@yahoo.com*

The Moral Challenges in Communities Living Near Protected Forests: The Case of Central Highland Ethiopia

Ethiopia has less than 2.7% of its land covered with forest though over 85% of the population relies on wood for construction, energy and other basic wood needs. In an attempt to protect the important forest reserves through minimized human interventions, some forests were declared as protected forests. This paper tries to assess the moral challenges communities living around protected forests face and the possible mechanisms to mitigate or lessen the problem. The study bases on data collected using interviews, informal discussions, direct observation, and group discussions held with the society living near Menagesha Suba state forest. Due to strong reliance on forest products-even though the forests are protected-the society still utilizes them illegally. But members of the society revealed that such illegal usage has got serious moral impact on them. Some of the major moral challenges are theft, mistrust, transgression, illegality and lie. Though these moral issues are also unacceptable within the society, their problem surpasses these challenges - forcing them to continue the usage. It was also found out that the moral challenges result from four major types of decisions individuals make regarding usage of protected forests. Those are the no-alternative decision (usage due to lack of alternative forest products sources), the â luxury' decision (extracting wood to generate income for entertainment), the ignorance decision (usage due to lack of knowledge about its importance) and the revenge decision (usage because the state forest took their lands). In general, to minimize the moral challenges posed due to the new forest management scheme, it is important either to incorporate the people in to the project scope or help them to produce forest products by using tree-based agroforestry practices.

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Forest - A Resource against Urban Poverty: Some Lessons from Central Ethiopia

Urban poverty-aggravated by rural-urban migration-is a major problem in Ethiopia. Farmers with failed yields and poor lands, youngsters and women are fleeing to urban areas to find jobs. Through time they just remain in there by devising their own way of life. This paper tries to address how such poor people living in urban areas make-up their livelihood from forests close to their new homes. The paper is based on informal discussions, visits and direct observations with urban migrants living in a poor condition. Urban poor depend on forests for two major aims: for household consumption and for income generation. Household consumption includes fuelwood, construction wood and some medicinal parts of plants in the forest. Dependence on forests for income generation has many forms. Households earn income by collecting and selling fuelwood and eucalyptus leaves and twigs to urban consumers. Some are also engaged in illegal smuggling of timber and poles from the forests which are sold at sawmills in the towns. Moreover, many of the urban poor are engaged in brokering task of forest products which may benefit them up to 5% of the price of the forest products. In general, forests nearby urban areas are considerably helping the urban poor survive from day to day. Nevertheless, forests are under great pressure from various dimensions (e.g. overutilization, illegal exploitation, conversion to farmlands, conversion to resettlement areas especially near urban areas, etc.) which threatens the urban poor's livelihood in the future. Thus, conserving forest resources is a mandatory activity in which urban administrations and communities and the rural farmers should be involved as forest depletion severely affects the whole community.

P2.12 Duque, S*; Abud, M; Valderrama, S; Calero, H; Sanchez, F; no; *gaiacarryon@gmail.com*

A camera-trapping approach for the study of the mountain tapir (Tapirus pinchaque) in the high-Andean ecosystems of the Purace National Park, Colombia.

The mountain Tapir (Tapirus pinchaque) is a large herbivore ungulate mammal inhabits the Northern Andes, including high-Andean ecosystems such as montane forest and paramo between 2000 - 4000 meters. This species is considered Endangered by the IUCN red list, being the habitat fragmentation a main threat throughout its original distribution. The larger populations are believed to be located in the Central Andean range of Colombia, distributed in some isolated protected areas. Also the hunting is reported how a critical threat for the species, owing to low density and intrinsic rate of natural increase in tapirs. Some studies reported a density between 0.17 - 0.25 ind/sq km and a home-range of 2.5 - 8.8 sq km through the use of radio-telemetry and GPS collars methods. The camera-trapping studies could be a prominent less expensive and invasive method for estimates some population parameters. Nevertheless, only one study with mountain tapir in Ucumari regional park - Colombia is reported using infrared monitors to survey the activity patterns of species. We initiate a camera-trapping approach for minimum abundance estimation of the mountain tapir on the Purace national park, for survey a site with tracks and visual records of the species. To date we found 1 individual on the area, visiting monthly the salt-lick and adjacent forest trails. We conclude that the camera-trapping is an efficient method for the area, how we expected to prove in the next months. At the same time we carry out a educational work in a settlement on the buffer-zone of the park, but we think that the stake-holders and administrator of the area could be the best fit population for replicate on time the human well-being knowledge beyond this study.

P1.107 DurÃ¡n, S. M. *; Koper, N.; University of Alberta, University of Manitoba; *sduran@ualberta.ca*

Scale-dependent effects of landscape context on grassland songbirds in a Canadian mixed-grass prairie

Landscape context may influence richness and abundance of prairie birds. Previous research has shown that local parameters have been better predictors than landscape parameters in explaining abundances of prairie birds. Yet many studies have been conducted at relatively small spatial extents on landscapes from 12 ha to 800 ha. We examined the spatial extent at which prairie birds respond most strongly to landscape factors. We sampled 20 landscapes in south-western Manitoba in 2008-2009 to determine species richness and abundance of obligate and facultative grassland birds. We evaluated bird responses to percent cover of grassland, forest, edge density and distance to the forest at seven spatial extents from 200 ha to 7200 ha. Obligate grassland birds responded at spatial extents of 1800 ha and higher, while facultative species responded at smaller extents of 450 ha. Abundance of obligate species decreased with edge density and distance to forest, while abundance of facultative species increased near woodland habitats. Our study emphasizes the importance of spatial extents greater than 800 ha and perhaps exceeding 7200 ha for some species. Previous studies that found local factors as better predictors may have evaluated landscape parameters at incorrect spatial extents. An incorrect selection of spatial extents may lead to misinterpretation of broad-scale processes, which can have undesired consequences for designing management strategies for species conservation.

SY79 Dyer,; SJ; *simond@pembina.org*

Troubled Waters: Oil Sands Development and Water

Oil sands development (both mining and in situ) consume significant quantities of water. A typical oil sands mine uses 2 barrels of water for every barrel of bitumen produced, and a typical in situ project over 1 barrel of water per barrel of bitumen. Tailings "ponds" of mine wastes now cover over 130 km2 of northern Alberta, while disposal of liquid waste material from in situ operations is a growing area of concern. Stakeholder concerns include impact of oil sands withdrawals on the Athabasca River during periods of low flows, tailings management, financial securities governing reclamation and tailings management, monitoring and the risk of pollution. This presentation will explore some of the contentious issues around impacts of oil sands development on water quality and quantity in Alberta and present potential solutions to ensure oil sands development proceeds more responsibly.

SY7 Dyer, SJ; The Pembina Institute; *simond@pembina.org*

Death by a Thousand Cuts? - an introduction to oil sands development in Alberta, Canada

Oil sands deposits underlay 140,000km2 of Alberta, Canada - an area the size of Florida and by volume represent the world's second largest recoverable oil deposit. Oil sands production of tar-like bitumen already exceeds 1.3 million barrels per day and is projected to increase significantly as new projects are developed. Oil sands development takes two forms: where oil sands are close enough to the surface it is strip-mined, where the deposit is deeper in situ techniques are used to extract the bitumen, most commonly involving injecting steam underground. Already, over 80,000 km2 of lands have been leased for oil sands development - a process that includes no environmental assessment. Both processes have significant impacts on wildlife and ecosystems. This presentation will describe the current approach to oil sands development in Canada, provide an overview of environmental impacts of oil sands development on air, land, wildlife, water and climate and examine how a failure to manage cumulative environmental impacts and set acceptable environmental thresholds and limits on the pace and scale of development is contributing to growing impacts and increasing attention from around the world.

SY65 Edpalina, Rizalita*; Nakamura, Koji; United Nations University-Institute of Advanced Studies, Center for Nature Science and Technology-Kanazawa University; *edpalina@ias.unu.edu*

Efforts for holistic coastal management based on Sato-umi Initiative in Noto Peninsula, Japan

Enhancing the role of local communities in managing coastal zones is an increasing commitment by governments in East Asia, including Japan. The Sato-umi Initiative is a traditional Japanese practice characterized by the harmonious interaction of local communities and coastal environment while preserving the traditional/local knowledge practiced by these communities. This paper discusses sato-umi conservation effort which regarded as a management option to reverse destruction of coastal habitats and support biodiversity conservation in Noto Peninsula. This study considered people\\\'s perceptions relating to sato-umi such as dependence on coastal resources, resources\\\' condition, threats and support for the conservation and management of the bay. The Noto experience has shown that participatory approach working with stakeholders is effective in addressing coastal issues at the local level. Attention should focus on the need to link local concerns, needs and actions to the national and international level activities to conserve and manage the coastal and marine ecosystems. Results recognize that co-management, community-based approaches and traditional knowledge can be appropriate in dealing with coastal management. Finally, lessons from the initiative may provide a conservation model that Japan can share throughout the world. Some aspects relating to sustainable management processes may be suitable and relevant under certain scenarios.

SY71 Edwards, Felicity*; Gibeau, Mike; CSE Group, Parks Canada; *mike.gibeau@pc.gc.ca*

Resolving Wicked Conservation Challenges -- It's About The People

Addressing resource management problems successfully is a complex task that involves knowledge both of the problem itself and its context. This paper focuses its discussion on the ways in which to involve people who both have an interest in and value the resource in different ways. In recent years, efforts to manage grizzly bears (Ursus arctos) in Banff National Park have been hindered by acrimonious disputes about the production and use of scientific knowledge in the management This paper describes the range of involvement practices used - moving along a spectrum - from the typical methods used such as informing to the use of more collaborative methodologies such as organizing frameworks for more innovative solutions. We describe the differences in process and outcomes to the wicked problems of grizzly bear conservation. In this presentation we discuss the design and outcomes of the discussions, the reality on the ground and the implications for both organizational change and learning. Topics discussed in this paper are organized around FIVE main questions: - What does it take to get people to the table? - What does it take to get people to see themselves and others in value terms? - What are the working assumptions of a group discussing a "wicked" issue such as this? - What is needed inside the participating organizations to enable this integrative approach to be successful? - What is the role of leadership in these situations?

21.8 Edwards, Mark*; Derocher, Andrew; Hobson, Keith ; Branigan, Marsha; Nagy.,John; Royal Alberta Museum, University of Alberta, Environment Canada, Government of Northwest Territories; *Mark.Edwards@gov.ab.ca*

Defining intrapopulation variation in the foraging behaviour of Arctic grizzly bears

Frequently, broad dietary categories are ascribed to populations, which can mask intrapopulation variation and as a result we may fail to meet the needs of certain segments within the population. To examine intrapopulation diet variation, we used stable isotope analysis (Î´13C,Î´15N) on hair and claw from 52 grizzlies (2003-06) from Arctic Canada. We examined within-population differences in foraging and the relationship between trophic position (i.e., Î´15N) and range use. Values of Î´15N in hair and claw (2.0â °-11.0â °) suggested a wide niche width. Cluster analysis identified 3 foraging groups ranging from near-complete herbivory to near-complete carnivory. Although we found no linear relationship between home range size and trophic position when data was pooled or when grouped by foraging behaviour, movement was positively correlated to trophic position. To determine the proportional contribution of seven prey sources within each foraging group we used multi-source dual-isotope mixing models. The mean bear dietary endpoint across all groups fell toward the center of the mixing model, which suggested relatively well-mixed diets. The primary difference between foraging groups was the proportional contribution of herbaceous foods, which decreased from 34-76% to 0-31%. We suggest that the improved knowledge of intrapopulation diet variation increases our understanding of the varying requirements of select species and communities across the landscape, and our ability to conduct effective conservation.

SY41 Eisenbeis, G*; Eick, K; Non-SBC member; *geisenbe@uni-mainz.de*

Attraction of nocturnal insects to street lights with special regard to LEDs

Artificial lighting is a key factor for nocturnal insects, which are attracted in huge numbers to many sorts of light sources. Millions of lights illuminate urban areas and extend deeply into the open landscape, especially along roads. In the summer of 2008 the City of DÃ¼sseldorf initiated a study to evaluate the insect flight activity to street lights. We compared modern lamp types such as metal halide and LEDs to older lamp types, e.g. high pressure mercury lamps, high pressure sodium lamps and fluorescent lamps. From June 24 to September 2, we used 20 traps to catch insects flying around the street lamps in a suburban area of DÃ¼sseldorf. Traps were exposed in a daily pattern. We analyzed 964 nightly samples containing 33,896 insects belonging to 13 insect orders, of which 7 predominated while 6 were counted only in lower numbers. In comparing the flight activity we used the attraction to the high pressure mercury lamps as reference (=100%). On this basis we determined a sequence of attraction for all insect orders down to -80%. The 7 most common orders behaved very differently, e.g. the moths were attracted to minimum values in the range of -95%. Two orders were found to be attracted stronger than the reference. The most significant differences regarding the bulk of insects were between LEDs and all the other lamp types. They did not emit any UV and proved to be very insect friendly.

SY28 Eisenberg, CA*; Ripple, WJ; Oregon State University; *cristina.eisenberg@oregonstate.edu*

Trophic Cascades Involving Humans, Wolves, Elk, and Aspen: A Landscape-Scale Study of the Ecological Effectiveness of Wolves

Trophic cascades feature a strongly interacting species that is a top carnivore, which influences the abundance and behavior of its primary prey, thereby indirectly affecting its prey's food consumption. An ecologically effective population of a top carnivore is one capable of triggering trophic cascades. In the case of the gray wolf (Canis lupus), this can shift an ecosystem from an alternative stable state characterized by intensely browsed vegetation, to one in which thriving vegetation can provide habitat for many species, such as songbirds. MVP criteria have been used to set population levels for delisting decisions under the ESA. By these measures it has been argued that the wolf in the northern Rocky Mountains is fully recovered. An ecologically effective population of wolves, i.e., one capable of triggering trophic cascades, may be a more scientifically sound approach. We used a gradient of wolf densities in the Crown of the Continent Ecosystem to investigate how trophic cascades effects differ among them. Methods included vegetation sampling, pellet transects, songbird point counts, radio-telemetry, and focal animal observations. We found high wolf density stimulates strong trophic cascades effects, medium density stimulates moderate trophic cascades effects, and at low densities wolves are not ecologically effective.

SY26 Eldridge, D.J.*; James, A.I.; Whitford, W.G.; University of NSW, Jornada Experimental Range; *d.eldridge@unsw.edu.au*

Ecosystem services outcomes from effective conservation: soil-foraging animals restore degraded rangelands

Animal reintroductions are increasingly popular in many ecosystems. Although their primary goal is to increase the size of dwindling populations, there is increasing recognition that reintroduced animals have the potential to contribute positively to the restoration of degraded ecosystems. Surface disturbances of soil-foraging animals intercept water, sediment, seed and litter, are areas of higher moisture and litter mass, and nutrient-rich hotspots of litter decomposition. We consider five propositions related to the effect of the pits of soil-foraging animals on ecosystems: 1) foraging pits provide the mechanism and focus for the concentration of critical resources in both space and time, 2) pits buffer resource pulses, allowing plants to withstand resource-poor pulse periods, 3) pits enhance biotic decomposition at the expense of abiotic breakdown, contributing positively to soil nutrient stores, 4) disturbance leads to the formation of soil biomantles, and 5) pits maintain a diversity of niches by creating patterns of enhanced moisture and nutrients within a relatively homogenous matrix. We consider these propositions by examining the effects of native animals on soil and ecological processes, with special reference to the semi-arid woodlands of eastern Australia and the desert grasslands of south-western United States.

P1.9 Elia PÃ©rez-Reyes*; Carolina Franco-Espinosa; Jorge DÃ¡vila-Osorio ; Javier HernÃ¡ndez-FernÃ¡ndez; 1GENÃ TICA, BIOLOGÃ A MOLECULAR & BIOINFORMÃ TICA" LABORATORIO DE BIOLOGÃ A MOLECULAR, CARRERA DE BIOLOGÃ A MARINA, FACULTAD DE CIENCIAS UNIVERSIDAD JORGE TADEO LOZANO Cra. 4 No 22-61, BogotÃ¡, Colombia; *javier.hernandez@utadeo.edu.co*

RFLPs OF THE MITOCHONDRIAL GENE COI: A STRATEGY TO IDENTIFY SPECIMENS OF HAWKSBILL TURTLES Eretmochelys imbricata (Cheloniidae:Testudines)

The hawksbill turtle Eretmochelys imbricata is subject to heavy exploitation of its carapace and plastron for making handicrafts. In recent years there have been listed as critically endangered species. Due to the above condition it makes relevant to identify at any level the entire life cycle of this turtle, in order to establish the current status of this population and provide information for its conservation. The COI gene works as a molecular label used to combat the illegal trafficking of specimens and their derivatives. We used 15 samples of peripheral blood of juveniles from the San Martin de Pajarales Island (Colombian Caribbean) from which total DNA was extracted and the COI gene amplified by PCR using specific primers. The amplified fragment was cut with the enzymes HpaII and BfaI and produced a band pattern of 432, 318, 240 and 158 base pairs. This pattern was compared in silico bioinformatics analysis of this gene for closely related species like the green turtle (Chelonia mydas) and freshwater turtles. Different patterns were observed, concluding that COI gene is a molecular tag usable for the identification of this species studied.

10.2 Elizabeth E. Crone*; Eric Menges; Martha Ellis; Jennifer Williams; Tom Kaye; William Morris; Amanda Stanley; University of Montana, Archbold Biological Station, National Center for Ecological Analysis and Synthesis, Institute of Applied Ecology, Duke University; *elizabeth.crone@cfc.umt.edu*

Back to the Future: Testing the predictive power of demographic matrix models for plant populations

Matrix population models are the foundation of most population viability analyses. However, they are often based on relatively little data, and use of predictions from these models remains controversial. We, first, quantified how matrix models are used in conservation and management, across 355 published matrix models for plant populations. Most uses do not involve quantitative predictions, which means these models could be useful even if they do not provide accurate forecasts. We also used long-term data to test the predictive accuracy of matrix models, by making forecasts with 5-15 years of data, and comparing these to observed population fates, 5-10 years after the data used to parameterize models were collected. Overall, population growth rates from stochastic matrix models were statistically significant correlates of change in population size. However, population size fell out of 95% projection limits substantially more than 5% of the time, in spite of the fact that confidence limits were wide, often spanning orders of magnitude. We discuss the implications for application of matrix models to conservation and management.

P2.92 Ellwood, Elizabeth R.*; Primack, Richard B.; Lloyd-Evans, Trevor L.; Boston University, Manomet Center for Conservation Sciences; *eellwood@bu.edu*

Changes in Bird Arrival Times and Cohort Sizes in Eastern Massachusetts (1970-2008).

Bird species have served as effective model organisms to study the impacts of climate change. What is largely unknown, however, is how responsiveness to climate change affects the ability of migratory species to maintain their populations over time. Using 39 years of banding records from the Manomet Center for Conservation Sciences, in Massachusetts, USA we determined mean spring arrival dates and annual cohort size for 32 species. Our phylogenetic analysis incorporated mitochondrial DNA sequences, and natural history and morphological traits. The populations of 21 species have significantly declined since 1970. This trend is so strong that in future years several species will likely not be caught at all or in numbers so reduced as to exclude them from analysis. The species also show varying degrees of change in arrival date over time and in response to temperature. Depending on the metric used, there is limited evidence that species with populations that are not changing their arrival date in response to temperature are more likely to decline. Few traits exhibit phylogenetic conservatism, suggesting that evolutionary history is not a good predictor of species response to climate change. The lack of a clear phylogenetic signal and the weak association between changing arrival dates and population change makes implementing conservation practices difficult; species appear to be equally at risk of being affected by climate change and declining population cohort size.

SP11.9 Elmeligi, Sarah; Canadian Parks and Wilderness Society - Southern Alberta Chapter; *selmeligi@cpaws.org*

Climate change and grizzly bears: drivers for large landscape conservation

Addressing the impacts of climate change requires identifying practical, adaptive strategies to reduce or mitigate anticipated negative effects (Mawdsley et al., 2009). Adaptive strategies include increasing the extent of protected areas, and improved their management to facilitate ecosystem resilience (Heller and Zavaleta, 2009). Grizzly bears are considered an umbrella species; by maintaining a healthy grizzly population, we can also maintain other elements, processes, and species of terrestrial ecosystems (Carroll et al., 2001; Gibeau et al., 2001). Conserving grizzly bears requires increasing the extent of secure core habitat. Although climate change adaptation and grizzly bear conservation occur on very different spatial scales, successfully addressing both is tightly tied to regional government policy and legislation. Influencing public policy is based on awareness and integration of science, public values, politics, and socioeconomic factors (Herrero et al., 2001). The Canadian Parks and Wilderness Society - Southern Alberta chapter has been working with the public and the Alberta Government to find conservation solutions that will increase grizzly bear populations and address climate change impacts. The solution to address both problems is to garner public support to expand Alberta's protected area system and to manage wilderness areas in ways that secure habitat and promote ecosystem resiliency.

22.1 Enrico Di Minin*; Douglas MacMillan; Durrell Institute of Conservation and Ecology (DICE), School of Anthropology and Conservation, University of Kent, Canterbury, CT2 7NR, UK ; *ed66@kent.ac.uk*

Planning for biodiversity conservation through private investment: the return of the big game to KwaZulu-Natal

The discipline of conservation planning has advanced rapidly in recent years with increasingly sophisticated models and information being applied to habitat and species suitability, protected area design, and ecosystem service provision. In this paper we argue that conservation planning will only realise its full potential, in terms of determining or influencing conservation investments if researchers better understand and incorporate incentive mechanisms in their models. Most conservation planning studies that consider economics largely frame their models in terms of cost-effectiveness of alternative plans, but this approach is not relevant to the real world where biodiversity conservation is increasingly determined by market forces and incentives rather than government land purchase. In order to highlight conservation potential arising from the private sector modellers should incorporate the private costs and benefits of conservation investments, including returns from enterprise based activities such as ecotourism, but also payments for carbon sequestration and from ecosystem services, as well as government subsidies. In this paper we explore the potential for re-introducing the big game in KwaZulu-Natal, South Africa, as a private investment by comparing investment returns from a range of competing land uses (sugar cane, eucalyptus) to those from ecotourism. A unique aspect of our study is that we estimate the use benefits and potential revenues from tourism (both hunting and viewing) using a choice experiment approach which estimates the willingness to pay of tourists for alternative opportunities to view/hunt big game.

P2.187 Enrico Di Minin*; Peter S. Goodman; Rob Slotow; Robert J. Smith; Institute of Conservation and Ecology (DICE), University of Kent, Canterbury, UK, Biodiversity Research Division, Ezemvelo KwaZulu-Natal Wildlife, Cascades, RSA, Amarula Elephant Research Programme, School of Biological and Conservation Sciences, Westville Campus, University of KwaZulu-Natal, Durban; *ed66@kent.ac.uk*

Planning the return of the big game to KwaZulu-Natal: integrating distribution and spatially explicit metapopulation models

Species distribution modelling and spatially explicit metapopulation models are important techniques for generating data as inputs into conservation planning. Here we discuss the use of the Maximum Entropy (MaxEnt) modelling approach, in combination with the spatially explicit metapopulation program RAMAS GIS, to model the potential distribution and total carrying capacity of lion, leopard, cheetah, African wild dog, elephant and black rhino in KwaZulu-Natal. MaxEnt models were fitted using presence records derived from ongoing research and monitoring in the area, as well as ecogeographical variables thought to affect species distribution. The effect of spatially autocorrelated sampling was examined by applying a spatial filter to the presence-only data. Resulting distribution maps were included into RAMAS GIS to define a metapopulation structure using a habitat suitability threshold and foraging distance for each species. Total carrying capacity for each species was then calculated by dividing the spatial extent of each population by its population density estimate. Area under the curve values indicated the distribution models were â highly accurate'. This process identified a different number of viable patches for each species, although the total area of suitable habitat and the median patch size was species dependent. Overall, results showed that KwaZulu-Natal contains important patches of unprotected habitat and that the current population size for each species is below total carrying capacity.

SP2.10 Erb, LP*; Ray, C; Guralnick, RP; University of Colorado at Boulder; *liesl.peterson@colorado.edu*

Climate drivers of pika persistence in the Southern Rocky Mountains

Alpine species are among those most threatened by climatic shifts due to their physiological and geographic constraints. The American pika (Ochotona princeps), an alpine mammal found in rocky habitats throughout much of western North America, has experienced recent population extirpations in the Great Basin of the United States. These trends have been linked to climatic drivers, and the species was recently considered for protection under the Endangered Species Act (ESA). The species was not listed under the ESA, in part because it remains unclear whether the patterns of climate-related loss observed within the Great Basin extend to other portions of the species' range. Currently, we are investigating the distribution of the American pika and the climatic processes driving these patterns within the Southern Rocky Mountain region. Following a resurvey of 69 sites historically occupied by pikas, data indicate that few populations have been extirpated within this region over the past few decades. Despite relatively few extirpations, low annual precipitation is implicated as a limiting factor for pika persistence in the Southern Rockies. Extirpations occurred only at sites that were consistently dry over the last century. While there is no climate change signal in these results, these data provide valuable insight into the potential future effects of climate change on O. princeps throughout its range.

4.4 Erickson, M.E.*; Boyce, M.S.; Found, C.; University of Alberta, Alberta Sustainable Resource Development; *m.erickson@ualberta.ca*

Western Grebe (Aechmophorus occidentalis) abundance relative to persistence in Alberta, Canada

The Western Grebe (Aechmophorus occidentalis) is a Species of Special Concern in Alberta, Canada that has undergone a 37% decline in distribution and 76% decline in abundance on 43 lakes over the past 40 years. Using a known former distribution of grebes, we evaluated how environmental variables including emergent vegetation, human development, and prey availability affect Western Grebe abundance relative to persistence. The small-population paradigm states that small populations are less likely to persist. However, persistence and abundance were weakly correlated among Western Grebe populations, suggesting that persistence alone may not adequately reflect the extent of the species' decline. Both abundance and persistence were positively associated with shoreline bulrush (Scirpus lacustris) and human development in a 500m buffer surrounding the lake, while inversely associated with surrounding forest cover. Bulrush is known to provide important habitat for nesting, but the relationship with recreational development puts grebes at risk for future disturbance and habitat loss-a primary threat to endangered birds. We recommend that shoreline vegetation remain intact to maximize grebe breeding success and recruitment, and human activity around colonies should be kept to a minimum to curb further Western Grebe decline.

SY15 Ervine, K; Trent University; *kateervine@trentu.ca*

The Contradictions of Market-based Conservation and Development: Lessons from the Mexico-Mesoamerican Biological Corridor in Chiapas, Mexico

This paper examines the implementation of the Global Environment Facility's (GEF) Mexico-Mesoamerican Biological Corridor in the LacandÃ³n Jungle of Chiapas, Mexico. As an Integrated Conservation and Development Project, the Corridor is rooted in what the author refers to as the GEF's "Universal Blueprint," a program of biodiversity's marketization as simultaneous conservation and poverty reduction strategy. It is argued that the Blueprint, whose framework both assumes and demands clearly delineated private property rights as the vehicle for determining payments for the preservation of ecosystem services, denied the existence of Chiapas' historic conflict over land, thereby adding a new layer to it. This paper warns that the increasing ubiquity of market-based conservation strategies such as the Corridor threaten to lead to, or exacerbate, conflicts over land and resources with the outcomes tending to favour more powerfully-situated local actors. In this, such projects, rather than solving poverty and inequality, may lead to new forms of marginalization.

SP3.7 Espinosa, M.; University of British Columbia; *maria.espinosa.romero@gmail.com*
Structured decision making for aquatic ecosystem management
I used the structured-decision making (SDM) to support the on-going marine planning process under development by West Coast Aquatic (WCA) - a multiple stakeholder body charged with managing the aquatic ecosystems on the west coast of Vancouver Island (WCVI). Usually, when individuals face complex tasks or problems, they make decisions by instinct, often ignoring or misprocessing important information (McDaniels, Gregory et al. 1999; Keeney and Gregory 2005). In multiple stakeholders' processes, where participants have conflictive objectives, the instinctive way to make decisions can lead to social conflicts, disagreement towards the alternatives or decisions advocated by strong personalities in the group (McDaniels, Gregory et al. 1999; Gregory, McDaniels et al. 2001). SDM is a systematic approach to making better decisions based on the values and objectives of different participants (Clemen and Reilly 2001). I followed this approach to identify and categorize objectives, separate fundamental from mean objectives, and find performance measures for those fundamental objectives. This process helped to identify the most fundamental objectives for WCA, to state them in a more measurable way and to find appropriate performance measures. This required the clear understanding of what matters to WCA. Consulting with stakeholders and reviewing other cases significantly strengthen this process.

P2.161 Espinosa, M.*; Gregr, E.; Christensen, V.; Chan K.; University of British Columbia; *maria.espinosa.romero@gmail.com*
Using ecosystem models for marine management
Sea otters are widely regarded as a keystone species, able to structure nearshore marine environments by releasing macro-algae from grazing pressure. This restructuring can shift an invertebrate-dominated nearshore system (urchin barrens) into a kelp-dominated system, which is assumed to support a greater biomass and diversity than the urchin barrens. The nearshore ecosystem on the west coast of Vancouver Island (WCVI) is experiencing these shifts because of the reintroduction of sea otters in the 70's, affecting those who depend on the natural resources. To manage this ecosystem, an integrated understanding of the ecosystem dynamics (including human interactions) is required. To contribute to this, I am building an ecosystem model using Ecopath with Ecosim (EwE), a software widely used for aquatic ecosystems. The model represents key ecosystem dynamics such as the relationship between sea otters-urchins-kelp forests as well as the indirect benefits provided by kelp forest to the ecosystem. Finally, it integrates information about the whole ecosystem since the reintroduction of sea otters to represent current and predict potential impacts to human activities.

P1.102 Estades, CF*; Acuna, MP; Universidad de Chile; *cestades@uchile.cl*
Plantation Clearcut Size and the Persistence of Early Successional Wildlife Populations
Plantation clearcuts represent an important habitat for many open-area wildlife species in landscapes dominated by industrial forests. However, due to the ephemeral nature of clearcuts, species using this type of environment face a "shifting mosaic" in which their ability to successfully relocate to another habitat patch may play a crucial role in the species' persistence in the landscape. Although several studies have shown a positive effect of patch size on the persistence of prairie species, forest clearcutting represents a special case in which, on average, larger patches also tend to be more isolated from each other, likely creating a trade-off between area and isolation effects. We developed an individual-based spatially-explicit model to test the effect of clearcut size (a critical management variable in plantation forestry) on the persistence of an early successional wildlife species in a landscape dominated by forest plantations. We simulated a landscape covered with a plantation harvested regularly over a 25-year rotation and different versions of a wildlife population whose habitat was constituted only by 1-4 year old patches. We observed that when the species could perceive the attributes of the neighboring pixels persistence time was usually higher at intermediate clearcut sizes agreeing with our prediction. Our results also highlight the importance that basic assumption on movement patterns may have on conclusions drawn from mechanistic simulation models.

P2.148 Estrada, A*; Delibes-Mateos, M; DÃ–az, S; Casas, F; ViÃ±uela, J; Arroyo, B; Instituto de InvestigaciÃ³n en Recursos CinegÃ©ticos - IREC (CSIC-UCLM-JCCM). Ciudad Real. Spain; *alba.estrada@uclm.es*
Relationship between Hunting Management and Bird Diversity in Small Game Estates in Central Spain
In Europe, hunting and its associated management has been performed for centuries and has had profound effects on our landscapes and on the biodiversity they hold. There are a number of studies addressing the effect of hunting management on the populations of game species. However, the relationship between hunting and non-target species has received much less attention. In this work, we investigated the relationship between hunting management and bird diversity in Central Spain. For this goal, raptors and steppe birds (the two bird groups of most conservation concern present in the area) were surveyed in 53 hunting management units (HMU) with different intensity of game management. Birds were counted from fixed points; an average of 61 fixed points was surveyed in each hunting management unit. On the other hand, the information concerning game management was gathered through interviews with game managers. Among other variables, three hunting regimes were considered: 1) social HMUs are typically managed non-intensively by local non-profit societies; 2) private HMUs are usually intensively managed by game managers with economic interests; 3) intensive HMUs are a special type of private HMU in which the management is almost exclusively based on the legal release of thousands of red-legged partridges (Alectoris rufa). Our results show that the type of hunting regime may affect some variables of biodiversity, such as the total number of steppe birds observed.

P2.18 Evan D Esch*; John R Spence; David W Langor; University of Alberta, Candian Forest Service; *eesch@ualberta.ca*

Population Dynamics of the Mountain Pine Beetle (Dendroctonus ponderosae; Coleoptera) in the Endangered Whitebark Pine (Pinus albicaulis) Ecosystem

Whitebark pine, an endangered component of western North America's sub-alpines forests is threatened by multiple factors. Over the past 100 years, whitebark pines have been devastated by an invasive fungal pathogen, white pine blister rust. Rising concerns that mountain pine beetle (MPB) outbreaks will further threaten the remaining rust resistant whithebark pines brings urgency to recovery plans for the species. Historically, climatic barriers have offered some protection to whitebark pines from MPB outbreaks; however, recent observations of increasing mortality caused by MPB suggest these barriers are retreating. Laboratory and field experiments were conducted to determine MPB life history parameters in whitebark pine as compared to the MPB's primary host lodgepole pine. The objectives of this study are to better understand the factors influencing the spread of MPB through whitebark pine containing stands. The results of these experiments suggest that different life history strategies of host species will affect the population dynamics of the MPB in whitebark pines and that previously identified climatic boundaries have now receded. We conclude that MPB poses a significant threat to the survival of whitebark pines and consequently, to other species depending upon it.

P2.62 Evans, Megan*; Cartar, Ralph; Wonneck, Mark; University of Calgary, Agri-Environment Services Branch, AAFC; *mmevans@ucalgary.ca*

Influence of grazing on bee pollinators and their floral resources in rough fescue prairie landscapes

Differences in cattle grazing have lead to a mosaic of range conditions in the rough fescue prairie. This study examines the floral and bee pollinator communities to consider the individual and joint effects on these communities of grazing regime and landscape. Using pan traps, at-flower netting, and floral censuses, we sampled bees and plants at 7 pairs of sites with contrasting range condition (lightly/heavily grazed) in rough fescue grasslands throughout the summer. Grazing had no effect on plant species richness or overall floral abundance, but significantly more bees were found in the lightly grazed sites. Flower communities differed between range conditions, but these differences were site-dependent. We resolve these disparate results using pollination webs and analysis of landscape features and range condition. Understanding the factors that influence bee and floral communities is critical when devising grazing strategies for this seminal Alberta landscape.

SY52 Evie Witten*; Steve MacLean; Laura Chartier; The Nature Conservancy; *lchartier@tnc.org*

Adaptation for Conservation Planning: Incorporating Climate Change Into Strategies and Actions

Changes we can already see are putting people, economies and nature at risk. The Nature Conservancy (TNC) is promoting and implementing comprehensive solutions to reduce emissions, minimize impacts and use the power of nature to keep the things we care about healthy and secure. As part of this effort, TNC has developed a framework for adapting Conservation Action Planning methods to incorporate climate change. A cornerstone of this process is developing "hypotheses of change," which hone in on the critical, specific climate-induced threats a project should address with adaptation strategies. Developing a "hypothesis of change" includes identifying key ecological attributes for a conservation target, identifying the specific climate factors that affect those attributes, estimating ranges of potential change, and estimating the likelihood of the estimated change to occur. In the Western Arctic, a region experiencing rapid and drastic climate change, this approach allowed for a scale-appropriate understanding of climate impacts. For example, a hypothesis for ice-dependent marine mammals highlighted the critical vulnerability of this target as well as the need to focus strategy development on direct habitat loss due to sea ice melt. Innovative strategies growing out of the "hypothesis" process, such as identifying and protecting climate refugia, and connectivity between those areas, will be especially important in the Arctic, where ecosystems are on the leading edge of climate change impacts. Other ways of adapting planning processes, such as understanding and incorporating human responses to climate change, are also part of TNC's guiding framework.

SY36 Ewers, R*; Coomes, D; Kapos, V; Laforetezza, R; Wearn, O; Imperial College, London, UK, Dept of Plant Sciences, University of Cambridge, UNEP World Conservation Monitoring Centre, Department of Scienze delle Produzioni Vegetali, University of Bari; *val.kapos@unep-wcmc.org*

Trends in ecosystem integrity: A new tool for assessing the biological impacts of forest fragmentation

Ecosystem fragmentation and its ecological effects are significant drivers of biodiversity loss, yet changes in fragmentation through time are poorly understood because we lack biologically meaningful indicators to quantify those changes. In order to translate complex spatial patterns of land-cover and land-use into indicators of biological or ecological impacts, a new generation of landscape metrics is needed. We have developed a statistical method that (1) examines how spatial patterns of ecological communities vary in relation to a range of fragmentation measures at multiple spatial scales; (2) predicts community composition for every forest pixel on a land-cover map; and (3) summarises these maps to calculate a landscape-level estimate of community change, which we term â BioFrag'. We have applied and tested BioFrag on a range of taxa from study landscapes around the world and at multiple spatial and temporal scales. BioFrag advances methods that quantify the degree of habitat modification and fragmentation from spatial patterns of forest cover alone by calibrating them to reflect observed species responses to those spatial patterns. It represents a significant step towards developing a biologically relevant, landscape-scale index of habitat fragmentation that will ultimately help quantify progress towards globally agreed policy targets on biodiversity and habitat conservation.

SY67 Fabinyi, M. ; James Cook University; *michael.fabinyi@jcu.edu.au*
Experiences with Tourism as an Alternative Coastal Livelihood: An Anthropological Analysis from the Philippines
In the Philippines and many other tropical developing countries, tourism is being enthusiastically promoted by governments and some analysts as a livelihood that is seen as more socially and environmentally sustainable than fishing. Based on long-term, ethnographic fieldwork with fishing communities in the Calamianes Islands of the Philippines, this paper analyses the experiences of local fishers with coastal tourism. The paper demonstrates that while tourism offers the potential for some fishers to adopt a successful alternative livelihood, this potential is strongly influenced by a range of local social factors. For many fishers, tourism has instead created significant problems, particularly with regard to the security of land tenure. The paper concludes that policymakers promoting coastal tourism as an alternative livelihood in the Philippines need to take account of the ways in which the outcomes of coastal tourism are shaped by broader issues of class, land tenure insecurity and governance patterns in Philippine society.

P1.12 Fanny M. Cornejo*; Fanny Fernandez; Departamento de Mastozoologia, Museo de Historia Natural, Universidad Nacional Mayor de San Marcos, Lima, Peru, Programa de EducaciÃ³n Ambiental, YUNKAWASI, Lima, Peru; *fanny19m@yahoo.com*
An innovative environmental education program for primate conservation in Peru
As one of the most primate-rich countries in the world and with very few people aware of primates' existence, Peru needed urgently an education program that involved local people and used primates' charisma for achieving public awareness and a change toward natural resources. The "conservation education program for Peruvian Primates" started in January 2008, in the regions of Amazonas and San Martin, part of the Tropical Andes Hotspot and home of Peru's endemic primate species -like the yellow tailed woolly monkey, one of the 25 most endangered primates of the world- and Lima, the capital and home of one third of Peru's population. The program was implemented through workshops, where surveys, audiovisual materials and guide books were distributed to school children and teachers. A total of 8675 schoolchildren and 382 teachers from 30 schools in 25 towns have been involved in the program, being more than 70 % from rural areas surrounded by forests where monkeys occur. Two additional activities were organized to complement the program: a "regional drawing contest of Peruvian monkeys" (2008) and a "myths and legends of Peruvian monkeys writing contest" (2009). The products are a Calendar featuring the best drawings and a book with the best works, both distributed freely. The enthusiasm and insight raised but these activities made the program extremely successful, surveys about the importance of the forests have changed radically since the beginning of the program, achieving the first step of the program: knowing the nature is loving it.

P2.82 Farokhkish, Bahram; Gross, Jackson*; Cornachione, Matthew A.; Shedden, Beth L. ; Henry, Theodore B. ; Shaw, Steven R. ; USGS Northern Rocky Mountain Science Center, Montana State University (Graduate Student), Montana State University, Ph.D.RC UK Academic FellowSchool of Biomedical and Biological Sciences, Assoc Prof-PhD Electrical & Computer Engineering, Montana State University; *hmsbeagleboy1@yahoo.com*
Effects of electricity on rainbow trout embryos: A study to determine the efficacy of electricity for the eradication of invasive salmonids
The use of electricity on aquatic species currently only targets free swimming individuals and is not inclusive of early life history stages such as embryos. This study evaluates the susceptibility of embryonic and larval stage rainbow trout to direct DC current between 2-20v/cm in varying conductive waters to determine lethality for eradication efforts. Embryos (n = 10 per exposure) were initially exposed to homogeneous electric fields for 5s with a water conductivity of 220uS/cm from 1 day post fertilization (DPF)/ 27 temperature units (TU) to 15DPF/405TU. Mortality was assessed 24h post exposure and the LV50 (Lethal Voltage) at 220uS/cm was determined for each TU. Embryos from six periods of development were then exposed to their respective LV50 voltages in varying conductive waters (20-600uS/cm). Susceptibility to direct DC voltages decreased with development. Susceptibility to a constant voltage increased with increasing conductivity and was consistent throughout early development (81TU - 292TU), but the effects of increased conductivity were not enhanced as mortality in eyed embryos after 364TU remained static with the LV50 . These data suggest that a combination of direct DC current and increased localized conductivity would be an effective means of eradicating invasive and nuisance salmonids prior to eyed embryonic stages.

SY23 Ferdana, Z*; Kelly, D; Bruce, C; Odell, J; Taylor, C; Stein, D; Smith, B; Bode, A; The Nature Conservancy, Minerals Management Service, NOAA Coastal Services Center; *zferdana@tnc.org*
Alternative Energy in the Marine Ecosystem: Building a Collaborative Coastal and Marine Spatial Planning Framework
The seas are no longer a wide-open frontier, and its spaces are broadly allocated and with extensive overlap by many management agencies. Coastal and marine spatial planning (CMSP) is a process to develop a blueprint for area-based management that accounts for multiple management objectives. Many agencies are pursuing CMSP to address the increasing human activities in the marine environment that are progressively more in conflict and thereby affecting the health of the ocean. Here we address two objectives, alterative energy production and biodiversity conservation, as a case study for CMSP in the U.S. Applications for wave and tidal energy projects have dramatically increased in recent years. The National Oceanic and Atmospheric Administration (NOAA), Mineral Management Service (MMS) along with other Federal partners have implemented the Multipurpose Marine Cadastre (MMC) tool as a marine information system in U.S. waters (http://www.csc.noaa.gov/mmc). The MMC contains marine cadastral information such as maritime boundaries and limits and marine managed areas as well as other regionally-specific data in support of planning, management, and conservation of marine spaces. Along with authoritative data sources, the MMC also seeks to incorporate data from trusted sources like The Nature Conservancy (TNC). The Federal government and TNC are collaborating to integrate regional marine habitat and biodiversity information into the MMC in recognition that trusted data sources alongside authoritative ones add significant value in pursuit of CMSP aims. Only by full representation of the marine environment, the ecosystems and the many human uses of them, can the goals of multiple management objectives be adequately considered.

P1.81 Ferguson HB; School of International Development, University of East Anglia; *ferguson.barry@gmail.com*

Customary Forest Tenure in Southern Madagascar: A Contribution to Conservation but Incompatible with Conservation Policy

Madagascar is undergoing an expansion of its protected areas system, with new protected areas being established in areas of human habitation. Consequently many protected areas now have both customary and state tenure regimes in force, two systems often at odds. Data was collected in 3 protected areas (Ifotaka, Ankodida & Anadabolava) using structured household forest use surveys, participatory land use mapping and a survey of expert stakeholders. It was found that the characteristics of contemporary land tenure and conservation policy restrict how customary tenure of forests can be integrated into new protected areas. Restricted consideration of customary tenure and forest based livelihoods presents a challenge to the success of new protected areas. Exceptions to this situation do exist however: sacred forests and species taboos are of importance both to Antandroy culture and biodiversity conservation, and both institutions are frequently part of new protected areas and conservation strategies. However, despite assertions by some scholars and practitioners, there is relatively limited opportunity to base broader conservation strategies on such institutions because sacred forests are limited in scale and species taboos are not enforceable across ethnic groups. Conservation policy should take broader account of Antandroy â tradition' which also respects the human right to derive a livelihood from the land, be it through deforestation, selective logging, hunting or otherwise.

SY15 Ferguson, B; University of East Anglia; *ferguson.barry@gmail.com*

Emergence of REDD as a conservation finance strategy: insights from national process and a pilot project in Madagascar

Madagascar is well known as a global biodiversity conservation priority and this led to significant changes in forestry policy over the last two decades. Integrated Conservation and Development Projects (ICDP's), Ecoregion Conservation, Community Forestry and Co-managed Protected Areas all became part of Madagascar's conservation policies. Most recently REDD emerged as a dominant global conservation finance mechanism, and NGOs in Madagascar were quick to establish five pilot REDD projects across the island. Projects were financed by bilateral and multilateral donors, Conservation NGOs themselves and the Private Sector. This paper will present analysis of national policy processes around Payments for Ecosystem Services (PES) through REDD on the island and these national level insights on policy will be put into context by case study material from a WWF run REDD Pilot Project in the southern spiny forest. The characteristics of local forest peoples livelihoods, customary tenure arrangements, forest carbon estimates and an institutional analysis of the new forest management arrangements of the REDD pilot project will be presented. The paper concludes with analysis from both national process and the site specific case, considering what potential the project has to finance conservation and local development as well as what challenges face the REDD approach in Madagascar in terms of policy effectiveness to deal with local livelihoods and customary tenure.

SP1.11 Fields, K*; Theobald, DT; Wildlands Network, Colorado State University; *kenyon@wildlandsnetwork.org*

Modeling Potential Broadscale Wildlife Dispersal Pathways Within Extant Connectivity in the Western United States

Wild LifeLinesÂ© depict potential dispersal pathways in the US between the Mexican and Canadian borders that emphasize the least human modification and highest extant connectivity for wildlife. These pathways are the result of a novel modeling approach that is based on a Natural Landscapes Index built from layers of land cover types, distance to roads, traffic volume, and housing density, and that identifies the least fragmented connections between remaining natural areas. We present two iterations, one of a branching system of pathways representing flowpaths of highest permeability for wildlife transit between the US borders; the second illustrates flowpaths of highest permeability between Gap 1 and 2 protected areas. Wild LifeLines help identify cores and linkages within conservation planning boundaries that might secure landscape capacity for broad-scale wildlife movement within extant high-connectivity lands. Although LifeLines identify areas important for landscape permeability, the intent is not to prioritize selection of parcels or local scale linkages, but rather to identify the most efficient existing pathways allowing broad-scale, regional dispersal. Wild Lifelines is a powerful new expression of places and pathways that are important for connectivity preservation projects with the goals of mitigating habitat fragmentation, providing for the dispersal of wide-ranging species, and facilitating adaptation to climate change.

2.6 Fields, WR*; Haddad, NM; North Carolina State University; *will_fields@ncsu.edu*

Can Climate Change Swamp Salamander Demographic Rates to Reduce Population Viability?

Population viability analysis is a frequently used approach to assist in planning for rare species conservation. Although there is increasing interest in understanding the impact of climate change on species, it is often difficult to quantify the mechanistic link between population vital rates and shifts in climate patterns. We conducted a population viability analysis to assess climate impacts for a rare amphibian, the tiger salamander (Ambystoma tigrinum). These salamanders breed in artificial wetlands where shifts in rainfall patterns could result in complete loss of larval cohorts if wetlands dry too quickly. We first analyzed a deterministic model of population growth to examine its relative importance to adult survivorship, fecundity, and juvenile recruitment. We then simulated population dynamics under three different hydrological regimes: historical wetland flooding patterns based on past climatic data, current wetland flooding patterns based on our observed data, and potential future flooding patterns based on projected climate data. Adult survivorship had four times the effect on population growth as fecundity and twice the effect on population growth as juvenile recruitment. However, simulation results indicate reduced juvenile survivorship from shifts in climate could result in reduced population viability even when adult survivorship remains high.

5.2 Figel, Joe; University of Central Florida; *joefigel@hotmail.com*

A cross-site comparison of jaguar (Panthera onca) conservation in community protected areas in Oaxaca and non-protected forest in Nayarit, Mexico

Most jaguar (Panthera onca) studies in Mexico have been conducted in lowland biosphere reserves despite substantial jaguar populations occurring outside protected areas (PAs). This study investigated jaguar ecology in two landscapes of varying protection and habitat types. Both study areas - the Chinantla in Oaxaca and the San Blas Municipality in Nayarit - are priority sites for jaguar conservation. The Chinantla is a remote, montane region populated by Chinantec indigenous peoples in the Sierra Norte of Oaxaca where the four study communities have declared 205 kmÂ² of their land as community protected areas (CPAs). In Nayarit, significant jaguar populations occur in non-protected, coastal forests despite greater human disturbance and the absence of PAs. Data on jaguar presence, livestock depredation, and human hunting of prey were collected at both sites. Camera-traps registered two jaguars in a 144 kmÂ² study area after 1,164 trap nights (TN) in the Chinantla. In San Blas, three times as many jaguars (six) were identified after 1/3 of the survey effort (308 TN) in a study area half the size as in the Chinantla (less than 75 kmÂ²). This was the first study to systematically assess the status of the species in both CPAs and non-protected forest in Nayarit.

SY19 Filardi, C. E.*; Sterling, E. J. ; American Museum of Natural History; *filardi@amnh.org*

Local ecology, poverty, and community conservation agreements in the Solomon Islands.

Conservation practice is often challenged by operating within natural systems where local populations simultaneously struggle with the need for sustainable access to natural resources and relentless pressure from global forces that drive poverty and threaten local ecologies (e.g. extractive industry). By most modern definitions of poverty, local populations in these cases are considered poor. However, a lack of money, material possessions, or economic opportunity is often linked to subsistence livelihoods and local ecosystems that are remarkably secure. Now more than ever, conservation practice must consider threats to local culture, local economics and local ecologies when pursuing global priorities. We present examples of community conservation agreements (CCAs) in the Solomon Islands that use approaches built on transparent identification of points of value convergence between conservation practitioners and local communities (e.g. customary land tenure and forest stewardship). We posit that when these CCAs succeed, it is because local populations are not choosing between the security of their subsistence-based economies and global economic engagement. "Poverty and conservation" frameworks used in global terms may be inappropriate at local or community scales. We suggest that at these scales relevant social issues - from poverty and oppression, to equity of resource access - will be addressed if points of value convergence are central to conservation practice.

SY63 Findlay, C.S.*; Doak, D.F.; Wolf, S.; Mooers, A.O.; University of Ottawa, University of Wyoming, Center for Biological Diversity, Simon Fraser University; *amooers@sfu.ca*

Critical Habitat for imperiled species: some Canada-US comparisons

There is evidence that Critical habitat (CH) designation is correlated with improving viability of listed species in the USA, but such designation has been contentious and unevenly applied under both the ESA and SARA. For example, 88% of listed plants in Hawaii have CH designations, 27% in California do, while elsewhere in the USA, the range is 18% to 0%. Lawsuits regarding CH are not uncommon under the ESA. Recent legal decisions in Canada should help clarify policy on designating CH under SARA. Prior to these court decisions, of the 99 species with Recovery Strategies on March 19, 2009, only 19 species had CH at least partially identified, and of these, 17 had CH identified either entirely or partly within existing protected areas. Interestingly, only 10% of listed species had CH identified under the ESA by the year 2000. Under both SARA and ESA, delineation of CH makes particular places, individuals and governments specifically responsible for the welfare of an imperiled species, a daunting responsibility. We conclude with thoughts on how to solve this roadblock in order to hasten action on species protection.

7.6 Finkelstein, ME*; Doak, DF; Grantham, J; George, D; Smith, DR; University of California Santa Cruz, University of Wyoming, United States Fish and Wildlife Service, National Park Service; *myraf@ucsc.edu*

Lead poisoning in the endangered California Condor (Gymnogyps californianus): Evaluating sources and effects of lead exposure in an avian scavenger

Endangered California Condors (Gymnogyps californianus) continue to be lead poisoned on a regular basis and lead is regarded a major factor limiting their recovery. Although lead ammunition is considered the primary source of lead poisoning to condors, direct evidence is limited. We used lead isotopic analysis of blood samples collected from pre-release (n = 17) and free-flying condors in California (n = 70) and a representative selection of lead-based ammunition (n = 71) to evaluate the likelihood that condors are exposed to a lead source consistent with that observed in lead ammunition. Using an isotopic mixing model, we found that ~90% of the condor blood samples had an isotopic composition that is explained by exposure to lead-based ammunition. To evaluate the sub-lethal health impacts of lead exposure in condors, we measured aminolevulinic acid dehydratase (ALAD) activity in condor blood samples (n = 60). We found a significant negative relationship between ALAD activity and blood lead concentration with a > 60% inhibition in birds with blood leads > 20 Î¼g/dL. Out of 760 condor blood samples collected between 2004-2009, ~ 35% had blood lead â ¥ 20 Î¼g/dL, suggesting that a large percentage of free-flying condors are chronically exposed to lead levels well-know to produce morbidity. Our work demonstrates that ammunition is the principal source of lead poisoning to California condors and ~ 1/3 of free-flying condors are experiencing toxicological effects from lead.

SY10 Fisher, J A; University of East Anglia, UK; *janet.fisher@uea.ac.uk*

â No pay, no stay?': Exploring local systems of environmental value under a payments for ecosystem services model.

A thread running through the literature on PES has raised questions about how a conditional, cash reward for service provision intersects with the systems of environmental value held by local people involved in PES. There is the possibility that local people will start to value natural resources more highly, responding to the external value demonstrated by the incentive. However, there is also the potential for payment systems to â crowd out' locally rooted systems of environmental value. This has led to the concern that PES may foster a â no pay, no stay' culture, where the behaviour providing the service is solely dependent on receipt of payments, and will therefore cease if payments stop. Little work has considered these issues empirically in relation to PES. This paper presents findings from a case study in rural western Uganda where communities have been paid in exchange for carbon sequestration, in an area bordering a forest reserve. The paper investigates the importance of the monetary incentive in changing people\'s behaviour relating to trees in the landscape, and explores the systems of value which local people hold for natural resources. It draws upon evidence from qualitative interviews, ranking exercises and ethnographic methods. Findings show that the monetary incentive far outweighs other motivations for environmental stewardship, although some interesting differences arise in relation to different forest management regimes. The paper considers the implications of this for the sustainability of PES interventions. While this is particularly pertinent for afforestation schemes due to a common mismatch between payment timescales and contract length, the findings are of wider importance for developing PES and REDD programmes.

P1.95 Fisher, JT*; Bradbury, S; Nolan, L; Alberta Innovates - Sustainable Ecosystems, Government of Alberta, Sustainable Resource Development; *jason.fisher@albertainnovates.ca*

Risk factors for an at-risk carnivore: Wolverine density and habitat selection on the edge of the Canadian Rockies.

Assessing the conservation status of rare and elusive species is difficult, as the probability of falsely detecting absences is high. However, rare species are often the ones most in need of status assessment for legal designation - a conservation catch-22. This is the case for Alberta wolverines (Gulo gulo), which historically occupied most of the province but have declined in the last century. Wolverines' population size and distribution in Alberta had never been studied. We sought to inform these estimates and identify natural and anthropogenic landscape features that affect wolverines' distribution. We used camera trapping and noninvasive genetic tagging to survey wolverine occurrence in a protected mountain forest landscape, and in an adjacent foothills forest landscape with extensive forest harvesting and energy development. Wolverine density was markedly higher in the undeveloped landscape than the adjacent developed landscape. Wolverines selected habitats with rugged topography and avoided high densities of linear features associated with energy development. In this major energy-producing province, our research impresses the need for wolverines to be explicitly considered in landscape management plans. It also illustrates the need to sample and model the detectability and occurrence of rare and elusive species where landscape development outpaces ecological data collection.

SY24 Fleishman, E*; Dickson, BG; Dobkin, DS; Leu, M; Thomson, J; University of California, Santa Barbara, Northern Arizona University, High Desert Ecological Research Institute, College of William and Mary, Monash University; *fleishman@bren.ucsb.edu*

Changes in land cover, structural connectivity, and occupancy of riparian birds in the Great Basin

Climate and land-use change affect ecological processes, dynamics of patches of land cover, and viability of faunal populations. Management treatments like riparian restoration and prescribed fire also may change the structural connectivity of species' habitats. We examined current and projected future avifaunal responses to natural and anthropogenic land-cover change in the central Great Basin of the western United States. We used multiple sources of free remote sensing data at 1-10 m resolution and field data to develop comprehensive maps of riparian land cover at 10 m resolution. This is the first robust, spatially extensive representation of the distribution and composition of riparian cover in the region. We applied the recently developed tool Zonation to optimize the quantity and connectivity of riparian habitat for multiple species of birds over time under different scenarios of environmental change. Selection of abiotic and biotic components of riparian habitat included in the models was based on empirical data on relationships among topography, vegetation, and occupancy of birds. Scenarios were spatially and temporally explicit, and were derived from existing knowledge and hypotheses about the response of plants, animals, and ecological processes to climate, land-use change, and potential management actions.

P1.45 Fleming, MA*; Roby, DD; Irons, DB; Bixler, KS; Ostrander, EA; Cook, JA; Biology Department and Museum of Southwestern Biology, University of New Mexico, Albuquerque, New Mexico 87131, Oregon Cooperative Fish and Wildlife Research Unit, Oregon State University, Corvallis, Oregon 97331, Migratory Bird Management, U. S. Fish and Wildlife Service, 1011 East Tudor Road Anchorage, Alaska 99503, National Human Genome Research Institute, National Institutes of Health, Bethesda, Maryland 20892; *maflemin@myuw.net*

Detecting admixture of fur farm mink in native populations in Prince William Sound, AK

Prince William Sound (PWS), Alaska supports native mink on its nearshore islands and mainland, but non-native mink were also introduced to small islands in the 1900s for fur farming. We used a multigene approach to determine whether mink on the Naked Island Archipelago (NIA) were native or introduced via fur farms. Using 309 bp of mtDNA control region (n=135) and 10 microsatellites (n=211), we analyzed samples from 7 PWS localities (including Montague I. where fur farm mink were introduced in 1951), 2 fur farm color phases, and 8-24 localities across North America. MtDNA distinguished mink from eastern and western North America; contemporary fur farm mink had ancestry from both regions. Fur farm ancestry on NIA is evident from the single "eastern" haplotype there (n=9) and nowhere else in the west except Montague I. (1 of 9) and Knight I. (3 of 7), 6 km from the NIA. In contrast, nuclear analyses supported fur farm ancestry for Montague I. (e.g., high allelic richness, 24% of alleles found nowhere else in PWS) but native ancestry for NIA mink (e.g., low allelic richness, 95% of alleles shared with Knight I.). Either there was once a fur farm on the NIA, or admixed mink colonized or were introduced from Knight I. (which had fur farms nearby). Knowledge of the phylogeographic history of mink in NA and PWS was critical to determining the origin of NIA mink, which have decimated seabird colonies there in the last decade.

SY15 Fletcher, R; University for Peace; *rfletcher@upeace.org*

Inequality: Conservation's Public Secret?

Political ecologists have increasingly drawn attention to the potential of conventional biodiversity conservation strategies to exacerbate the very socioeconomic inequality that, these critiques argue, underlies much natural resource degradation. Responding in part to critiques such as these, most contemporary conservationists now incorporate poverty alleviation in their agendas. Yet while such efforts, in their increasing emphasis on neoliberal, market-based income generation initiatives, may acknowledge political ecologists' diagnoses of the causes of environmental degradation, the solutions these critics advocate-focused, in the Marxist tradition, on fundamental redistribution of resource access-are commonly ignored. From a Marxist perspective, however, capitalist strategies will likely exacerbate the very poverty they ostensibly redress-or at best, merely redistribute the field of gainers and losers. Thus, much contemporary conservation seems to present a paradox, validating its critics' identification of inequality as a driver of resource degradation yet overlooking these same critics' identification of capitalist markets as a driver of this inequality. The results is a situation whereby poverty appears to be explicitly acknowledged and addressed as a major impediment to global conservations efforts while in practice this poverty may be largely neglected. Hence, inequality may constitute something of a "public secret" in conservation discourse at present, its importance and origins simultaneously acknowledged and denied. I illustrate this analysis with an examination of contemporary conservation practice in Costa Rica's controversial Osa Peninsula.

P2.144 Flockhart, DTT*; Martin, TG; Norris, DR; University of Guelph, CSIRO Sustainable Ecosystems; *dflockha@uoguelph.ca*

Optimizing Conservation Investment for Migratory Monarch Butterflies in Eastern North America

Conservation planning for migratory species should attempt to maximize population size and probability of persistence during all aspects of the annual cycle. Migratory monarch butterflies (Danaus plexippus) in eastern North America face threats from loss of breeding habitat, reduction of food resources on migration, and degradation of specialized winter habitat. We will use decision theory to address two questions. First, what is the optimal land conservation strategy to maximize population size of monarchs across the entire distribution? Guided by land cost and a population model we will use dynamic programming to optimize how resources should be allocated between breeding, migration, and wintering locations at a continental scale. Second, what set of actions will maximize monarch population persistence on the winter grounds when considering three conservation actions: combating illegal forestry, supporting reforestation programs, or enhancing habitat quality? We will solicit expert opinion to gauge the likelihood of success of each action and use stochastic dynamic programming to determine the optimal investment schedule and action sequence, based on financial cost and ecological benefit, for wintering monarchs. We will provide strategies to protect migratory monarch populations at a vulnerable stage of their life history and across political boundaries and offers a framework that could be used to manage any migratory species with a complex migration facing multiple threats.

17.5 Foley, ML*; Krauss, SL; University of Western Australia, Botanic Garden and Parks Authority; *michalie.foley@bgpa.wa.gov.au*

Population Size Effects on Genetic Pattern and Process in Banksia ilicifolia: Consequences for Conservation and Ecological Restoration

With the increasing desire of the community to own new houses, Banksia woodlands within the biodiversity hotspot of Southwest Western Australia are increasingly in high demand for housing estate developments in both urban and regional areas. This pressure of increased human encroachment has reduced population size and increased isolation which can be associated with a suite of genetic problems including loss of genetically differentiated populations, increased inbreeding and loss of genetic variation due to genetic drift. This project focuses on exploring genetic structure and the underlying genetic processes in the tree Banksia ilicifolia, a species that is naturally disjunct in its distribution. This common, wide spread species will serve as a model for understanding gene flow processes in a fragmented landscape. This project is being achieved through the use of microsatellite markers and paternity analysis of large and small populations within the Perth metropolitan area. With this knowledge of pollen dispersal it can be seen whether barriers such as roads, houses and gardens act as barriers and corridors. It can also inform land managers and housing estate developers on how new developments should be designed to for the long term sustainability of both common and rare plant populations.

P2.40 Foley, MM*; Halpern, BS; Micheli, F; Armsby, MH; Caldwell, MR; Crain, CM; Prahler, E; Sivas, Deborah; Center for Ocean Solutions, National Center for Ecological Analysis and Synthesis, Hopkins Marine Station, Stanford University, University of California Santa Cruz; *mmfoley@stanford.edu*

Guiding ecological principles for marine spatial planning

The declining health of marine ecosystems around the world suggests that the current structure of sectoral governance is inadequate to successfully sustain human uses of the ocean and support healthy coastal and ocean ecosystems. One possible solution to this problem is ecosystem-based marine spatial planning (EB-MSP), which aims to maintain sustainable uses, healthy ecosystems, and the delivery of ecosystem services. In order to achieve these goals, EB-MSP must be based on ecological principles that articulate scientifically recognized attributes of healthy, functioning ecosystems that can be incorporated into a decision-making framework. We present recommendations based on a synthesis of previously suggested principles, along with recommendations generated by a group of twenty marine scientists with diverse backgrounds and perspectives on MSP. The four ecological principles - maintaining or restoring (1) native species diversity, (2) habitat diversity and heterogeneity, (3) key species, and (4) connectivity, and two additional guidelines, (1) context and (2) uncertainty - must be explicitly taken into account in the planning process. When applied in concert with social, economic, and governance principles, these ecological principles can inform the designation and siting of ocean uses and the management of activities in the ocean to maintain or restore healthy ecosystems, allow delivery of marine ecosystem services, and ensure resilient economic and social communities.

SY42 Foote, L; University of Alberta; *lee.foote@ualberta.ca*
Sustainable Wildlife Use: Can Africa and Canada share some lessons?
What are the best ideas in sustainable wildlife use to emerge from Sub-saharan Africa and Canada in the last century and are any of these ideas transferable across the political, ecological, cultural, economic, and latitudinal distance between continents? Canada and southern Africa share early histories of indigenous occupation, colonization and ultimately, independent governments by citizens . Since the late 1800's countries on both continents have allocated, managed, and regulated the harvest of valuable wildlife under a variety of governance structures . Some problems are shared, for example, tensions over access to wildlife for indigenous peoples; the appropriate role of foreign hunting; the growing public discomfort with firearm ownership, international pressure from special interest groups and competing land uses under population growth and resource demand. Would the "North American Model" of wildlife management work in Africa? A Canadian version of CAMPFIRE? What are the limits of subsistence harvesting rights in various African contexts? Can scientific knowledge interface with traditional wisdom and understanding?

P1.57 Foroughi Abari, M; Radnezhad, H*; Islamic Azad University khorasgan (Esfahan) Branch, Islamic Azad University Khorasgan (Esfahan) Branch; *maryforo62@yahoo.com*
Nest Site Selection by Pleskes Ground Jay (Podoces pleskei)
For many species of birds, habitat selection is of particular importance. However, as of yet no study has been made of the nestling habitats of Pleskes Ground Jay. Apart from the observations made by Zarundy (1911), Farnsworth (1992) and Hamedanian (1991), little is known of this bird's habitat. The aim of this study is to identify such parameters as proportion of floral cover, density, frequency, bare ground, normal gravel, fine gravel and topographical features of the plots surrounding the active and inactive old nests and their comparison with random sites not selected for nests. Ghareh Tappeh, a protected site with an area of 50,000 hectares south of Yazd Province in the central Iranian plateau was explored in 2005 and 2006 following the Bird Protocol (Martin, T.E. and G.R. Geupel, 1993). Some 30 active nests (14 active nests in 2005, 16 active nests in 2006), 202 inactive nests (30 nests in 2005, 173 nests in 2006) were found and the above parameters were measured for a total 232 nests at random habitat spots. Floral cover, density, frequency, proportion of bare ground and the topographical features were measured at both nest sites and random non-nest sites, for both active and inactive nests during the interval of the first and second year by placing plots and then were compared using a t-test, whereupon no statistically significant difference was observed ($p<=0.05$). Keywords: Nest, topographical features, Pleskes Ground Jay, active nest, old nest, site selection.

P2.165 ForsstrÃ¶m, Sofie; Jefferys, Josephine; Scott, Makrina; Tremblay, Candice*; Augustana Campus, University of Alberta; *candice.tremblay@ualberta.ca*
Inter-specific Differences in Habitat Selection and Human Tolerance of Iguanids in a Dry Forest Mosaic
Two rapid assessment surveys were conducted in 2007 and 2009 to determine habitat preferences and effects of trail-use intensity on escape behaviours of the green iguana (Iguana iguana) and black spiny-tailed iguana (Ctenosaura similis). Five habitats with varying levels of human presence were surveyed using transects in a small, dry-forest mosaic in Guanacaste, Costa Rica. Species distributions differed significantly among habitat types (X2=60.40, P

7.2 FOSTER, ROLAND*; Bowring, Jacqueline; Perkins, Harvey C.; Department of Social Science, Parks, Recreation, Tourism and Sport, Lincoln University, Lincoln 7647, New Zealand, School of Landscape Architecture, Lincoln University, Lincoln 7647, New Zealand; *roland.foster@lincolnuni.ac.nz*
The Ecotourism Species Concept: The Manipulation of Taxonomy to Advance Conservation and Tourism Development
Taxonomy has a fundamental role to play in setting conservation priorities because population sizes and distributions of a given species are only accurate if the taxonomy is correct. Taxonomy, can, however, be misused to elevate particular taxa in order to increase conservation funding, or to act as a proxy for landscape conservation, which has become known, colloquially, as the â conservation species concept'. Extending these ideas, this paper reports a case study of penguin taxonomy, conservation and ecotourism on Banks Peninsula, Christchurch, New Zealand. It reveals how a phylogenetic study of the white-flippered penguin (Eudyptula albosignata) appears to have been influenced by a proposal to develop a â penguin parade' in which penguin chicks are translocated to establish a new predator-proof fenced colony in a highly valued and contentious landscape that is more accessible to tourists. We argue that while ecotourism can support conservation initiatives, the use of taxonomic science, and a resultant â ecotourism species concept', to pursue the development goals of ecotourism promoters has the potential to adversely affect the work of both taxonomists and nature conservationists.

13.3 Foster, S.J.*; Vincent, A.C.J.; Project Seahorse; *s.foster@fisheries.ubc.ca*
Fishing a sinking boat: Tropical shrimp trawl fishers' knowledge of and attitudes about their fishery
Tropical shrimp trawl fisheries are currently unsustainable, with similar sets of management measures used globally to address the direct and indirect costs of their practices. Yet little is known about shrimp fishers' perceptions, despite the clear importance of human behaviour in determining the success of fisheries management. We present the results of interviews with industrial shrimp trawl fishers from the southern Gulf of California, Mexico. Fishers were asked to comment on problems facing the fishery, management options to address the issues, and the future of the fishery in general. The interviews also elicited new knowledge on effort and valuable components of bycatch, useful to the management process. Among the problems facing the Gulf\'s fishery, fishers tended to identify those generated externally - fluctuations in shrimp populations, increases in fishing effort, decreases in shrimp prices and increasing overheads - and thus distance themselves from responsibility for management options. The successes of any mitigation measures for the fishery are likely to depend on proper enforcement and reliable governance, as our study indicates. Should strong enforcement be put in place, then trawl free areas seem to be the most pragmatic way to alleviate problems associated with the fishery; our effort data point to areas that might have greatest acceptance among fishers. In the long run, however, it may be economic extinction of the fishery that reduces pressure on the marine ecosystem.

11.4 Foufopoulos, J*; Anthony, N; Hurston, H; Pafilis, P; Hasselquist, D; Valakos, E; University of Michigan, University of New Orleans, University of Lund, University of Athens; *jfoufop@umich.edu*
Effects of Long-term Habitat Fragmentation on Genetic Diversity, Immune Function and Parasitism in Island Lizards.
Loss of genetic variability in fragmented populations has important, yet not well-understood, implications for the long-term persistence of such populations. Because loss of genetic variability is progressive and the accompanying ecophysiological impacts accrue over many generations, it is difficult to evaluate their effects in free-ranging species. We quantify the long-term loss of genetic diversity and evaluate the concomitant effects on immune function and susceptibility to parasitism by comparing wall lizard (Podarcis erhardii, Lacertidae) populations found on 20 Holocene landbridge islands in the Aegean Sea (Greece). Because this species is an extremely poor overwater disperser, for these populations, formation of islands by rising sea levels can be likened to a population bottleneck whose magnitude and duration is determined by island area and time since isolation, respectively. In accordance with neutral bottleneck theory we find that loss of nuclear genetic variability decreases on larger islands and increases with longer periods of isolation. Immune function, measured as the ability to produce antibodies to standardized novel antigenic challenges, is impaired in small island populations. Parasitism (blood parasite populations and ectoparasite loads) increases in those lizard populations that have been isolated the longest. These results suggest that long-term loss of genetic diversity can have important implications for the health of fragmented populations.

P2.74 Found, R*; Boyce, MS; University of Alberta; *found@ualberta.ca*
Predicting and Mitigating Deer-Vehicle Collisions in an Urban Area
Collisions with deer and other large animals are increasing across North America, and the resulting rise in economic costs and risks to public safety have made mitigation measures a priority for both city and wildlife managers. In the metropolitan area of Edmonton, Alberta, approximately 100 deer-vehicle collisions occur each year, involving mostly white-tailed deer (Odocoileus virginianus). We used a database of collision locations held by City administration and used GIS to identify the characteristics of both collision sites and randomly-chosen sites with a similar spatial distribution. We then created landscape and roadside habitat models to describe and predict deer-vehicle collision locations and frequencies within the city of Edmonton, Alberta. These models suggested that modifying certain landscape and roadside habitat variables could be an effective way to reduce deer-vehicle collisions. We also tested the effectiveness of warning signage at mitigating deer-vehicle collisions. We provided standard-sized deer crossing signs at half of the sites identified to have high rates of collisions. The other half of these sites did not receive signs. After one year, those sites with signs exhibited significantly fewer collisions than non-signed sites did. We conclude that alerting drivers to high-collision locations can be effective at reducing deer-vehicle collisions.

SP2.4 Fowlds, M.*; Lutz, R. S.; Martin, K.; University of Wisconsin, Wisconsin Department of Natural Resources; *peanutheadbug@yahoo.com*
Habitat Associations of Golden-winged and Blue-winged Warblers in Central Wisconsin
The Golden-winged warbler, Vermivora chrysoptera, has shown a population decline over the past 40 years, largely due to habitat loss and hybridization with the Blue-winged warbler, V. pinus. Our work contributed to knowledge of the current status of both species in central Wisconsin and examined habitat associations between species where their ranges overlap. We conducted point-count surveys, mapped territories, and surveyed vegetation at both the site and territory spatial scales. We surveyed three different vegetation cover types: clear-cut aspen, clear-cut hardwoods, and shrub swamp edges. Results showed both species in all three cover types. Golden-wings occurred at significantly higher densities than Blue-wings in aspen and swamp edge in both years (P

24.5 Francis, Wendy L.; Yellowstone to Yukon Conservation Initiative; *wendy@y2y.net*
Climate Adaptation in Practice: the Yellowstone to Yukon Conservation Initiative
The impacts of climate change are predicted to be exacerbated by existing conservation challenges. The loss and fragmentation of habitat from transportation and utility infrastructure, human settlement, and resource exploration and development are already major contributors to the accelerating loss of global biodiversity. Fragmented landscapes will pose barriers to plant and animal communities attempting to shift their ranges in response to changing temperatures and precipitation patterns. One highly-recommended management response to both biodiversity loss and climate change impacts is to pursue conservation planning with the goal of implementing large-scale networks of interconnected protected areas. The Yellowstone to Yukon Conservation Initiative (Y2Y) has been implementing and facilitating such a large-scale conservation vision for over 17 years. Its programs have achieved numerous successes in increasing the number and size of core protected areas, securing linkages zones and addressing the impacts of major transportation corridors. The Y2Y initiative represents a globally-leading model of an appropriate response to impending climate-induced biogeographic changes.

P1.53 FRANCISCO, PM*; Mori, GM; Souza, AP; Laboratory of Molecular and Genetic Analyses, Department of Genetics, University of Campinas, Laboratory of Molecular and Genetic Analyses, University of Campinas; *patricia_francisco@ymail.com*
Development of Microsatellites Enriched Libraries to Study the Population Dynamics of Mangrove Trees (Rhizophora mangle and Rhizophora racemosa)
Mangroves are heterogenic environments composed by different animals and plants adapted to unique conditions such as variable salt concentration, flooding, and slimy and anaerobic soil. Although mangroves provide important ecosystem services (e.g. pollution filters, prevention of coastal erosion and flooding), and is used by many species of fish and crustacean as breeding and feeding habitats, human activities have destroyed 35% of these forests in the world only during the last two decades. In Brazil only three genera of angiosperms can be found in mangrove ecosystems, in spite of having the second largest mangrove area in the world. The aim of this study was to develop microsatellite molecular markers to better understand the population dynamics of two species of the genus Rhizophora, Rhizophora mangle and R. racemosa, in Brazil. Given the lack of such studies in this area, this information can be used to design conservation and reforestation strategies. We developed 44 microsatellite markers for the species R. mangle and 36 for R. racemosa. We used (CT)8 and (GT)8 DNA probes to enrich the microsatellite libraries. For both species, the most common microsatellite motifs found were AC/GT and CA/TG, in contradiction to the fact that the most common motifs in plants are AT/AT. We concluded that this contradiction is due to the DNA probes motifs used to enrich the libraries and not necessarily because these species have more of these microsatellite sequences in their genome.

P2.11 Fraser, Christopher*; Princz, Juliska; Scroggins, Rick; Environment Canada; *christopher.fraser@ec.gc.ca*
The Development of New Test Methods for the Assessment of Contamination in Canadian Boreal Forest Soils
Due to significant industrial and commercial development in boreal forest region, there is a recognised need for new standardized toxicity methods for the assessment of soil contamination from these industrial activities. Regulatory authorities have recognized that there is a critical need for new test methods that use plant and invertebrate species representative of the boreal and taiga eco-zones of Canada. Current soil biological methods published by Environment Canada use test species validated for soils of agronomic regions of Canada. Methods are under development which better reflect the unigue characteristics of the boreal forest ecosystem (i.e., stratified nature of boreal forest soils, difference in chemical characteristics such as depressed pH, species of plants and soil invertebrates native to forest soils). The current research is focusing on boreal plant species (such as black spruce, golden rod and paper birch), and invertebrates (collembola and earthworms). This poster will focus on the research conducted on the boreal earthworm species Dendrodrillus rubidus and the collembolan species Proisotoma minuta.

P1.49 Frazer, KK*; Russello, MA; University of British Columbia (Okanagan); *kfrazer@interchange.ubc.ca*
Outlier locus detection in kokanee salmon and their utiity for informing fisheries management.
Landlocked kokanee salmon (Oncorhynchus nerka) have differentiated into two distinct reproductive ecotypes that occur sympatrically in many post-glacial lakes along Pacific coasts of North America, Russia and Japan. â Stream-spawners' migrate up tributaries, build redds and choose mates. â Shore-spawners' are a novel form that aggregate along the lake shore to spawn. We are examining genetic variation at expressed sequence tag (EST)-linked and putatively neutral microsatellite loci within and between sympatric kokanee ecotype pairs from several isolated lakes to investigate the following questions: (i) did shore-spawning behaviour evolve independently within multiple lakes or is it ancestral to a single source population, (ii) can loci putatively under selection consistently distinguish sympatric ecotype pairs found in internationally dispersed lakes, and (iii) to what geographical extent can this genetics-based approach improve the accuracy of kokanee stock assessments within lakes. Preliminary results demonstrate significant variation in EST-linked loci exhibiting signatures of a selective sweep (â outliers') among lakes. Yet, outliers provided superior accuracy in individual assignment and mixed population analyses for Okanagan and Wood Lake kokanee relative to neutral loci. Accurate abundance estimates for these morphologically indistinguishable, but ecologically and evolutionarily unique ecotypes, will better inform fisheries management in lakes where kokanee are of conservation concern.

P2.39 Freitas, MO*; Moura, RL; Francini-Filho, RB; Minte-Vera, CV; Universidade Federal do ParanÃ¡, Marine Program, Conservation International Brazil, Universidade Federal da ParaÃ–ba, Universidade Estadual de MaringÃ¡; *serranidae@gmail.com*

First evidence of fishing on reproductive aggregation of Ocyurus chrysurus in the Brazilian coast.

The yellowtail-snapper Ocyurus chrysurus is an important reef fishery resource, representing a source of food for coastal populations in tropical countries. The Abrolhos Bank, Eastern Brazil, encompasses the largest and richest coral reefs in South Atlantic Ocean. In this study, we report the first evidence of fishing on aggregations of this species in the Brazilian coast. For this, we sampled fish landings, infered spawning seasons using GSI data and interviewed fishers from May 2005 to October 2007 in four municipalities in the Abrolhos Bank. Temporal variability in spawning activity was evaluated using the GSI. The CPUE data was inspected for peaks. A set of 1850 landings from hook-and-line fisheries was sampled. Peaks in CPUE are observed mainly during the Southern spring and summer. A total of 619 fish were collected and analyzed macroscopically. O. chrysurus showed two peaks of reproductive activity, a more intense one between September and October, and another between February and March. The fisher knowledge corroborated our findings: of the 22 skipper interviewed, 7 (32%) felt capable to respond about the spawning season of O. chrysurus, which coincided with the two season detected using the CPUE and GSI information. The peaks of CPUE during the spawning season are typical of fisheries upon aggregations of reef fishes. Research efforts are being made to identify the spawning grounds and restrictions of fishing effort and the creation of MPAs are suggested.

P1.67 Freudenberger, L*; Schluck, M; Hobson, P; Kreft, S; Cramer, W; Ibisch, PL; Department of Forestry and Environment, University of Applied Sciences Eberswalde, 16225 Eberswalde, Germany, Writtle College, Chelmsford, Essex, CM13RR, UK, Potsdam Institute for Climate Impact Research, 14473 Potsdam, Germany; *lfreudenberger@fh-eberswalde.de*

Interdependencies between human development and the present status of Earth's ecosystems

Human well-being and development is dependent on the Earth's ecosystems and the services they provide to us. Within the last 100 years technological advancement has transformed much of the global land surface and resulted in macro-scale mining of natural resources with major consequences for the survival of existing biodiversity. Nature conservation strategies attempt to mitigate the negative impacts of economic development and operate through social and political frameworks. To deal with complex conservation problems requires a more integrative approach to conservation planning that addresses both social and political factors. In practice, nature conservation planning usually refers either to national state or to ecoregional scale. For the purpose of analysis and subsequent global priority-setting, we present a new spatial classification of the earth into 9041 eco-political units. Applying multivariate statistical procedures we found strong interdependencies and linkages between the current biological and ecological status and social, political and economic parameters. These insights into global interrelations between the ecological status and the socioeconomic conditions provide us with valuable indicators for effective and proactive conservation planning that focuses on global ecosystem functionality and expected effectiveness of conservation action.

P1.180 Frock, CF; North Carolina State University; *catherine.frock@gmail.com*

The Effects of Human Landscape Modification on the Movement Behavior of Common and Rare Amphibian Species

Humans alter landscapes in drastic and subtle ways. Although the impacts of changes such as habitat fragmentation are well-studied, finer-scale modifications are often overlooked and also have substantial impacts on organisms, including dispersing amphibians. Habitat structure is an important variable that influences species movement and is manipulated by humans. At the Fort Bragg military installation in North Carolina, humans modify landscapes through development and management activities such as grass cutting and pinestraw removal. To assess the effects of human habitat structure modification on amphibian movement, I conducted two fluorescent dye powder tracking experiments. The first study involved eastern newts (Notophthalmus viridescens) released into plots within longleaf pine forests in which pinestraw was either removed or retained. For the second study, I released chorus frogs (Pseudacris spp.) into the aforementioned plot types as well as into plots within open fields in which tall grasses were either retained or cut and removed. Newts moved over twice as fast in modified plots than in unmodified ones. The behavioral changes I observed may reflect differences in habitat quality and indicate the importance of habitat heterogeneity to amphibian movement behavior. Fine-scale habitat modifications such as these do impact dispersal ability and should be considered in conservation plans undertaken in fragmented landscapes.

P2.197 Fuentes,MMF*; Hamann, M; James Cook University; *mariana.fuentes@jcu.edu.au*

Vulnerability of sea turtle nesting grounds to climate change

A particular species may be affected by multiple climatic processes at different temporal and geographical scales. However, in the context of limited resources, political, social and cultural constraints, lack of ecological knowledge and issues of scale managers cannot address all of these threats. To efficiently prioritize their resources managers need to understand the relative impact of different climatic processes and the spatial variation of the cumulative impact of these climatic processes on a particular species. However, this information is often lacking as most studies predict how a single climatic process will affect a particular species, and they typically focus on only one location, which does not provide a full understanding of how a management unit will be affected. To address this issue, a vulnerability assessment framework was applied to the full spatial range of nesting grounds used by a green turtle, Chelonia mydas, population to assess the cumulative impact of sea-level rise, increased temperature and cyclonic activity on their nesting grounds as climate change progresses. Nesting grounds closer to the equator were found to be the most vulnerable to climate change. By 2030 sea-level rise will cause the most impact to the reproductive output (hatching success) of this population, however, by 2070 sand temperatures will reach high temperatures causing relatively more impact. Therefore, in the long term, reducing the threats from increased temperature may provide a greater return in conservation investment than mitigating the impacts from other climatic processes. Potential options to mitigate the impacts of increased temperature include changing the thermal gradient at beaches, and artificial incubation.

SY26 Funston, P.J.; Tshwane University of Technology; *funstonpj@tut.ac.za*

Effective conservation of lions in Africa

There is general concern about the status of the African lion with conflict with livestock pastoralists being symptomatic. This trend has triggered conservation action plans at national and regional levels, with some rather high expectations. For example, each state within the current range of the lion should try and conserve at least one representative lion population. These goals may need to be reviewed. The key may be to rather prioritise larger populations. Key issues within realistically viable populations need to be tackled with more urgency. One of these is the issue of disease, with at least two of the six key viable populations already infected with bovine tuberculosis. One of the other key issues is the effect of trophy hunting. Clearly the quotas being set for lion hunting in most areas are very high, and this has multiple and largely unknown effects on population performance. Many small isolated lion populations will not be viable in the long-term without substantial intervention. Conservationists need to think very rationally about their efforts to ensure the persistence of these populations, which paradoxically are those in which the largest financial resources are being spent. Thus the effective conservation of lions in Africa will depend on a re-prioritisation of scientific effort and financial resources.

SY71 Gailus, J; Natural Resources Defense Council; *jeff@gailus.ca*

A Science-Based Vision for the Recovery of Alberta's Threatened Grizzly Bear Population

Alberta's grizzly bear has been recognized as a threatened species requiring recovery efforts. Alberta's Endangered Species Conservation Committee made this recommendation because of small population size (~800), increasing habitat fragmentation, life-history characteristics that make grizzlies sensitive to human-caused mortality, and limited immigration from other populations. The goal of the Alberta Grizzly Bear Recovery Plan (2008-2013) is to "restore, and ensure the long-term viability of, a self-sustaining grizzly bear population" across "current provincial distribution and occupancy levels." According to the recovery plan, this encompassing approximately 228,000 sq. km of western Alberta. Unfortunately, the current recovery plan does not appear to provide adequate amounts of secure habitat to achieve the plan's stated goal. Based on successful recovery efforts in the U.S., the minimum requirement is to manage approximately 68 per cent of the recovery area as secure habitat. The current recovery plan would likely support a population of approximately 1100 grizzly bears across a much smaller area than was defined in the recovery plan. How many grizzly bears could the recovery area support? Habitat characteristics suggest that with appropriate recovery efforts, more than 2000 grizzly bears could be supported.

P2.87 Gallant, D; Slough, B; Berteaux, D; Reid,D*; Universite de Quebec a Rimouski, Private, Wildlife Conservation Society Canada; *dreid@wcs.org*

Arctic Fox Versus Red Fox in the Canadian Arctic: Is there a clear winner in the past four decades in the warming northern Yukon?

Many studies have shown species range shifts correlated with a warming climate. One such shift is the northward expansion of red fox (Vulpes vulpes) into the circumpolar tundra habitats of the competitively inferior arctic fox (Vulpes lagopus). This is frequently interpreted to be a result of climate change. During an International Polar Year research project (Arctic WOLVES; 2008-09) we repeated aerial surveys of fox dens on the coastal plain and Herschel Island of north Yukon, Canada, and compared species occupancy and distribution to surveys in 1971-72, 1984-90, and 2003. This region has experienced amongst the highest levels of warming globally (mean surface temperature anomaly of >1.60C since 1951-80), so we hypothesized that red fox den occupancy and range would have increased at the expense of the arctic fox. In 2008 and 2009 the number of dens occupied by each species was within the range of numbers in previous surveys. For dens surveyed at least 4 times over a 20-year period, only a small proportion changed occupancy between species, and arctic fox took over red fox dens as frequently as red fox took over arctic fox dens. There was no contraction in arctic fox range, and red fox did not expand at the expense of arctic fox. These results refute our hypothesis, and raise doubt about the climate warming explanation for red fox range shift in other regions. We propose a clearer mechanistic explanation of red fox range limitation based on winter food availability.

17.2 Galpern, P*; Manseau, M; Wilson, P; Natural Resources Institute, University of Manitoba, Parks Canada and Natural Resources Institute, University of Manitoba, Biology Department & Forensic Science Program, Trent University; *pgalpern@gmail.com*

Interpretation of spatial genetic structure using graph-based landscape connectivity models for woodland caribou, North Interlake, Manitoba, Canada

The effect of landscape features on boreal woodland caribou (Rangifer tarandus caribou) movement is poorly known, yet such information is important for the management of this threatened ecotype. If there has been restricted movement over time, landscape features may be correlated with spatial genetic structure (SGS). Here, we adopt a novel approach to identify correlates of SGS by examining the fit of landscape models to genetic observations obtained by non-invasive sampling of caribou fecal pellets. We built landscape graphs representing different hypotheses of caribou landscape connectivity, and tested their fit to the spatial genetic data. Fit was assessed using partial Mantel tests with geographic distance as a covariate to control for isolation by distance. We found strong evidence of SGS. Models describing the spatial configurations of treed muskeg and mature black spruce patches had good fits to the SGS. Because caribou are highly mobile, it is unlikely that disconnected habitat alone is determining SGS in this 600,000 ha (approx.) study area. A high cost associated with linear features yielded a 10-fold improvement in our goodness of fit metric and the best fit model overall (Mantel $r = 0.29$; $p < 0.001$). This suggests that provincial highways may be acting as barriers. More generally, our work demonstrates how graph theory based models of landscape connectivity can be used to explore SGS.

P2.119 Gancos, Tara; Center for Environmental Studies, Brown University; *Tara_Gancos@brown.edu*

Matching Theory and Practice: An Examination of Practitioners Descriptions of Ecosystem-Based Management in Central California

Ecosystem-based management (EBM) strives to address the inadequacies of traditional single-sector natural resource management approaches by targeting the full suite of ecosystem services being produced in a naturally delineated place, assessing cumulative impacts of different human activities, evaluating tradeoffs between objectives, and engaging stakeholders throughout the management process. Published articulations of EBM contain a variety of distinguishing characteristics, many of which have yet to be fully operationalized among pioneering EBM sites. Disparities between EBM theory and practice have been attributed by some to insufficient translation of EBM principles between scholars and practitioners. To determine the extent to which poor translation is inhibiting EBM implementation, I investigated two EBM demonstration sites on the central California coast, USA: the Elkhorn Slough Tidal Wetland Project (ESTWP) and the San Luis Obispo Science and Ecosystem Alliance (SLOSEA). Twenty-six semi-structured interviews were conducted with practitioners at these sites: ten from the ESTWP and sixteen from the SLOSEA. Distinguishing characteristics mentioned by practitioners in their descriptions of EBM were compared to published descriptions. The results indicate coherence between published articulations of EBM and practitioners descriptions within and across sites. This led me to conclude insufficient translation of EBM concepts is not a problem at the ESTWP or SLOSEA. The interviews yielded indications of other EBM implementation challenges, which appear to be playing more significant roles in hindering progress of EBM at these sites.

20.7 Gangadharan, A.*; Srinivas, V.; Ram, S.; Foundation for Ecological Research, Advocacy and Learning; *gangadha@ualberta.ca*

Modeling population-level linkages for elusive large mammals in the southern Western Ghats, India

The Western Ghats of India are a major biodiversity hotspot and contain critical habitat for endangered, wide-ranging mammals such as tiger Panthera tigris, elephant Elephas maximus, gaur Bos gaurus, and lion tailed macaque Macaca silenus. In the southern part of the region, the two remaining strongholds of these and other species are increasingly separated by a 400 km2 mosaic of degraded forests, plantations and human infrastructure, threatening connectivity. We quantified habitat use for 9 focal large mammals using occupancy methods to identify population-level linkages at a coarse resolution. We used spatially replicated surveys to estimate site-level detection probabilities of animal signs as a function of local covariates. We then modeled spatial variation in habitat use as a function of human disturbance, habitat quality, and physical characteristics, and used the resulting surfaces to model least-cost corridors for each species. Disturbance covariates were the most important predictors of habitat use for the rarer species. Combining and buffering least-cost corridors identified a wide area that can potentially serve both as home range habitat and a population-level linkage between the two protected regions for large mammals. We suggest that using an occupancy based approach within a least-cost corridor framework is an effective empirical means of identifying linkages at a coarse resolution for rare and elusive large mammals, even without detailed telemetry data.

2.8 Garcia-Gonzalez, Claudia*; Garcia-Vazquez, Eva; University of Oviedo (Spain); *claudiacgg@yahoo.es*

Country toad and city toad. Human constructions as Amphibian shelters.

In North Iberia (south Europe), eight Amphibian species have been found in troughs constructed for cattle watering in the Trubia valley. Seven of them were in juvenile development stages. Moderate management, presence of sediments in the bottom and abundant floating vegetation were identified as principal factors contributing to Amphibian species richness. However, changes in agriculture activities in the region consisting of decreasing husbandry and increasing tourism are leading to changes in trough use: from cattle watering to loss of function (abandon) or transformation into decorative elements. Most Amphibian species cannot develop in excessively cleaned troughs. As no other sites suitable for reproduction of aquatic amphibians were found in the valley studied, traditional troughs can be considered refuges. Management actions like moderate cleaning and protecting vegetation and bottom sediments are recommended. To compare urban with rural areas, we have sampled a very small urban pond and found abundant populations of two Anurans and one Urodele (Alytes obstetricans, Discoglossus galganoi and Triturus helveticus). The three species present in the pond exhibited high genetic diversity at mitochondrial DNA, comparable to that found for near rural areas with larger water points with Amphibians. Under the current situation of strong Amphibian decline, we suggest that urban ponds are subject of conservation measures.

SP2.5 Garner, Jocelyn; Thompson Rivers University; *jocegarner@gmail.com*

Once a spadefoot always a spadefoot? Ecology of the Great Basin Spadefoot (Spea intermontana) in a â novel' environment

The Great Basin Spadefoot (Spea intermontana) ranges from Arizona to British Columbia in western North America, being typically associated with arid grasslands such as in BC's southern interior. However, they also appear further north in BC, where only pockets of grassland dot a forested landscape and the climate is cooler and wetter. Other than data on their presence at certain breeding ponds in early spring, there is little information available on this population, and it is unknown how they utilize the atypical northern environment. Using telemetry, I am examining core terrestrial habitat and utilized habitat characteristics at two scales for these animals near their northern limit at 70 Mile House, BC, namely mesohabitat (forest vs grassland) and microhabitat (ground cover). In 2009, core terrestrial habitat ranged from 6.4 to 219.5 m from the pond edge (mean=72.1 m). All retreat sites were in open grassland, indicating forested or shrub habitat was not preferred. The strongest predictor for use at the micro-habitat level was bare ground, along with correlated decreases in ground cover (litter, shrubs). My preliminary study suggests that spadefoots at this location are, like conspecifics further south, still tied to open grassland, which is relatively scarce in the northern ecosystem.

P2.140 Garrard, Georgia*; Williams, Nicholas S. G.; Bekessy, Sarah A.; McCarthy, Michael A.; Wintle, Brendan A.; University of Melbourne, Univerisity of Melbourne, RMIT University; *ggarrard@unimelb.edu.au*

A general model of detectability and minimum survey effort for plants

Imperfect detectability is recognised as an issue in ecological surveys and, if unaccounted for, may have implications for the management of threatened and invasive species. A number of modelling methods now exist for estimating species' detectability. These models provide valuable information about detection rates and required survey effort, but inference is restricted to the species for which they were developed. Here we present a multi-species model of detection time for plants in which detectability is modelled as a function of the characteristics of the species, and demonstrate the application of our model in a case study in native temperate grasslands in south-eastern Australia. Plant characteristics shown to influence detectability in this study include life-form, rarity, flower colour and size, phenology, uniqueness and origin. Because the model is based on species traits, detection rate estimates can be derived for species even if repeat surveys are not available for those species. Given that there are insufficient suitable data to estimate detection rates for most plant species, our model will be extremely useful for ecologists and conservation practitioners needing to determine minimum survey requirements for monitoring or impact assessment when species-specific detection data cannot be collected.

6.3 Gates, C. Cormack*; Suitor, Michael J.; Jones, Paul; Jakes, Andrew; Kunkel, Kyran; Bender, Darren; Grue, Mike; Sheriff; Faculty of Environmental Design, Universityof Calgary, Faculty of Environmental Design, University of Calgary, Alberta Conservation Association, World Wildlife Fund U.S.A., Dept. Geography, University of Calgary, Alberta Conservation Association, Tera Environmental Consulting; *ccgates@nucleus.com*

Conserving crucial habitats and connectivity for pronghorn in the Northern Mixed-grasslands of the Great Plains

Large mammal migration is an increasingly threatened element of biodiversity globally. For populations exhibiting partial migration, the loss of migrants can substantially decrease population resilience and abundance. Truncation of migration by anthropogenic features and landscape change are two leading threats to migratory populations. We demonstrate that pronghorn in the mixed-grasslands of Alberta, Saskatchewan and Montana exhibit two types of seasonal movements, long distance (LD) migration and much shorter movements where summer and winter ranges overlap or are in close proximity. Movements during migration periods differed between migrants and non-migrants. LD migrants moved 451 + 177 km (SE; maximum 831 km, a record for the species). LD migrants occupied larger winter home ranges than non-migrants. Pronghorn were more abundant where both types were represented in large areas of intact native prairie. The apparent loss of LD migration in a highly converted landscape (tilled) suggests LD migration is sensitive to landscape change. Areas were identified in migration pathways where development threatens to block migration. If managers wish to maintain resilient and abundant populations of pronghorn, it will be necessary to design land use plans that maintain the competence of landscapes to sustain LD migration, including seasonal habitat areas, movement corridors, and key linkage zones.

P1.63 Gauli, K.*; Baral, S.; Centre for Development Research, University of Natural Resources and Applied Life Sciences (BOKU), Vienna, Austria, Practical Solution Consultancy Nepal Pvt. Ltd., Kausaltar, Bhaktapur, Nepal; *kalyan.gauli@boku.ac.at*

Livelihood outcomes of commercializing non-timber forest products in Nepal's community forest user groups

This paper compares a traditional and an enterprise oriented non-timber forest product (NTFP) marketing approach in two community forest user groups (CFUGs) of Dolakha district in Nepal. This is important, because forest policy documents of Nepal consider the commercialization of NTFPs in CFUGs as an effective poverty reduction strategy. What remains unclear, however, is the role that institutional arrangements play in both approaches in order to reduce poverty. The data were collected using various participatory rural appraisal methods such as household interviews and key informant interviews, formal and informal discussions with CFUG members. The study findings suggest the enterprise oriented arrangement ensures secure market access, which benefits poorer households in particular. In comparison, the traditional marketing approach tends to benefit better-off users. Moreover, the findings also suggest that users in both CFUGs spent most of their NTFP income on purchasing cereals. As poorer households under the enterprise oriented approach earn proportionally more than their traditional counterparts, they are in a better position to fulfill the household food requirements. Based on our findings we conclude that the enterprise oriented NTFP marketing has secured NTFP related benefits to poor users.

P1.132 GÃ¤rtner, Stefanie*; Reif, Albert; Nill, Michael; Prinz, Juliane; Essmann, Hans; Department of Renewable Resources, University of Alberta, Edmonton, Canada, Institute of Silviculture, Albert-Ludwigs University, Freiburg, Germany, Forest Research Institute of Baden-Wuerttemberg, Freiburg, Germany, Institute for Ecosystem Research, Freiburg, Germany, Institute for Forest and Environmental Policy, Albert-Ludwigs University, Freiburg, Germany; *stefanie.gaertner@ales.ualberta.ca*

Integrating local interests in land use planning for conservation in a changing environment a case study from the Upper Rhine Valley in Southwest Germany.

Our objective was to show how a public participatory approach and a decision support system can be used to improve the efficiency and transparency of decision making in land-use planning. A decline in ground water levels due to the canalization of the Rhine River has changed what was formerly flood-plain vegetation to xerothermic vegetation. Although these xerothermic sites are receiving costly conservation measures to prevent valuable species and habitat loss the measures cannot prevent ongoing succession. We identified the land use objectives with five stakeholder groups. Their objectives were defined as desirable landscape conditions through the use of criteria and indicators. The present condition of the landscape and the landscape conditions desired by the stakeholders were evaluated. This process revealed several land use conflicts. Based on these evaluation results three compromise variants were designed as possible development directions for the area. The results were discussed with the landowners and a trial treatment was applied. Within this project we have developed a concept showing how the traditional cultural landscape in the former alluvial sites of the upper Rhine valley can be transformed by improving habitat qualities. This could become a model for restoration practices in the region.

SY28 Geist, V; University of Calgary; *kendulf@shaw.ca*
Large Carnivores and Human Conflict
The ability to survive consistently all African predators on the ground at night, marks the beginning of human evolution 2.0-2.5 years ago, segregating ape from human. We alone among primates do not require trees. It freed us to evolve as carnivorous herbivores, changing from man the hunted to man the hunter. Our dispersal into Eurasia was predicated on dealing with new predators such as bears and wolves. Our North America colonization was delayed some 40,000 years till the collapse of the Pleistocene gigantic, food-stressed predators. Already in the Upper Paleolithic the species patterns in cave art indicate that wolves and hyenas were intensely disliked, much as is in modern times. There is a long history to human - wolf conflict. Where unarmed humans meet wolves, tragedies develop; were wolves meet well armed people co-existence is possible. This conflict deals with predation on humans, livestock and wildlife, and with the effects of parasites and diseases. Historically, Grimm's fairytale of little Red Riding Hood was rooted in painful reality.

P2.156 Gendreau-Berthiaume, B.*; Kneeshaw, D.; Harvey, B.; UQAM, UQAT; *gendreau-berthiaume.benoit@courrier.uqam.ca*
Can partial cuts emulate partial natural disturbances?
There is increasing interest in developing alternatives to traditional management as well as cueing forest management strategies and silvicultural treatments on natural disturbance dynamics. This study compares the effects of natural mortality following partial disturbances with experimental partial cuts to determine the extent to which the latter could emulate natural disturbance dynamics. Forest composition and structure after the different disturbances were the parameters that were evaluated. Higher densities of shade intolerant species were found following partial cuts compared to naturally disturbed stands but similar densities of shade tolerant species were found following all disturbances. Partial cuts and naturally disturbed stands also maintained similar volumes of coarse woody debris, snag basal area and snag density, important structural attributes for the preservation of suitable wildlife habitat. The creation of harvesting trails in partial cuts allowed higher densities of intolerant species to establish, as compared to naturally disturbed stands. However, partial cuts could emulate natural mortality resulting from partial disturbances by maintaining similar densities of tolerant species in the regeneration layer and residual stems (dead and alive) in the canopy layer, thus retaining compositional and structural attributes characteristics of stands in an advanced successionnal stage that have been affected by secondary disturbances.

11.8 GENDRON, AD*; Marcogliese, DJ; Thomas, MV; Aquatic Ecosystem Protection Research Division, Environment Canada, 105 McGill, 7th Floor, Montreal (QuÃ©bec) H2Y 2E7 , Aquatic Ecosystem Protection Research Division, Environment Canada, 105 McGill, 7th Floor, Montreal (QuÃ©bec) H2Y 2E7, Lake St. Clair Fisheries Research Station, 33135 South River Road ; *andree.gendron@ec.gc.ca*
Has the invasive round goby evaded its parasitic enemies in the Great Lakes-St. Lawrence ecosystem?
Parasitism represents an insidious and unpredictable dimension that complicates the evaluation of impacts of alien species on invaded ecosystems. In addition to the risk of exotic pathogen transmission, other mechanisms, such as parasite-release or spillback of indigenous parasites, may contribute to the overall negative effect of invasive species. To further explore these ideas, we studied the parasite fauna of the round goby (Neogobius melanostomus). Introduced in the 1990s into the Great Lakes, this Eurasian fish recently invaded the upper reaches of the St. Lawrence River (SLR). In addition to being infected by fewer parasite taxa (14) than in their native range (up to 72), the goby parasite community in the SLR was two to three times less diverse than that of two sympatric indigenous species. Gobies were less heavily parasitized than native species. Their mean number of helminth parasites was up to 18 times lower than in logperch (Percina caprodes), a native fish that has declined in the Great Lakes since the invasion of the goby. According to the enemy-release hypothesis, the reduction in parasite diversity and abundance could favour the intruder over native competitors. However, this potential advantage might be time-limited as suggested by the relatively higher parasite abundance in gobies collected in Lake St. Clair in 2009 compared to that 15 years earlier at the same sites

SY53 George F. Wilhere; Washington Dept. of Fish and Wildlife; *wilhegfw@dfw.wa.gov*
How Much Habitat is Enough for Listed Species Recovery?: Getting the Policy Horse Before the Science Cart
How much habitat is needed for the recovery of a listed species? The implicit, if not explicit, goal of every recovery strategy is reducing extinction risk to an acceptable level. Therefore, the amount of habitat needed for recovery depends on the acceptable risk of extinction. What ought to be the acceptable risk of extinction? At present, neither SARA nor the ESA give adequate guidance regarding an acceptable level of extinction risk. SARA and ESA both connote that excessive levels of risk - "facing imminent extinction", "in danger of extinction", or "likely to become endangered"- are unacceptable, but these phrases are vague and open to subjective interpretation. Recovery teams, which are ostensibly purely scientific, have unknowingly filled this semantic void with their own ethical value judgments. That is, the amount of habitat identified by recovery teams reflects their personal feelings regarding acceptable risk. This is an inappropriate role for scientists. The acceptable risk should be informed by science, but it is ultimately rooted in societal values tempered by economic realities. Government agencies responsible for administering SARA and the ESA should establish policies for acceptable risk. A critical question for government policy makers is should the costs of recovery affect the acceptable level of extinction risk?

SY71 George Hamilton; Alberta Sustainable Resource Development; *george.hamilton@gov.ab.ca*

Alberta Grizzly Bear Recovery Plan Implementation

The conservation of grizzly bears in Alberta continues to maintain a high public profile, and is often controversial. Improved population estimates have informed a recent species status reassessment. This presentation will outline recommended action items from the approved recovery plan, and steps taken to address them. The focus of conservation effort is generally to reduce human-caused bear mortality. A moratorium was placed on sport hunting in 2006. Public education efforts are in place, and are continually being expanded. Ongoing efforts are needed to deal with human-bear conflicts. The current major challenge is to reduce motorized access within important grizzly bear habitats. The Alberta government is committed to maintaining sustainable grizzly bear populations over the long term.

P1.68 George, AL; UNC Chapel Hill; *andrewg@unc.edu*

Conservation Democracy: Ecology, Democratic Theory, And National Forest Management Under The Healthy Forest Initiative

National forest management in the United States has traditionally included public participation in agency decision-making. Under the Bush Administration's 2002 Healthy Forest Initiative, the rules governing citizen involvement were substantially modified. A consequence of this was that the US Forest Service was able to propose more commercial forestry in US National Forests with less public oversight and environmental review previously mandated by the National Environmental Policy Act. This combined with other rule changes allowing use in sensitive areas with "extraordinary circumstances" that were previously off-limits to commercial activity. This North Carolina case study explores the affects of the Healthy Forest Initiative on citizen participation and environmental management in the Pisgah, Nantahala, Croatan, and Uwharrie National Forests.

P2.209 Ghikas, Diana; Canadian Wildlife Service; *Diana.Ghikas@ec.gc.ca*

Linking Habitat Use to Vital Rates by Accounting for Extreme Behaviour

Using habitat in an extreme way may be risky or rewarding for an animal, yet rarely is this behaviour explicitly identified and considered when seeking insights about how an animal's habitat affects its survival or reproduction. I introduce an approach that: i)utilizes the lower and upper quartiles of habitat use by the population to characterize habitat features and identify extreme behaviour; and ii) measures habitat use by an individual relative to that of the population, HR. This approach is illustrated using data collected by Martin Jalkotzy and Ian Ross who studied a population of cougars (Puma concolor) during 1981-94. To predict the effects of habitat use on cougar survival and reproductive success, generalized-linear models were developed that included relative habitat use, HR, estimated by the population quartile approach (PQA), or, the average absolute habitat used, HA. Models involving these relative and absolute measures of habitat use were compared and the most parsimonious models selected. Methods and results will be presented. â ¢ Models that considered extreme behaviour predicted survival and reproductive outcomes better than models that considered the average absolute habitat used, in all cases; â ¢ The PQA of characterizing habitat provides lower and upper bounds which can be used as coarse guidelines for habitat conservation; and, â ¢ Important insights about the effects of habitat on an animal's vital rates can be achieved by accounting for extreme behaviour.

SP11.5 Ghikas, DM*; Jalkotzy, MG; Canadian Wildlife Service, Golder Associates; *Diana.Ghikas@ec.gc.ca*

Habitat and Seasonal Weather Influences Cougar (Puma concolor) Survival and Reproduction

The relative importance of intrinsic and extrinsic factors on fluctuations in the size of animal populations has been debated extensively in ecology. Variation in the vital rates of a hunted population of cougars was explained well by behaviour (i.e., habitat use) and seasonal weather. To examine how survival and female reproductive success varied with a cougar's identity and behaviour, cougar density, and seasonal weather, we analysed data from a population of cougars in SW Alberta studied by Jalkotzy and Ross during 1981-1994. Generalized-linear models were developed to identify different influences on cougar survival and reproductive outcomes. Survival during winter increased significantly if cougars frequented habitats >1.4 km(â) or >2.2 km(â) from a highway, between 1445-1678 m(â) or 1513-1646 m(â) elevation, and with 50% and >45% open-canopy cover) within 1 km2 of a cougar's location. Winter survival was higher during dry winters and following wet springs. Productive females frequented habitats with 49% open-canopy cover) within 1.0 km2 of a female's location. Litter sizes were large when mothers occupied mid-elevation habitats (summer: 1437-1745 m, winter: 1445-1678 m). Female-biased litters were reared when mothers experienced harsh conditions: cold snowy winters and springs; poor-quality habitat. Implications of habitat and climate on cougar survival and reproduction are discussed.

22.3 Gibbons, J.M; Nicholson, E.; Milner-Gulland, E.J.; Jones, J.P.G.*; Bangor University, Imperial College; *julia.jones@bangor.ac.uk*

Should we pay for biodiversity conservation by action or results?

There is growing interest in the potential of payments for environmental services (PES) to encourage land managers to protect the environment. However questions remain about how PES agreements should be designed. A division exists in whether schemes structure payments by action or by results. Most biodiversity PES schemes pay by action: for example incentivizing land managers to carry out actions believed to increase biodiversity. Payment by results is a common incentive structure in the private sector (e.g. labourers doing piece work or no-win no-fee lawyers) but rarer in PES. Using a modelling approach we investigate the conditions under which each way of structuring payments may be more cost-effective in a biodiversity PES. We found that payment by results is favoured in degraded landscapes as it creates incentives for managers to use their local knowledge and to join the scheme only if they can increase biodiversity. Other factors, including the relative cost of monitoring results or actions, have a weaker effect. We illustrate these principles with examples (maintaining carnivores in herding areas, restoring farmland wading bird populations and protecting bushmeat species) and suggest that, despite not being suitable in all circumstances, payments by results deserves more attention from those designing biodiversity PES.

P1.73 GIBBS, K.E.*; Currie, D.J.; University of Ottawa; *katiemgibbs@gmail.com*

Protecting endangered species: do the legislative tools work?

It is critical to asses the effectiveness of tools used to protect endangered species. The main tools enabled under the Endangered Species Act are funding, recovery plan development and critical habitat designation. Here, we used general linear models and recovery status data from 1988 to 2006 for 1151 species to quantify the magnitude of effects of mean yearly funding, recovery plans, critical habitat designation, scientific information and time listed on species recovery status. Recovery status was positively related to the number of years with a recovery plan and to the interaction between funding/scientific information and years listed. However, these tools explain only 5% of the variation in species' status. Earlier studies that reported significant effects of these tools did not focus on effect sizes; however, they are in fact similarly small. Either these tools are not effective in promoting species' recovery, or we cannot detect their effects due to imprecise status data. Monitoring of listed species must be improved because without precise measures of species' status through time, it is impossible to assess and improve endangered species protection measures.

P2.63 GIBERSON, NICOLE*; Zeller, Ulrich; Gottert, Thomas; University of Namibia Private Bag Private Bag 13301, 340 Mandume Ndemufayo Avenue, Pionierspark, Windhoek, Namibia , Chair of Systematic Zoology, Humboldt UniversitÃ¤t zu Berlin, InvalidenstraÃ e 43, D-10115 Berlin Germany, Museum fÃ¼r Naturkunde, Leibnitz-Institute for Research on Evolution and Biodiversity at the Humboldt University Berlin, InvalidenstraÃ e 43, D-10115 Berlin, Germany; *nicole_giberson@hotmail.com*

A Study of the ground squirrel's response to the Ashy Tit's alarm calls in a Namibian semi-arid ecosystem

The following is a proposal concerning my Master thesis within the programme "Biodiversity Management and Research", which is jointly been offered by the Humboldt-UniversitÃ¤t zu Berlin and the University of Namibia. By taking a comprehensive ecological approach, I propose to examine the co-evolution of interspecific communication between the Cape ground squirrel (Xerus inauris) and selected bird species. The study will take place between March and July 2010 on the farm "Brackwater" that is situated app. 15 km north of Namibia's capital Windhoek. I will use observational studies on the avian species richness, squirrel population characteristics and squirrel behaviour to gain a higher understanding of the function of this particular system. Furthermore, I will conduct playback experiments using seed trays and local bird call recordings to determine the timeliness, intensity and type of squirrel responses (responses to direct predatory calls and responses to warning calls from fellow prey species). Through this comprehensive study I aim to prove if the co-evolution of this eavesdropping behaviour which has already been proven in North America and Europe is conserved in the savannah ecosystem of Namibia.

SY36 Gill, M*; Zockler, C; McRae, L; Loh, J; Collen, B; Chair, Circumpolar Biodiversity Monitoring Program, UNEP World Conservation Monitoring Centre, Institute of Zoology, Zoological Society of London, Institute of Zoology, Zoological Society of London; *mike.gill@ec.gc.ca*

Tracking Trends in Arctic Wildlife: The Arctic Species Trend Index

The Arctic Species Trend Index (ASTI) has been developed providing a circumpolar perspective on trends in the Arctic's living resources. The ASTI illustrates overall vertebrate population trends by integrating data from across the Arctic over the last 34 years (1970 to 2004). It gives a composite measure of the overall trajectory of Arctic populations and can be disaggregated to investigate trends based on taxonomy, biome, region, etc. These analyses can help identify species groups and regions undergoing rapid change and improve predictive ability. 965 populations of 306 species (35% of all Arctic vertebrate species) were used to generate the ASTI. In contrast to the global Living Planet Index, whose overall decline is largely driven by tropical vertebrate population declines, arctic populations rose by an average 16%. This pattern is similar to the temperate LPI and consistent in both the North American and Eurasian Arctic. The increasing trend is thought to be partly driven by the recovery of some vertebrate populations (e.g. marine mammals) from historical overharvesting as well as from recent changes in environmental conditions both inside (e.g. Bering Sea Pollock) and outside of the Arctic (e.g. Lesser Snow Geese) resulting in dramatic population increases. This increasing trend, however, is not consistent across biomes, regions or groups of species. Despite the robust dataset expanded monitoring efforts are needed to fill critical gaps.

SY57 Gilmer, B*; Ferdana, Z; Beck, M; The Nature Conservancy; *bgilmer@tnc.org*
Coastal Resilience: Using marine spatial planning to support management decisions that address the needs of natural and human communities
Coastal Resilience (www.coastalresilience.org) is an ecosystem-based marine spatial planning framework and tool that discusses and illustrates biodiversity conservation and coastal hazards information in Suffolk County, New York, USA. Much of Suffolk County's private property is only inches above sea level, placing millions of dollars in public and private funds at risk to rising sea levels and other coastal hazards. These impacts also threaten wetlands and other coastal ecosystems that provide habitat, natural buffers to storms, and other ecosystem services. Despite a growing awareness of global climate change, local decision makers still lack the tools to examine different management objectives as sea levels rise and coastal hazards increase. The Coastal Resilience project provides tools and information to better inform decision-making with a primary goal of identifying vulnerable human and natural communities, while illustrating the important role that ecosystems will play in the face of sea level rise and increased storm frequency and intensity. The Nature Conservancy, working with multiple partners such as the NASA Goddard Institute for Space Studies and NOAA's Coastal Services Center, deliver this information via an internet mapping application to help local decision makers keep the environment and public safety in mind.

18.2 Ginsberg, J.R.; Wildlife Conservation Society; *jginsberg@wcs.org*
How long is perpetuity?
Understanding the time frame over which human actions are valid, or can be enforced or predicted, is critical to conservation planning, and to an understanding of the value and permanence of field-based observations and modeling. In both the social and natural sciences, the time frame over which actions are valid is often stated, or assumed, to be "in perpetuity." In reality, perpetuity has a length that can be measured and or inferred and is almost always significantly less than what most of us would consider "forever." This presentation explores how concepts of perpetuity translate into reality and what this means for our ability to plan and manage our conservation efforts, effectively, into the future. In this work I assess the time frame and accuracy over which different biological endeavors are measured (e.g. the predictive values of Population Viabilty Assessment; the length of long-term field studies of species, populations, or ecosystems; accuracy of various models projecting human population growth, deforestation etc. produced in the 1970's and 1980's, etc) and compare this to the time frame over which legal instruments and policy efforts related to conservation (easements, leaseholds, treaties, etc.) remain in force. My finding is that in both the biological and socio-legal realms, perpetuity last for 25-100 years, and rarely can be measured, or projected, beyond this.

SY13 Giovanni Amori; Federica Chiozza; Bruce Patterson; Carlo Rondinini; Jan Schipper; Alessio Mortelliti*; Luca Luiselli; CNR, University of Rome, Field Museum, Chicago, Big Island Invasive Species Committee, Agip (Nigeria) Env Dept; *giovanni.amori@uniroma1.it*
Macroecology And Distribution Of Neotropical Rodents: Conservation Implications
We analysed the range of 791 species of Neotropical rodents in order to understand whether their distribution is affected by habitat quality and quantity on a continental scale. Distribution data (size of each species'range, Km2) and relative quantity of each macrohabitat type (Km2) were obtained respectively from the Global Mammal Assessment data bank (IUCN Red List 2008), and the Global Land Cover 2000 (GLC 2000). Habitats were grouped according to 9 categories, ranging from Forest to Bare areas. Total range size varied significantly among families with members of the family Cuniculidae having larger ranges than any other families, followed by Myocastoridae, Caviidae, Dasyproctidae, and Erethizontidae. Mean range size did not differ significantly between endemic and non-endemic taxa. The range size of each species was significantly influenced by five habitat categories (shrubland, grassland, flooded, artificial, and cultivated). Cultivated habitat was important for three families, shrubland and flooded for two families, and grassland, artificial, and near water habitats for one family. Forest housed the great majority of the species of conservation concern; the other two habitats housing a considerable number of threatened species were grasslands and shrubland.

P1.174 Girard, Caroline B.; SUNY Albany; *cbgirard@yahoo.com*
Intensive Rotational Targeted Grazing of Romney Sheep as a Control for the Spread of the Invasive Plant Mile-a-Minute (Persicaria perfoliata)
We investigated the effectiveness of an intensive rotational targeted grazing protocol for controlling the spread of the invasive plant Persicaria perfoliata. Three Romney ewes (Ovis aries) were deployed into a system of four experimental (exp) paddocks, each with an area of approximately 200 m2, at sites invaded by P. perfoliata in the Ward Pound Ridge Reservation (Cross River, Westchester County, NY). The ewes were moved from one paddock to the next at 2-3 d intervals. Four adjacent, ungrazed reference (ref) paddocks were also delineated. A suite of plant community attributes (cover classes, species richness and composition), as well attributes of individual P. perfoliata plants (stem density, inflorescence) were monitored in the exp and ref paddocks from June 24 to August 7, 2009. P. perfoliata cover in the exp paddocks was reduced, on average, by 18.69 + 14.6 percent relative to the ref paddocks and inflorescence was nearly eliminated in the exp paddocks. Recovery of native and naturalized species was also evident. While, prior to grazing, mean species richness in exp and ref paddocks were not different ($t=0.56$; $p>0.05$), differences (exp = 23.8+3.0; ref=16.8+3.3) were significant ($t=3.03$; $p< 0.05$) following grazing.

P2.49 GLEASON, CHRISTINE M.*; Atwood, Jonathan L.; Parsons, E.C.M.; Environmental Studies Department, Antioch University New England, Keene, New Hampshire, Environmental Science & Policy Department, George Mason University, Fairfax, Virgina; *cmgleaso@hotmail.com*

The conservation awareness and attitudes of whale watching tourists in Samana, Dominican Republic

I investigated the conservation knowledge and opinions of whale watching tourists in SamanÃ¡, Dominican Republic. I collected 485 questionnaires from January 26 to March 10, 2009. I examined the knowledge and opinions of tourists viewing humpback whales (Megaptera novaeangliae) regarding marine mammal conservation and education, threats to marine mammals and the potential impact of whale watching. Respondents represented 34 countries with participants primarily from the United States, France, Canada and Germany. 44% of respondents stated they had some amount of knowledgeable regarding conservation issues. The majority (82%) of respondents believed public education was â important' or â very important'. The top criteria tourists used to select a whale watching trip were whale sightings (68%) followed by education (50%). The majority (77%) of respondents stated that international protection of whales was not adequate. The Dominican Republic's level of whale protection was rated as not adequate by 26% of respondents, adequate by 26% of respondents and 48% had no opinion. To assess respondents' whale knowledge they answered a series of statements as true, false or unsure. General knowledge questions were answered correctly but accurate responses decreased with more detailed questions. In conclusion, more boat-based education programs by qualified individuals should be offered by whale watching companies to increase the awareness and knowledge of whale watching tourists.

SY19 Glew, L.*; Hudson, M.D.; Osborne, P.E.; University of Southampton; *l.glew@soton.ac.uk*

Measuring the effectiveness of Northern Rangeland Trust strategies in enhancing livelihoods and conservation in Kenyan rangelands

In sub-Saharan Africa, the persistence of large mammal populations is often dependent upon resources located outside formal protected area networks. Yet these resources are also subject to widespread and locally intense use by pastoralists, whose needs may conflict with biodiversity conservation. Locally-appropriate, sustainable solutions are needed to meet conservation goals in a manner which enhances rather than constrains livelihoods. The Northern Rangelands Trust (NRT) supports an expanding conservancy network in Kenya, facilitating pastoralists to alleviate poverty through biodiversity by establishing community institutions. To measure the impact of NRT's efforts, a matched comparison evaluation examined livelihood and ecological outcomes using participatory techniques, remote sensing and wildlife survey data. Pastoralist livelihoods were largely enhanced by conservancies, particularly through public service provision, transport and security. Beneficiaries held more positive attitudes toward wildlife and conservation management than pastoralists in other areas. Evidence from local informants and existing datasets suggested that conservation targets are subject to fewer threats inside NRT areas than non-conserved areas; and that some target species are expanding either in number or range. In northern Kenya, public services derived from conservation produce a willingness to conserve and ultimately led to greater protection for mammal populations. Further work is required to assess whether these observed outcomes are context-specific or more widely applicable in developing nations.

SY52 Glick, Patty; National Wildlife Federation; *glick@nwf.org*

Assessing the Vulnerability of Coastal Wetlands to Sea-level Rise: Implications for Adaptation

An accelerating rate of sea-level rise due to climate change poses a significant threat to coastal wetlands and other habitats in the United States and around the world. A better understanding of the potential risks to habitats at a regional scale is necessary to enhance and support efforts to restore and protect the long-term ecological integrity of those habitats. The National Wildlife Federation (NWF) has conducted several studies across the U.S. to model the impacts of sea-level rise on coastal wetlands, including those in the Pacific Northwest, the Chesapeake Bay, Florida, and (currently) Louisiana, to help decision makers involved in developing climate change adaptation strategies assess the risks of sea-level rise and identify reasonable steps to manage those risks. Specifically, we applied the Sea Level Affecting Marshes Model (SLAMM), which was designed to simulate the dominant processes involved in wetland conversions and shoreline modifications among a multitude of different habitats under various scenarios of sea-level rise. The results of these studies can be used to inform a number of important decisions regarding coastal restoration and management to help fish, wildlife, and people cope with the expected changes to their habitats and communities and build in the flexibility to deal with unforeseen impacts.

P2.37 Glines, LM*; Merrill, EH; White, CA; University of Alberta, Parks Canada; *glines@ualberta.ca*

Implications of a Changing Montane Landscape: Assessing Nutritional Carrying Capacity for Elk of the Red Deer River Valley.

The fescue grasslands of the Red Deer River valley have provided both seasonal and winter range for a large migratory elk (Cervus elaphus) herd since the 1950's. Within the eastern slopes of the Rocky Mountains of Alberta, grasslands have experienced fire suppression, resulting in woody plant encroachment. I used field data on forage and browse biomass to estimate the change in the nutritional carrying capacity of elk over this time period using a model developed by Hanley and Roger (1989) for deer. The loss of grassland extent in the Red Deer River between 1952 and 1992 was quantified using aerial photography. Model inputs included 4 different plant communities, quantity and quality of forages within these plant communities, and elk nutritional requirements. The model estimated nutritional carrying capacity as the number of elk days of use/ha under the assumption that winter is the limiting season. We quantified changes in major meadow complexes between time periods and the net change in elk winter range. The implications of our results for future landscape management will be discussed.

P1.75 Glowinski, Sheri L.*; Porter, Rob; Moore, Frank R.; The University of Southern Mississippi, Western Illinois University; *sheri.glowinski@eagles.usm.edu*

The Relationship Between Birdwatcher Involvement And Environmental Concern: Evaluating The Role Of Individual Meaning

Birdwatchers are dependent on natural resources to conduct their recreational activity and as such, are proposed to demonstrate a level of awareness of and concern for those resources commensurate with level of involvement. Previous research on other nature-based recreationists has shown that individual meaning associated with an activity can serve to mediate this relationship (Bright and Porter 2001) but this has not been tested for birdwatchers. To test the relationship between involvement, meaning and environmental concern, a mail-back survey was sent to 1256 American Birding Association members residing in several southern U.S. states that examined birdwatchers' participation, motivations, and environmental-related behaviors and beliefs. We used structural equation modeling to conduct mediation analysis and included the following variables in our models: number of days spent birdwatching representing level of involvement (predictor), responses to the New Ecological Paradigm scale as a measure of environmental concern (criterion), and birdwatcher motivations representing individual meaning (mediator). Given that birdwatchers do not compose one homogeneous population (e.g. Cole and Scott 1999), we predict that individual meaning may mediate the relationship. An understanding of birdwatchers' environmental views is necessary to develop effective education on issues pertaining to conservation of natural resources geared towards this population of recreationists.

SY43 Glowka, Lyle; Convention on Biological Diversity; *lyle.glowka@cbd.int*

The Convention on Biological Diversity: On the Road to 2010 and Beyond

The Convention on Biological Diversity (1992) is the only global forum focusing comprehensively on the conservation and sustainable use of biodiversity. Its membership includes all but two countries in the world. It sets the global agenda for biodiversity conservation and sustainable use, while providing a broad set of international commitments for action by Governments at national level. The presentation will explore the concept of biodiversity and its evolution into a cornerstone of sustainable development, particularly since the Millennium Ecosystem Assessment (2005) demonstrated that biodiversity underpins the ecosystem goods and services that support human well-being. It will explain the CBD's basic framework for action and its global toolkit. Two key challenges will be encountered in the run-up to the tenth meeting of the CBD Conference of the Parties in 2010 during the International Year of Biodiversity: (1) Assessing progress towards achieving the 2010 Biodiversity Target and implementing the Convention and (2) updating the CBD Strategic Plan and setting a new post-2010 target. The role of science within and contributing to the forum will be explored. Opportunities for inputs by SCB and its members will be suggested.

SP9.1 Gobush, K.S.*; Baker, M.R.; Vynne, C.V.; Department of Biology, University of Washington, School of Aquatic and Fishery Sciences, University of Washington; *mattbakr@uw.edu*

Systematic Review of Significance Patterns in Glucocorticoid Measures in Wildlife

An increasing need to understand how wildlife populations respond to disturbance and environmental change has resulted in a proliferation of research examining physiological indicators of stress response in wildlife. Among the most frequently measured physiological indicators of the vertebrate stress response are stress hormones: glucocorticoids (GCs), typically cortisol and corticosterone. To provide a comprehensive comparison of the factors, covariates, and interactions that influence GC measures across vertebrate species, we conducted a comprehensive review of the current state of research on stress physiology of wild or free-ranging animals and their conservation. This literature review examines more than 1000 articles from 1969 to 2007. We delineate the breadth of studies completed across vertebrate taxa, organized by class, order, species, and conservation status, and commercial value. Such an inventory is useful in highlighting the current focus of conservation physiology and identifying new areas relevant to this field. We also inventory the range of ecological and anthropomorphic factors, hypothesized to influence or correlate with variation in GC values. We analyze patterns of significance and the consistency of these patterns across studies. This review provides a quick, comprehensive, unbiased view of factors and covariates that influence GC measures and should be useful to prospective conservation physiologists in study design, analysis and interpretation.

SP3.10 Gobush, KS*; Harting, B.; Littnan, C.L.; NOAA, NMFS, PIFSC; *kathleen.gobush@noaa.gov*

Detection and Deterrence of Shark Predation of Hawaiian Monk Seal Pups

Shark predation on critically endangered Hawaiian monk seal pups (Monachus schauinslandi) at French Frigate Shoals significantly contributes to the 75% decline of this important subpopulation. In 2001-2003, systematic observations conducted from a 12-foot tower resulted in over 3000 observation hours that confirmed Galapagos shark (Carcharhinus galapagensis) in pup predation. However, observing a shark attack was rare, thus we also developed conservative criteria to determine incidences of shark kills when data was limiting but pup disappearance confirmed. Additionally, shark-detection ability decreased as observation time proceeded though predation rates remained constant, suggesting sharks were wary of the presence of humans. In 2008, we conducted a pilot study to determine the feasibility and efficacy of a suite of devices to deter predation, including visual cues, and electromagnetic and auditory instruments. In 2009, device application was repeated in a systematic manner. The incidence of shark predation was compared across three experimental treatments that capitalized on the apparent wariness of sharks and included 24-hour human presence, visual and auditory devices mimicking human presence, and a control at two islets. Through direct observation and remote camera video recording, we made 15 shark sightings. A chi-square analysis revealed that a treatment effect was not significant and device deployment did not appear to influence the pattern of attacks across years. Although these new approaches provide additional insight, the detection and deterrence of shark predation continues to be a challenge to the recovery of this monk seal subpopulation.

SY52 Goldbeck, SE; San Francisco Bay Conservation and Development Commission; *steveg@bcdc.ca.gov*

Adaptation to Sea Level Rise in San Francisco Bay

The San Francisco Bay is the largest estuary on the west coast of the Americas. It has been extensively modified through urbanization, which has substantially decreased the Bay's wetland habitats. Global sea level rise driven by global warming threatens to inundate not only developed areas, but also much of the Bay's remaining wetlands and natural habitat. The San Francisco Bay Conservation and Development Commission has prepared a vulnerability assessment of the risk posed by sea level rise and the need for adaptation strategies that address both the natural and built environments.

P2.151 Goldberg, CS*; Pocewicz, A; Nielsen-Pincus, M; Waits, LP; Morgan, P; Force, JE; Vierling, L; University of Idaho, The Nature Conservancy, University of Oregon; *cgoldberg@uidaho.edu*

Predicting ecological impacts of alternative policy scenarios on a rural landscape in northern Idaho, USA.

Land use change driven by rural residential development and changes in agricultural practices can lead to dramatic alterations in the structure and function of landscapes. We simulated land use change under a variety of policy scenarios in a rural, northern Idaho region that is increasingly experiencing residential development. To predict ecological effects of these potential policy changes, we designed habitat models for a variety of at-risk and socially-valued species based on field surveys and literature reviews. Policies that increased the amount of land enrolled in the Conservation Reserve Program benefited many species. Policies to protect productive agricultural lands, however, led to intensified residential development on nearby shrublands, reducing habitat for development-sensitive species in those marginal areas and increasing the development threat to remaining native Palouse Prairie patches. While a conservation planning option maximized habitat for most target species, impacts to Palouse Prairie and ungulate winter range were minimized under the alternative urban growth boundary policy. Predicting the effects of potential land use policies on species' habitat is a complex process that can illuminate the tradeoffs local communities must evaluate in making planning choices and empower the decision-making process.

SY19 Goldman, R*; Benitez, S; Calvache, A; Ramos, A; The Nature Conservancy; *rgoldman@tnc.org*

Conserving Nature can Impact People but Impacts can and should be Compensated

Conservation approaches can impact people by limiting access to land such as through creating a protected area with limited use or through implementing conservation management practices diminishing land area available for crops and/or grazing. Nature provides essential livelihood services to people, like clean water and fertile soil, but this provision can be delayed or unequally distributed among people impacted by conservation. Thus, compensating for impacts to people is critical. The Nature Conservancy is leading the implementation of a series of payment for watershed service projects, water funds, which compensate people for the potential livelihood impacts of watershed conservation strategies. In water fund projects, water users voluntarily pay water suppliers (upstream watershed communities and natural ecosystems) to secure a clean regular supply of water. Watershed communities are relatively poor, small-scale agricultural producers. Water funds support implementation of conservation management practices, like fencing riparian areas or reforestation/re-vegetation of landscapes. Such practices help achieve water user goals, but they tend to diminish the land available for crops and grazing. Water funds find a way to compensate this loss by providing access to alternative resources. By providing for people and for nature, water funds will make conservation efforts last into the future.

P2.96 Gonzalez-Torres, L.R.*; Palmarola, A.; Barrios, D.; Cruz, D.; National Botanical Garden, University of Havana; *lrgonzaleztorres@gmail.com*

The first five years of the Programme for the Conservation of Cuban Cacti

Cuba supports the highest cactus diversity of the Caribbean hotspot. Thirty three of the total 60 species are endemic to the island and are somewhat threatened by its very small population sizes, very narrow distributions and human activities. In 2005, the National Botanic Garden started a conservation project focused to protect and enforce the unique know population of Melocactus actinacanthus in partnership with the protected area this species is located. This initiative grew up to date enlarging its scope to promote the conservation and sustainable management of other cactus species and to their habitats by building capacity, monitoring populations and habitats and enforcing depleted populations, providing advice and information, and raising public awareness and education. In this presentation we briefly summarize the achievements of this programme till its fifth anniversary this year. These achievements include the enforcement of two population of Melocactus actinacanthus and Dendrocereus nudiflorus, the establishment of ex situ collections of the five most threatened cacti, the identification of the important areas for cacti conservation, and results on the impact of fires on the diversity and structure of dry habitat vegetations. We also provide information on the training courses and raising awareness activities we have organized.

P2.186 GOOD TATJANA C.*; Pressey, Robert; Ridges, Malcolm; ARC Centre of Excellence, James Cook University, Townsville QLD 4811 Australia, ARC Cemtre of Excellence, James Cook University, Townsville QLD 4811 Australia, Dept. Environment, Climate Change & Water. PO Box 494, Armidale, NSW, Australia 2350; *tatjana.good@gmail.com*

Measuring the cost-effectiveness of better maps of natural resources: scale, benefits, costs and outcomes for conservation.

Conservation planning is always limited by biodiversity data but few studies have addressed the costs and benefits of improving data. Often conservation planning exercises are conducted at regional scales using broad resolution maps (e.g., 1:250,000), but implementation occurs at local scales. Fine resolution data (e.g., 1:25,000) are rarely available across entire planning domains. Most often they cover only small parts of planning domains where they show that biodiversity within regional, broad resolution map units is highly heterogeneous. We demonstrate that as one moves from broad-resolution to fine-resolution data within study areas, priority areas for conservation change in extent and location. This raises important unresolved questions: when and at what resolution should finer-scale data be collected to conduct cost-effective priority setting exercises?, and, given the high costs of fine-scale data, what are the trade-offs between better data and more conservation action? We use three different measures of the benefit of improved data at finer scales and work at two different resolutions to demonstrate the effect that additional information has on the choice of priority areas. We discuss the dilemma that conservation practitioners are facing when having to decide how to make best use of their limited budgets for conservation planning.

SP9.5 Gore, M. L.*; Nelson, M. P.; Smith, A. ; Clark, M.; Michigan State University, Monash University; *gorem@msu.edu*

Toward understanding the human dimensions of genetic rescue: the case of the inbred wolves of Isle Royale, Michigan, USA

Understanding the ethical basis of stakeholder support for conservation actions, such as biodiversity preservation, can help conservationists challenge assumptions, respond to, or engage stakeholders' fundamental views about biodiversity. Although social science and ethical insights are critical components of sound conservation, serious work blending these human dimensions is lacking. We now know the wolves of Isle Royale (IR) posses congenital bone deformities for which no natural genetic mitigation option exists. We used content analysis to analyze arguments on a 2009 public online discussion board (n=147 posts) posing the question: "Do IR wolves need genetic rescuing?" We coded content to characterize solution frames, argument appeals, attributions of responsibility, and scope of moral commitments invoked to justify claims. Nearly Â¼ of posts supported genetic rescue. Two-thirds appealed to consequences of genetic deformities, 37% to motives (e.g., rights) 22% to peer authority, 21% to natural law, and 1% to divine command to justify their opinion on genetic rescue. One-third noted the needs of both populations of and individual wolves; half supported human intervention for resolving inbreeding depression. Correlations between stakeholders' solution frame and moral justification illustrate widespread disagreement and tension in ethical reasoning about conservation action. More deliberate and quantitative integration of ethics into conservation may foster efficacy.

SP7.7 Gosse, J*; Hermanutz, L; McLaren, B; Deering, P; Knight, T; Parks Canada, Memorial University, Lakehead University; *john.gosse@pc.gc.ca*

Degradation of forests by non-native herbivores in Newfoundland's National Parks: Recommendations for ecosystem restoration

Introductions of species to novel environments where natural predators are absent often leads to population irruptions and sometimes to the development of alternate stable states. On the island of Newfoundland, Canada, introduced moose, red squirrels and other herbivores are modifying forest composition and structure through selective browsing, seed depredation and by facilitating the establishment of invasive plants. Effects are particularly acute in the two National Parks (Terra Nova and Gros Morne) where past management has restricted the use of hunting as a mechanism to regulate moose numbers. Our research has documented a disruption of natural forest regeneration and a decline in a dominant trees species, balsam fir. Following canopy disturbance by insects, chronic browsing by moose is converting forested areas to alternate stable states dominated by species that inhibit the re-establishment of boreal tree species. Recommendations for ecosystem restoration including lethal control of moose, and supplemental tree planting are discussed.

8.8 Goulart, F.F.*; Sa, I.G.; Salles, P.; Saito, C.H.; University of Brasilia; *goulart.ff@gmail.com*

Farming, Biodiversity and Ecosystems Conservation: trade-off or win-win? a qualitative model approach

One of the greatest challenges of modern science is to find a balance between agricultural production and biodiversity conservation. Recently, the debate on agriculture and conservation has divided experts in two groups. Defenders of the Land Sparing approach argue that maximum production should be achieved in already farmed areas, saving land for conservation purposes. Biodiversity Friendly Farming defenders point out the negative impacts of agricultural intensification on both biodiversity and human development, arguing that non-intensive farming may produce large quantities of high quality food and still protect biodiversity. Education is essential to move forward in this debate and to support public involvement in conservation measures. Qualitative Reasoning modeling is a valuable tool for exploring conceptual knowledge about ecological systems in educational settings (see Ecological Informatics, 4(5-6): 261-412, 2009). This work presents a qualitative simulation model built in the workbench Garp3 (www.garp3.org), to compare the impacts of these two approaches on both farmed and natural areas, with respect to productivity, water resources, soil properties, greenhouse gases emissions and biodiversity. The results explain the inefficiency of intensive agriculture in protecting wildlife while biodiversity friendly agriculture protects biodiversity and increases productivity. Due to the diagrammatic approach, the explicit representation of causality, and the possibility of exploring all possible behaviours of the system, qualitative models are seen as important tools for education in conservation. (This work received financial support from Project DynaLearn (EU-FP7 contract 231526: www.dynalearn.eu).

P2.107 Gourguet, S*; Doyen, L; Macher, C; Guyader, O; Thebaud, O; MNHN- IFREMER, CNRS, IFREMER, IFREMER, CSIRO- IFREMER; *gourguet@mnhn.fr*

A stochastic viability approach for ecosystem-based management of mixed fisheries : the case of the Bay of Biscay demersal fisheries.

Marine scientists and stakeholders are increasingly advocating ecosystem-based fishery management (EBFM). However, the way to operationalize such EBFM remains controversial. The viability approach can be a relevant modelling framework for EBFM as it accounts for dynamic complexities, uncertainties, risks and sustainability objectives balancing ecological, economic and social dimensions together with intergenerational equity. Mixed fisheries operating in the Bay of Biscay provide a challenging example to illustrate these issues. The present paper focuses on the case of the demersal fisheries catching nephrops, hake, sole and monkfish. A bio-economic multi-species and multi-fleets model is developed to examine the capacity for the stochastic viability framework to assist in developing practical approaches to EBFM. The model integrates the dynamics of the harvested stocks with an uncertain recruitment and technical interactions through joint catches. It relies on data from ICES and IFREMER. A co-viability analysis of the fish populations/fisheries system is performed to investigate how to simultaneously preserve the species (using Bpa precautionary referenced points) and guarantee economic incomes for the fleets. First results suggest that the viable harvesting intensities require a significant reduction in the effort of some fleets, as compared to reference year 2006.

22.5 Gracey, Kyle B.; University of Chicago; *gracey@uchicago.edu*

Economic Valuation of Biodisparity - Potential Worth, a Research Agenda, and Challenges

Biodisparity is recognized as an important property beyond overall biodiversity. Knowledge of biodisparity can influence where to direct scarce conservation resources. Numerous studies have attempted to understand how much economic value people ascribe to biodiversity and its conservation. No comparable effort yet exists for biodisparity valuation. Creating a methodology for valuing biodisparity would require several steps, each with their own challenges. The first would involve developing methods of accurately but simplistically communicating the concept of biodisparity and the disparity of particular species or ecosystems to the target audience, including feedback testing for understanding, and sensitivity testing with alternate words and/or images. The next step would involve examining how knowledge of biodisparity affects willingness to pay for conservation and willingness to accept species or habitat loss, especially controlling for, and considering covariance with, overall biodiversity and endemism. Lack of biological assessments of disparity for the target ecosystems or species will hinder these valuations. Biodisparity valuations should test for lexicographic preferences and scope and embedding problems, as biodiversity studies often exhibit these. Determining the public value of biodisparity might increase, or at least alter, the overall monetary value of conservation priorities, but calculating accurate values requires mitigating these valuation problems.

P2.19 Graham, E. E. *; Macdonald, S. E. ; Department of Renewable Resources, University of Alberta; *erica.graham@ualberta.ca*

Effects of Underplanted White Spruce on Understory Vegetation and Environment in Aspen-Dominated Stands of the Western Boreal Forest

Underplanting white spruce (Picea glauca) in aspen (Populus tremuloides)-dominated stands (mimicking natural boreal succession) was introduced as an alternative to single species management but little is known about impacts to the understory. Previous research has shown differences in understory richness, diversity and composition related to canopy composition, with mixedwoods being more similar to conifer-dominated than broadleaf-dominated forests. The objectives of this study were to determine the influence of underplanting white spruce on understory vegetation and environment; and if changes are observed, if the spatial extent and strength increase with time passed since planting. The study was conducted in the Alberta Boreal Mixedwood in nine mature aspen stands which were underplanted in 1994, 1999 and 2004/05. Vegetation and environment measurements were taken in plots set up 0-1m and 1-2m outward from the underplanted spruce and in control plots established in unplanted areas of the stands. Based on initial analysis of 150 plots, significant differences (pâ ¤0.05) were not observed in richness (total, shrub, herb), diversity (Simpson, Shannon-Weiner, Whittaker) and edaphic conditions between underplanted and non-underplanted areas by 15 years after planting. Research will continue in stands planted in the 1960s to provide insight into processes controlling understory plant community diversity in mixedwoods and the impacts of an increasingly popular management option.

SY65 Granek, E.*; Rodriguez del Rey. Z.; Portland State University; *graneke@pdx.edu*

Getting lost between land and sea: Changing our science and changing our minds about how we fit in "transitional" systems"

Synthetic chemicals have been detected in wastewater, surface water and groundwater, yet the input of these chemicals into coastal marine waters - linking terrestrial water bodies with our coastal oceans - has received minimal attention. We measured the concentrations, distribution and fate of chemicals ranging from DDT and flame retardants to caffeine and examined potential sources of input including wastewater treatment plants, septic leakages and combined sewer overflow systems. In coastal waters, these chemicals may present an exposure risk to organisms, though toxicity levels are unknown. To examine sublethal effects of introduced chemicals we conducted tank experiments to quantify the effects of caffeine on the intertidal mussel, Mytilus californianus. We exposed mussels for 10, 20, or 30 days to 4 levels of caffeine previously recorded in coastal marine systems. Levels of the heat shock protein Hsp 70 were then measured to indicate sublethal stress. Hsp 70 response indicated sublethal stress at all experimental levels of caffeine exposure, though the response was affected by quantity and exposure time. These findings indicate that current levels of environmental exposure to land-based chemicals may have sublethal effects on coastal marine organisms and highlight an area in need of further research and management.

SY51 Graumlich, L*; Lopez-Hoffman, L; Morehouse, B; University of Arizona; *lauralh@email.arizona.edu*

Next steps in developing adaptive capacity for maintaining transboundary connectivity under climate change

Wherever political boundaries traverse ecosystems, managing for landscape-level connectivity becomes more complex: information flows are slowed, administrative regimes are fractured, decisions are delayed and often executed with little or no coherence, and responsibilities are masked. As climate change alters species distributions and ecosystem processes, the administrative difficulties of maintaining cross-border connectivity might limit the ability of human and natural systems in North America to adapt to change. Over 40 transboundary conservation practioneers developed a short list of specific, targeted, priority actions to be taken in the next 2-5 years to strengthen transboundary conservation programs, policies and institutions. The highest priority was an international agreement for transboundary conservation and climate change. Other next steps include incorporating climate change adaptation into regional compacts, restructuring transboundary water agencies to include water for nature (in-stream flows).

SA2 Gray, Laura*; Hamann, Andreas; Aitken, Sally; PhD. Student, Department of Renewable Resources, Faculty of Agricultural, Life, and Environm Sciences, University of Alberta, Department of Renewable Resources, Faculty of Agricultural, Life, and Environm Sciences, University of Alberta, Department of Forest Sciences, Faculty of Forestry, University of British Columbia; *lkgray@ualberta.ca*

Conservation of forest genetic resources in western Canada under uncertain future climates

Conservation of forest genetic resources in western Canada under uncertain future climates Laura Gray1*, Andreas Hamann1, and Sally Aitken2 * Oral Presentation 1 Department of Renewable Resources, Faculty of Agricultural, Life, and Environm Sciences, University of Alberta, 751 General Services Building, Edmonton, AB, Canada, T6G 2H1 2 Department of Forest Sciences, Faculty of Forestry, University of British Columbia, Forest Sciences Centre #3041 - 2424 Main Mall Vancouver, BC, Canada, V6T 1Z4 Species distribution models are widely used for conservation planning and to predict potential climate change impacts. It has been acknowledged, however, that this modeling approach violates a number of assumptions for species that are widespread, long-lived, and genetically adapted to local climate conditions. In this study, we introduce simple modifications to species distribution models that account for genetic structure and limited migration capacity of tree species. In a case study for 15 tree species in western Canada, we investigate how well predictive species distribution models can estimate known census population sizes in the current reserve system, and whether habitat for locally adapted genotypes in reserves remains adequate under projected climate change. For the interpretation of projected habitat under future climate scenarios, we use four biological scenarios that bound the range of adaptation and migration capabilities of each species. Key to this evaluation is the interpretation of model results in a way that avoids the violation of model assumptions: instead of inferring threats to population we focus on maintenance of species habitat under 18 climate projections from general circulation models for the 2020s, 2050s and 2080s, as well as under observed climate trends.

SY68 Gray, T.J.; Ivey Foundation; *tgray@ivey.org*

Wilderness and Green Jobs: A globally significant forest industry conservation collaboration in the Canadian Boreal Forest

Leading Canadian ENGOs and a large portion of the Canadian forest sector have launched a globally significant business and conservation agreement for Canada's managed that will greatly advance conservation goals and credibly position boreal forest producers as sustainability leaders in an emerging green economy. Nineteen member companies of the Forest Products Association and seven leading conservation organizations and funders have announced temporary deferral of harvest in 30 million hectares of boreal forest while they negotiate the following elements of their agreement: Completion of woodland caribou conservation plans; advancement of protected areas completion; adoption of leading forest management standards; development and adoption of sustainability-focused forest biomass practices and offset protocols; promotion of accomplishments in the domestic and international marketplace. The author will discuss the genesis of this initiative, its key elements, challenges to its success and the prognosis for its ultimate success.

SP7.11 Green, S*; Dulvy, NK; Cote, IM; Simon Fraser University; *stephanie.green@sfu.ca*

Unsustainable prey consumption by invasive lionfish (Pterois volitans) on Caribbean coral reefs

Invasive species are a leading threat to biodiversity across the world's ecosystems. One spectacular invasion that is currently unfolding is that by predatory Indo-Pacific red lionfish (Pterois volitans), which are rapidly spreading across Caribbean coral reefs. There is growing concern that populations of these exotic predators will severely impact Caribbean marine ecosystems, particularly by preying on native coral reef species. We quantified the capacity of lionfish to reduce the biomass of their fish prey on 13 invaded Bahamian reefs. We show that lionfish have reached densities capable of removing prey at rates far greater than reef fish populations can replenish themselves at 11 of the 13 reefs we studied. Reconstructing historical fish biomass on the same reefs reveals that lionfish have likely depleted the biomass of their prey by 40-90% in less than four years since their initial colonization of the area. We conservatively estimate that resident lionfish populations must be reduced by 12-94% to prevent further erosion of native fish biomass on those reefs already impacted by lionfish predation. The exponential increases in lionfish abundance observed on many Caribbean reefs strongly suggest that lionfish are capable of severely impacting native fish communities. Our study highlights the urgency of this invasion at the forefront of ecology and conservation research.

SY12 Greenwald, David Noah*; Suckling, Kieran F.; Center for Biological Diversity; *ngreenwald@biologicaldiversity.org*

Critical habitat and the role of peer review in government decisions

The U.S. Endangered Species requires designation of critical habitat for all listed threatened and endangered species. Critical habitat provides important protection for species, placing requirements on federal agencies to avoid modifying habitat and providing an opportunity to protect areas where species no longer occur for the purpose of recovery. The designation of critical habitat involves a two step process in which scientists with the U.S. Fish and Wildlife Service identify areas essential to the conservation of listed species and issue a proposed designation, which is then opened to peer review and public comment. This proposal is then finalized by the Secretary of Interior after determining the economic and other impacts of designation and whether the benefits of excluding specific areas outweigh the benefits of designation. We reviewed proposed and final critical habitat designations finalized between 2002-2008 to determine the direction and magnitude of change in the area designated. We also reviewed scientific peer reviews of these designations to determine whether changes reflected expert advice. Sixty-seven percent of critical habitat designations were reduced between proposed and final by an average of 49%. Of 163 peer reviews analyzed, 80 called for adding habitat, which was ignored in all but four cases. These results highlight the limitations of peer review of government decisions, where there is no arbiter to ensure that reviews are followed.

SY52 Gregg, RM*; Hansen, L; Hitt, J; Hoffman, J; Mielbrecht, E; Score, A; EcoAdapt; *rachel.gregg@ecoadapt.org*

Marine and Coastal Climate Change Adaptation in North America: A Synthesis of Emerging Ideas

Climate change is now widely acknowledged as a global problem that threatens marine and coastal conservation, management, and policy. Mitigation and adaptation are the two responses commonly taken to address actual and projected climate change impacts. While mitigation (reducing greenhouse gas emissions) is essential, adaptation (reducing vulnerability to climate change) has also become a necessity in order to prepare for and respond to the unavoidable effects of climate change. The field of adaptation is developing rapidly but in an ad hoc fashion, and organizations and governments are often hard put to make sense of the dispersed information that is available. This talk will present the efforts of EcoAdapt to survey, inventory, and assess adaptation projects from different regions, jurisdictions, and scales throughout North American marine and coastal environments. We will provide context and examples of how climate change is being addressed in conservation, management, and policy, review the adaptation options available to and in use by coastal and marine practitioners, and introduce the case studies provided by other symposium panelists.

P1.69 Grilo, Catarina; Faculty of Sciences of the University of Lisbon; *ccgrilo@fc.ul.pt*

Transboundary Marine Protected Areas for Coral Reefs and Humpback Dolphins in East Africa

Transboundary marine protected areas (TBMPA) require cooperation between States, and knowledge of marine resources' ecology and institutions. Common pool resource (CPR) theory was used to identify biophysical and institutional aspects of marine resources to be protected by future TBMPAs between Mozambique-Tanzania (Mz-Tz) and Mz-South Africa (Mz-SA). Two CPRs of different mobility were selected to study existing near-border MPAs: coral reefs (CR) and humpback dolphins (HD). Interviews were conducted with local communities, tourism operators and state officials, and triangulated with other sources. Results suggest that existing MPAs in the Mz-Tz region have not avoided the main threats to CRs, such as overfishing by local and migrant fishermen. Variations in currents location imply that CR health in both States is mutually dependent. HDs are not a conservation priority, despite some threats and their likely cross-border movements. In the Mz-SA region, results suggest CRs are targeted by intense tourism activities, and uneven conservation measures (i.e., MPAs) that contradict local currents and unidirectional ecological dependence. HDs are affected by fishing and land-based pollution, but cross-border movements are unknown. Future TBMPAs may address most threats to CRs and HDs in these regions, but are inapt to deal with land-based pollution. CPR theory can inform TBMPA planning about the implications of (TB)MPAs for CPRs with different ecological and institutional attributes.

SP11.10 Groom, RJ*; Romanach, S; Lindsey, P; African Wildlife Conservation Fund, University of Pretoria and University of Zimbabwe, African Wildlife Conservation Fund, African Wildlife Conservation Fund & University of Pretoria; *rosemary.groom@bristol.ac.uk*

Changing Circumstances for African Wild Dog Conservation in Zimbabwe

African wild dogs are the most endangered large carnivore in southern Africa and are threatened throughout their range by habitat loss and/or fragmentation, wire snaring, disease, prey depletion, human persecution and competition with lions. Such threats have increased considerably in south-east Zimbabwe since the onset of the Land Reform Program in 2000, which has caused the extirpation of wild dogs from many areas, with consequent loss of genetic diversity. We have documented land use trends and changes in the wild dog populations throughout the region since 2000. Using the SavÃ© Valley Conservancy (SVC) as a study area, we investigated the major threats to existing wild dog populations and documented all causes of mortality. Snaring was the biggest cause of adult mortality (67%, N=12 in 15 months), with 84,396 snares removed from SVC from August 2001 to July 2009. Additionally, disease has severely impacted neighbouring wild dog populations; rabies killed 98% of the population in Malilangwe Reserve in 2007, and lions killed two litters of pups in SVC in 2009 alone. Genetic analyses show low genetic diversity and population isolation. Wild dog populations are in decline throughout the region and we work at both the local and regional level to mitigate established threats through policy intervention, anti-poaching efforts, vaccination campaigns and education.

SP7.12 Gross, JA; USGS-Northern Rocky Mountain Science Center; *jgross@usgs.gov*
Innovative Suppresion Technologies for the eradication of invasive fish from the western United States.
Many native fisheries in the western United States are impacted by introduced or invasive fish. Millions of dollars have been spent on suppression programs, as in many locations throughout the United States Mountain West; these fish have significantly altered both the aquatic and terrestrial ecosystem. To date no current fisheries management strategy such as gill netting, poison application or physical barriers have yielded successful outcomes at eliminating these invasive predators from these or other large lakes. Current methodologies are costly and have significant environmental implications. Unintended consequences include mortality in non-target organisms from by-catch or piscicides, further alterations in food web dynamics, and the impediment of genetic material and nutrient movement in a watershed. Additionally while eradication strategies tend to target adult organisms few methods address other life history stages such as recruitment from the embryo and larval stages of fish. New conservation and integrated suppression technologies must be employed to address recruitment of new individuals into a population. This presentation will discuss new physical, biological and chemical suppression technologies that offer promise to inhibit recruitment of invasive fish.

SY10 Gross-Camp, ND*; Martin, A; Kebede, B; McGuire, S; Munyarukaza, J; International Development Group UEA; *n.gross-camp@uea.ac.uk*
What have we here? A preliminary review of the Reconciling Biodiversity and Development through Direct Payments for Conservation (ReDirect) Project
We report the findings from the initial stages of ReDirect, an experimental Payment for Environmental Service (PES) project that addresses the PES's ability to achieve conservation and poverty alleviation goals. Our PES scheme seeks to reduce household dependence on products from the Nyungwe National Park, Rwanda, as a proxy for biodiversity conservation. We randomly selected four cells (a unit of 300-1300 households), each paired with a control cell. Key design features of our PES are the public tenure of the resource, for which access is legally prohibited, and the collective basis of the incentive and performance contracts. Our preliminary findings come from baseline data including: household surveys, meetings with residents, public goods games (PGGs), and assessments of anthropogenic threats. Some important lessons to date relate to the diversity of local contexts around the Park and the need for different incentives and monitoring structures in each cell. For example, the experimental PGGs demonstrated different attitudes towards collective action and this may in turn influence a cell's ability to cooperate for support activities such as investing in a nursery for medicinal plants, bamboo, or trees. Threats were also found to vary from cell-to-cell with a minority controlling lucrative (often illicit) goods that pose challenges this project is unable to address. One of the key difficulties has been to develop shared understanding and goals, amongst groups with different interests and power status. For example, we have spent considerable resources on relations between our partner organization (RDB) and communities, namely to quell unsubstantiated rumours and clarify project objectives.

12.5 Grouios, CP*; Manne, LL; Biological Sciences, University of Toronto Scarborough, Biology Department, College of Staten Island / City University of New York; *chris.grouios@utoronto.ca*
With many repeated surveys, consistent occupancy can predict local species persistence nearly as well as abundance
We compared the utility of two time-series data measures for applied conservation biology by investigating how well each could predict future local persistence of a diverse set of non-rare bird species with varying survey efforts. We used 37 years of data from an eastern subsection of the North American Breeding Bird Survey. We first calculated abundance from yearly point-counts and variations of permanence (i.e., consistent occupancy over time) from yearly presence-absence data in six different length survey intervals from an early time period (1970-1981). We then used a contemporary time period (2001-2006) to empirically evaluate how well each measure predicted local persistence two decades later, and each measure's sensitivity to survey interval length. We found that permanence could only match the ability of abundance to accurately predict local species persistence if many multiple within-year repeated observations directly contributed to its calculation. All measures remained fairly robust to reductions in data from 12 to 4 years of survey intervals, but only the abundance measure and the best permanence measures were similarly effective at predicting persistence with fewer than 3 years of surveys. Thus, to best ensure biodiversity persistence, we recommend both the yearly and within-year repeated collection of abundance estimating data for use in applied conservation biology, such as protected area selection.

SY76 Grove, SJ; Baker, SC*; Forestry Tasmania; *simon.grove@forestrytas.com.au*
Keeping arthropod conservation relevant in sustainable forest management: tips from Tasmania, Australia
Arthropods are frequently given short shrift in forest conservation planning and management compared to more charismatic organisms, yet this makes little sense ecologically. Obstacles to wider consideration of arthropods include: lack of knowledge of their ecology or taxonomy; sampling, curation, analytical and data management issues; and public indifference or revulsion towards creepy-crawlies. Keeping arthropod studies on the agenda of forest managers requires demonstrating their advantages in facilitating practical management outcomes. This presentation introduces some of the approaches that have been successfully adopted in Tasmania. For instance, we have allayed the taxonomic impediment through (a) restricting much of our sampling to the vicinity of the Warra Long Term Ecological Research Site in southern Tasmania; (b) restricting our taxonomic focus to the beetles (1200 species and rising); (c) developing a comprehensive repository for beetle specimens arising (the Tasmanian Forest Insect Collection); and (d) adopting standard code-names for the two-thirds of sampled taxa that remain undescribed. Likewise, we have focused ecological studies on the same subset of taxa, and have used these to explore a range of responses to different aspects and scales of forest management. Narratives concerning the behaviour and ecology of individual flagship species from these studies have the potential to turn the yuk-factor into a wow-factor, while our growing knowledge of this fauna has enabled us to turn the sheer magnitude of arthropod biodiversity into a research asset and a conversation piece, enabling channels of engagement between conservation biologists and forest managers and the wider public.

SY63 GUMMER, DL*; Aldridge, CL; Western and Northern Service Centre, Parks Canada Agency, NREL, Colorado State University and U.S. Geological Survey; *david.gummer@pc.gc.ca*

Putting lines on a map: an approach for classifying species occurrence models to identify critical habitat for endangered species

Conservation efforts require understanding of species resource needs across space and time, and increasingly involve detailed quantitative models to delineate important habitat areas for protection, management, or broader-scale planning. Resource selection function models are frequently developed to estimate the relative probability of occurrence of a species across an area of interest. Inevitably, however, it becomes necessary to classify the resulting habitat map into categories for further analysis or interpretation. Common approaches to classify habitat areas are based on frequency histogram analysis or confusion matrices, and typically utilize arbitrary thresholds. We expanded on commonly used methods for testing the validation of species occurrence models as the basis of a more meaningful approach for classifying habitat models. This approach assesses the predictive capability of model classifications at maximizing the proportion of species occurrence records captured. We tested this approach using a nest occurrence model for Greater Sage-Grouse (Centrocercus urophasianus) and identified habitat that contained 87% (95% CI 76-95%) of nest sites within 49% of the study area in southeastern Alberta, Canada. This approach is likely to be useful for classification of detailed habitat models for other endangered species where the challenge is to use the best available information to identify critical habitat.

P2.22 Gurean DM; ; *dangurean@unitbv.ro*

The carpathian larch natural forests between the High Conservation Value Forests from Romania

Identified sometimes as a subspecies (Larix decidua ssp. carpatica), but mostly only as a variety (Larix decidua var. carpatica) of the european larch (Larix decidua), the carpathian larch is present in spontaneous status in Romania on almost 4500 ha of natural forests, mostly mixed stands with spruce, beech, scotch pine and other species, where the larch represents less then 50 % in composition, but also stands dominated by this rare taxa (60% or more in composition) or even small pure stands. The floristic and phytocoenological investigations realised along the years, and, most recently, our researches, relieved that in the Romanian Carpathians the natural, pure or mixed, larch forests shelt 24 endemic species (12 for Romania and 12 for the entire Carpathians chain), one endangered and one vulnerable species, 6 vulnerable/rare species and 42 rare taxa, according the Romanian Red Lists, justifying entirely, in our opinion, their conservation management and also the High Conservation Forests level.

P1.120 Gutierrez-ChacÃ³n, C*; Franco, P; Roncancio, N; Banguera, Y; Wildlife Conservation Society -WCS, Universidad del Quindio; *cgutierrez@wcs.org*

Considerations for the surveillance of Cauca Guan (Penelope perspicax) populations, an endangered and endemic species to Colombia

The Cauca Guan (Penelope perspicax) is an endemic and endangered species of the Colombian Andes, with only six confirmed populations. An essential aspect to design adequate management strategies is to continuously assess population status (e.g. size and density), however accurate population estimates are difficult to obtain especially when birds are rare, inconspicuous and shy. Accurate estimates, needed to detect significant changes in a population, require rather large efforts in terms of time, personnel and resources. In order to guide sampling design to obtain reliable and comparable population estimates (in space and time) for the Cauca Guan, on aspects such as sampling design and effort, we conducted a series of simulations based on data from previous studies on three of the six known populations. In these previous studies encounter rates contributed the most to the total variance. Considering the costs and benefits of each option, simulations suggest that line transects are recommended over other sampling methods, single observer is preferred over double observer and more transects (despite shorter) are helpful in order to reduce total variance.

P1.79 Gwali, S*; Okullo, JB; Eilu, G; Nakabonge, G; Nyeko, P; Vuzi, P; Makerere University; *gwalis@yahoo.co.uk*

Folk classification and local knowledge of shea tree (Vitellaria paradoxa subsp. nilotica (Kotschy) A. N. Henry et al.) varieties in Uganda

Local knowledge of plant variation has been used for the domestication of many plant species including potatoes, sorghum, yams, cassava and rice. The process involves documentation of apparent variation of different phenotypes and subsequent selection of superior plus individuals of such plants. One useful plant of high economic value in Uganda for which local classification knowledge and variation have not yet been documented is Vitellaria paradoxa (the shea tree). Local farmers point to a high variation in form, yield and fruit taste of the shea tree. To document shea tree folk classification and ethno-varieties, we used 300 questionnaires, 15 focus groups and 41 key informants in three farming systems of Uganda where this species occurs. Our results revealed that farmers utilise use-related traits and morphological attributes to classify, name and group shea trees into â ethno-varieties'. Variation of folk classification schemes was not significant across the three farming systems (Kruskal - Wallis Ï 2 = 28, df = 28, p > 0.05; Spearman's R > 0.8, p < 0.0001). Local knowledge and classification were however highly influenced by ethnicity (Pillai's trace = 0.817, p < 0.001). Farmers identified 29 ethno-varieties based on fruit, nuts and habitat characteristics while 10 (fruit, nut and habitat criteria) were utilised for classification. However, there is need to complement farmers' classification criteria with more detailed studies involving biochemical and molecular markers.

P2.76 GyÃ¼re, P.*; JuhÃ¡sz, L.; KozÃ¡k, L.; University of Debrecen Department of Nature Conservation Zoology and Game Management ; *gyurep@agr.unideb.hu*

The effects of climate change to the migration of the wild geese in the HortobÃ¡gy (Hungary)

The Carpathian basin is one of the main migrating and wintering area of several wild goose species in Europe. The typical habitats of the HortobÃ¡gy are mainly grasslands, wetlands and marshes which are favourable assembling places for several migrating bird species. Most of the migrating geese are White fronted geese (Anser albifrons), but the endangered Lesser White fronted goose (Anser erythropus) and the Red breasted goose (Branta ruficollis) also observed annually. The Greylag goose (Anser anser) is the only breeding goose species in the area and regular in the migration periods. Hungary has a temperate continental climate that is influenced by three main factors, these are the Eastern-European continental, the Western-European oceanic and the Mediterranean influences. The winter temperature is fluctuating between wide ranges caused by the diverse effects and the basin character. The study period was the last twenty years since 1989. We analysed the correlation of the average monthly temperature and the number of wintering geese. Our results showed significant increase in number of overwintering geese, and we have found several phonological changes in the timing of goose migration.

15.3 H. Resit Akcakaya*; David Keith; Damien Fordham; Miguel Araujo; Tracey Regan; Jane Elith; Richard Pearson; Barry W. Brook; Stony Brook University, New York, USA, NSW Department of Environment and Climate Change, Australia , University of Adelaide, Australia, Museo Nacional de Ciencias Naturales, Spain, University of Melbourne, Australia, American Museum of Natural History, New York, USA, University of Adelaide, Australia; *Resit.Akcakaya@gmail.com*

Identifying Species at Risk of Extinction due to Climate Change

Developing a comprehensive set of guidelines or criteria for identifying species at risk of extinction due to climate change requires a more in-depth understanding of the effect of climate change on extinction dynamics than we currently have. To increase this understanding, we have been exploring a novel modeling approach, which integrates downscaled global climate model ensembles, single and ensemble bioclimate models, and stochastic metapopulation models with dynamic spatial structure. This approach is applied to a set of vascular plant species with a broad range of life history traits, as well as other groups of animals and plants. The results allow assessing climate change impacts on species viability through limited dispersal (causing some suitable habitat to remain unoccupied), increased fragmentation (causing local extinctions due to demographic and environmental stochasticity), increased fluctuations due to increased frequency of extreme weather events (causing increased risk of local extinctions), reduced vital rates (survival, growth, and fecundity), and changes in species interactions (e.g., reduced prey base). The ultimate goal is to provide general rules for red-listing species that may be threatened by climate change, based on a meta-analysis of the results of the application of the integrated model to several taxonomic groups and geographical regions.

P2.182 Haas, CA*; Gah, E; Palmer, M; Cassidy, A; Ridgely, G; Government of the Northwest Territories, The Nature Conservancy, Indian and Northern Affairs Canada; *claudia_haas@gov.nt.ca*

Applying conservation planning principles in the design of a network of protected areas in a relatively pristine northern landscape.

The NWT Protected Areas Strategy (PAS) is a community-driven effort to establish a protected areas network with core representative areas in the NWT. To support the goals of the PAS, we analyse this network using conservation planning principles. We have conducted terrestrial coarse filter representation analyses and identified additional areas for complete ecological representation in the NWT. To incorporate freshwater into our analysis, we started with the creation of a freshwater classification for most of the NWT. A finer filter approach is also being utilized, identifying and mapping â special features', including rare and may-be at risk plants, amphibian and reptile sightings, hot and warm springs, eskers, mineral licks, glacial refugia, and karst. We have run into challenges including limited availability and coarseness of data for the entire territory and how to incorporate this sparse data into our analyses. Standard protected area design methods, developed in more highly fragmented landscapes, are not all relevant in our relatively pristine northern landscape, e.g. the creation of buffer zones and corridors does not apply as most of the NWT is unfragmented and still supports ecosystem processes and connectivity. It is important to ensure our protected areas network is robust; able to conserve biodiversity and remain viable, while withstanding future industrial developments, e.g. the proposed Mackenzie Gas Pipeline, and adapting to processes, e.g. climate change.

SP1.3 Habberfield, Michael W.*; Larsen, Chris P.S.; Department of Geography, SUNY at Buffalo; *mwh2@buffalo.edu*

Do Species' Body Mass and Home Range Size Determine the Functional Connectivity of Corridors? Results from a Meta-analysis of Tracking Studies

Maintaining the structural and functional connectivity of landscapes is paradigmatic in conservation biology. Conservation corridors are typically designed to connect habitat structurally with the expectation of also supporting functional connectivity for wildlife. General guidelines often suggest that species with large body masses or home ranges are most in need of corridors. Tracking studies provide a means to determine if structural connectivity actually does generate functional connectivity for wildlife. We conducted a meta-analysis of animal tracking studies, each having the goal of determining if corridors, or similar forms of structural connectivity, were important for the functional connectivity of the focal species. Our objective was to determine whether species with larger body masses or home range sizes were more likely to benefit from corridors. Published results for each study species were interpreted to indicate either strong, partial, or no relationship between structural and functional connectivity. Ordinal logistic regressions indicated that home range size is a predictor of corridor efficacy (n=52, p=0.06) but body mass did not predict efficacy (n=57, p=0.29). These results contribute to the important validation of recommendations to use corridors for conserving species with large home ranges. Further analyses will identify if other variables influence corridor efficacy, such as species' cognitive ability and the type of movement behavior being tracked.

20.6 Haddad, NM*; Brudvig, L; Damschen, E; Johnson, B; Orrock, J; Sullivan, L; Wagner, S; Levey, D; North Carolina State University, Michigan State University, Washington University, Washington University, Iowa State University, University of Florida; *nick_haddad@ncsu.edu*

On the negative ecological effects of corridors: assessing Simberloff's critique

Corridors have been widely implemented to promote species persistence in fragmented landscapes. In spite of their popularity, longstanding concerns exist that corridors may have negative consequences. Raised over 20 years ago by Simberloff (1987), these concerns include increasing the dispersal of antagonists, such as the predators and diseases of conservation species; the spread of invasives; and the spread of disturbances, like fire. These concerns have never been rigorously tested. Working within the Savannah River Site Corridor Experiment, we tested these potentially negative effects of corridors. Our experiment included eight replicate landscapes, each with ~1ha patches that were either isolated or connected by corridors. We found that corridors did not increase plant invasions. Negative effects of corridors on predation were, when present, primarily attributed to the effects of edges, a side effect of the creation of narrow corridors. Corridors increased prevalence of animal-dispersed parasites, but not wind-dispersed disease. Finally, corridors facilitated hot fires by increasing the temperature at which fuels burned, likely by funneling and increasing speed of wind. Despite the potential for some negative effects of corridors on edge effects and spread of animal dispersed parasites, there remains no evidence that corridors reduce population persistence; on the contrary, our data show they help maintain populations of native species.

1.1 Haddaway, NR*; Grahame, JW; Mortimer, R; Christmas, M; Dunn, AM; Institute of Integrative and Comparative Biology, Faculty of Biological Sciences, University of Leeds, School of Earth and Environment, University of Leeds, Environment Agency; *bsnrh@leeds.ac.uk*

Survival of the Fattest: evidence for phenotypic plasticity in relocated British White-clawed Crayfish (Austropotamobius pallipes)

Relocation of threatened populations is commonly employed in conservation, but low success rates are reported in the literature, with failures likely underrepresented. Investigations comparing success of different aspects of relocation are of great importance to such conservation. Conservation of threatened British white-clawed crayfish (Austropotamobius pallipes) involves relocation of populations to isolated ponds where risk of competition with invasive crayfish is minimised. In this study, field experiments were undertaken comparing survival, growth and morphological change in crayfish from lotic and lentic habitats following relocation to a lentic recipient habitat. Lentic populations have previously been shown to be broader than lotic; possibly increasing gill volume in adaptation to oxygen-poor environments. Firstly, no costs growth reduction cost was detected between relocated or control populations. Secondly, no difference in cost was detected between relocated lotic and relocated lentic populations. Thirdly, survival did not differ between treatment groups. Finally, lotic crayfish grew allometrically. Carapace width and areola width growth rates were significantly higher for lotic crayfish than lentic; evidence of phenotypic plasticity. Our study found no difference in survival or growth costs between relocated lotic and lentic populations. Evidence of phenotypic plasticity suggests that crayfish are resilient to relocation and can adapt morphologically to novel environments. Population relocation should therefore be employed to conserve white-clawed crayfish in Britain.

3.3 Hagell, S*; Otterstrom, S; Chambers, C; Perla Medrano, C; Northern Arizona University, Paso Pacifico Nicaragua; *seh222@nau.edu*

Teak, carbon, and spider monkeys: Using a landscape perspective to conserve Tropical Dry Forest

Non-native tree plantations have been supported by national and international bodies as a quick means to meet global carbon targets while taking advantage of existing timber markets. However, one primary venue for developing plantations are tropical dry forests, which are already severely fragmented by past exploitation. These forests and dependent wildlife populations could be better protected if the landscape context is considered prior to plantation development. In this analysis, we used least-cost path and circuit-based connectivity measures to predict the effect of non-native plantations (teak, Tectona grandis) on wildlife in Nicaragua, targeting the endangered Central American spider monkey (Ateles geoffroyi). In particular, we compared landscape connectivity and native forest extent prior to plantation development to a series of post-development scenarios. Our results strongly suggest that connectivity will be lost between critical forest stands following the current plantation operations. This scenario could have been avoided if the landscape had been evaluated prior to planation development, even using available land cover information. We conclude that non-native reforestation for carbon sequestration can be better balanced with native biodiversity conservation if landscape context is incorporated into planning and certification.

P2.195 Hagerty, Christina; Ferron, Kelly; Watts, Sean*; Santa Clara University; *ferronkelly@gmail.com*

Federally endangered serpentine endemic, Dudleya setchellii (Crassulaceae): Which side are you on?

Dudleya setchellii is a locally abundant, but narrowly distributed succulent perennial restricted to serpentine outcrops in the Santa Clara Valley (CA). Despite its status, little of its autecology is known. D. setchellii reproduces sexually and vegetatively via rosettes that separate from the parent. We investigated the influence of aspect on D. setchellii germination and transplant success at Coyote Ridge Open Space, a serpentine ridge in Santa Clara Valley. 2009 censuses indicated that south-facing slopes produce more inflorescences than north-facing slopes (2.16 Â± 0.37SE vs.1.64 Â± 0.30SE). In fall 2009, seedling trays of 20 cells each were filled with nursery loam or locally-collected, homogenized serpentine soil. Each cell received one dudleya seed and 10 trays were distributed randomly on three north- or south-facing slopes. Germination was best in nursery soil and on north aspects (29.6% Â± 0.51SE) and worst in serpentine soil on south aspects (14% Â± 0.08SE). Our results suggest a tension between adult performance and germination on north vs. south aspects. In spring 2010, reciprocal transplants between north- and south-facing slopes will demonstrate whether D. setchellii may be locally adapted to aspect. Given the uncertain public status of Coyote Ridge, establishing new dudleya populations will be important. It is therefore critical to D. setchellii conservation to understand how microhabitats interact with its demography and life history.

SY41 Haim A; University of Haim; *ahaim@research.haifa.ac.il*
Chronobiological disruption and nature conservation
Most organisms are adapted to the daily and seasonal light variations that result from planetary motion. The biological clock of such organisms is entrained by these variations, acts both as a clock and a calendar. Light at night (LAN) and Light interference (LI) disrupt these circadian rhythms with deleterious effects. Several studies in our laboratory show that to short day acclimated rodents, LAN signals a long day acclimation and thereby disrupts seasonality. This creates a \\\\\\\\\\\\\\\\"seasons-out-of-time\\\\\\\\\\\\\\\\" effect, discovered in the thermoregulatory system of the social vole Microtus socialis. LAN may change conductance properties of the integument, meaning that exposure to low ambient temperatures will result in hypothermia if heat production cannot compensate for heat loss. These changes can be attributed to the interruption of melatonin production and secretion by the pineal gland. Rapid increase in light intensity (via an on/off switch) from minimal levels to 450 lux forms a source of stress and in M. socialis resulted in an increase of stress hormones levels. A comparative thermoregulatory study (diurnal versus nocturnal) Gerbils revealed different patterns likely stemming from activity time. LAN and LI also have a negative impact on the immune system. With the modern increase in LAN and LI, conservation biologists should be aware of these negative impacts on animal welfare in relation to light intensity, wavelength and duration of exposure.

SY4 Hall, J; U.S. Department of Defense; *john.hall@osd.mil*
We have 40 questions-now what?
In combination, the 40 questions reflect the considered input of many knowledgeable individuals and address a wide range of conservation science, policy-relevant issues. But questions left unanswered are simply unfulfilled musings. Themes emerged during the workshop discussions that indicated successful use of the questions relies on three key elements. First, translation and education are necessary. As scientists we struggle communicating our ideas and understanding to the public, policy-makers, and even the resource managers that are the consumers of research. To make an impact these questions need to be understood and appreciated for their relevance to biological resource management issues faced by society. Such understanding and appreciation would be facilitated by improvements in the ecological literacy of the public. Second, adequate and sustained funding will be needed to address the questions. Public and private funding institutions must evaluate, each subject to their own constraints and missions, which questions they will choose to apply resources against to address. Third, those entities that represent the end users will need to consider their support for the research to address each question and their willingness and ability to implement the understanding that results amidst all the other requirements and constraints they confront.

4.2 Hall, Jonathan C*; Chhangani, Anil K; Waite, Tom A; The Ohio State University, Columbus, OH, The School of Desert Sciences, Jodhpur, India; *hall.1073@buckeyemail.osu.edu*
The impacts of La NiÃ±a induced drought and the Bishnoi people on Indian vulture populations in Western Rajasthan
Previous research on the catastrophic decline of the Gyps species complex has identified diclofenac, an anti-inflammatory drug administered to livestock, as the primary cause. Large-scale climatic phenomena, such as El NiÃ±o Southern Oscillation induced drought, might exacerbate diclofenac-caused declines; however, these phenomena have not been examined. Here, we ask whether El NiÃ±o Southern Oscillation (ENSO) contributes to the population dynamics of the critically endangered Indian vulture (Gyps indicus). Based on time series analysis of annual count data, 1996-2005, we provide evidence that ENSO synchronized population dynamics throughout western Rajasthan. We attribute this impact largely to two La NiÃ±a events, including the major event spanning 1999. Although these climatic events apparently affected local populations in a parallel way across the region, we explore whether one particular local population might have been partially buffered by the presence of the Bishnoi people who practice a religion with specific conservation tenants. Our results show that the Indian vulture population in the Bishnoi village of Khejerli was buffered from drought events.

SY57 Hall, K*; Doran, PJ; The Nature Conservancy; *kimberly_hall@tnc.org*
Ecosystem-based Adaptation to Climate Change Impacts in the Laurentian Great Lakes
The Laurentian Great Lakes cover more than 94,000 square miles, drain more than twice as much land, and hold one-fifth of the world's usable fresh surface water supply. While healthy, this vast resource faces a variety of threats including incompatible development, invasive species, dams and barriers, and non-point source pollution. Changes in climate are predicted to enhance many of these existing stressors, and add new ones. For this freshwater resource, ecosystem based adaptation not only involves re-evaluating current practices (e.g., agricultural best management practices) where we seek mutual benefits for people and nature through creative partnerships, but it also involves engaging in new strategies to deal with emerging issues (e.g., lake level changes). Here we discuss climate change impacts, formulate "hypotheses of change" that link impacts to biodiversity features, and subsequently discuss a variety of ecosystem based adaptation strategies. Additionally, we discuss decision support tools intended to inform climate adaptation strategies. We will focus on three case studies that include aquatic systems imbedded in an agricultural matrix, large freshwater bays and estuaries, as well as Great Lakes coastal habitats - each of which lie at the intersection of social, economic, and ecological interests. Efforts thus far highlight great potential for "win-win" strategies, and some daunting challenges in terms of losses of biodiversity that appear unavoidable.

SP1.14 Hall-Beyer, M.; Department of Geography, UNiversity of Calgary; *mhallbey@ucalgary.ca*

Interannual variability patterns in vegetation density derived from AVHRR GMMS data,1982-2006: Alberta Canada

Monitoring effects of climate change often concentrates on total change through time, but increasing emphasis is placed on more frequent outlier events or greater overall variability resulting in the ecosystem. We used the globally validated 8km GIMMS AVHRR dataset of NDVI for half-month repeats over 25 years April through October. The amount of variability and its seasonal pattern were compared for different land covers and different ecoregions of Alberta, Canada. All types of forested ecosystems show maximum interannual variability in spring and fall, but timing differs with ecoregion. This pattern may show temperature dependence. Grass ecosystems' peak variability is in midsummer, likely moisture-dependent. Some areas show elements of both patterns. Agriculture-dominated areas follow the grasslands pattern even where irrigated. These measurements are the only spatially-explicit baseline available, since globally equivalent satellite data has only been produced since the 1980s. These 25 years span several major El Nino and La Nina events, and can provide a baseline to compare future variability. AVHRR and comparable MODIS and SPOT Veg data will allow continued equivalent data gathering and monitoring. Results suggest that monitoring needs to be spatially stratified by both ecoregion and landcover. It requires continued updating of validated land cover products in the public domain.

P1.111 Hamilton, CM*; Radeloff, VC; Pidgeon, AM; Heglund, PJ; Thogmartin, WE; Helmers, D; University of Wisconsin - Madison, U.S. Fish and Wildlife Service, United States Geological Survey - Upper Midwest Environmental Sciences Center; *cmhamilton2@wisc.edu*

Midwestern Housing Growth Surrounding the United States Fish and Wildlife Service National Wildlife Refuge System

Biodiversity conservation requires protected areas to provide habitat for fish and wildlife populations. The mission of the United States National Wildlife Refuge System (NWRS) protected areas is to provide ecological benefits and it has a recognized role in preserving biodiversity. However, the refuges are typically surrounded by private land, a substantial portion of which is developed. Development may influence the ecological benefits of refuges. Our goal was to quantify housing development in the surroundings of all National Wildlife Refuges in the U.S. Midwest as an indicator of the threat that development poses to the biodiversity conservation function of the refuges. We quantified housing growth surrounding the Upper Midwest NWRS for each decade from 1940 to 2000 using detailed spatial housing growth data. We found housing units within 50 km of NWRS protected areas increased from 5.8 to 13.3 million. The average decadal rate of housing growth varied between 18.1 and 21.5% within 1, 5, 10, 25, and 50 km of NWRS areas. Growth was highly variable among refuges, reaching up to 651% (120 to 970 housing units from 1940 to 2000) within 1 km of Sherburne NWR. Housing growth threatens to isolate National Wildlife Refuges and diminish their ability to protect biodiversity.

SY76 Hanula, JL*; Horn, S; Campbell, JW; USDA Forest Service, Southern Research Station, Shorter College; *jhanula@fs.fed.us*

Altering Deciduous Hardwood Forests to Improve Bee Diversity and Abundance

Pollinators, particularly bees, have declined in many regions of the world. In the southeastern United States one factor that may be contributing to fewer pollinators is increasing forest cover and changes in forest structure and composition. We conducted two studies on the impact of removing a dense shrub layer from deciduous hardwood forests on pollinator diversity and abundance. In the Appalachian Mountains of North Carolina a century of fire exclusion resulted in a thick cover of native shrubs. Treatments included prescribed burning only, shrub cutting followed by burning, shrub cutting only, and no treatment. Cutting and fire alone had no effect on pollinators but when cutting was combined with prescribed burning nearly twice as many pollinators and ~30% more species were caught. In a second study, an invasive shrub was removed from bottomland hardwood forests in Georgia. This resulted in a 10-fold increase in pollinators and 4-fold increase in pollinator species. Both studies resulted in similar forest structure and density despite very different methods. These studies suggest that pollinators would benefit from lower tree densities and less shrub cover.

SY33 Hard, JJ*; Allendorf, FW; NOAA NW Fisheries Science Center, University of Montana; *jeff.hard@noaa.gov*

Adaptation to Human Exploitation and the Challenge of Evolutionarily Sustainable Harvest

Humans are highly efficient predators of wild organisms. Evidence is mounting that selection imposed by human harvest could be limiting the adaptive capacity of exploited populations, but with few exceptions harvest management has not taken evolutionary effects of harvest into account. When sufficiently selective, exploitation imposes "unnatural" selection that can reduce the abundance of individuals with characteristics favored by natural and sexual selection in the wild. Successful adaptation to unnatural selection requires three things. First, genetic variability must be conserved to maintain evolutionary potential. Second, harvest cannot be too selective: removing individuals with high fitness as potential breeders directly threatens viability as well as diversity. Finally, harvest-induced mortality must not be so high that it limits productivity. Harvest that maximizes short-term yields is often too high and too selective on key life history traits to avoid maladaptive evolution. Because it is likely that some undesirable changes in exploited populations have been caused by harvest-induced selection, there is an urgent need to identify management interventions that could arrest or reverse these changes. Identifying evolutionarily sustainable harvest practices remains a formidable challenge for natural resource managers-but it is a challenge that can no longer be ignored.

SP4.9 Hare, KM*; Cree, A; University of Otago; *Kelly.Hare@otago.ac.nz*

Exploring the Consequences of Climate-induced Changes in Cloud Cover on Reproduction and Offspring Phenotype of a Temperate-zone Ectotherm

Historically, studies predicting the response of organisms to climate variability have emphasised changes in temperature, with few considering other climatic changes. Ectotherms depend on external heat for most biological processes, and basking behaviour is an absolute requirement for lizards from temperate-zones for processes such as digestion and embryogenesis. Given that predicted changes in cloud-cover will alter basking opportunity in many locations, we measured the reproductive and phenotypic consequences of a large increase or reduction in basking opportunity during pregnancy in a live-bearing temperate-zone skink. Gestation period was longer and pregnancy success reduced under the lowest basking regime. However, the phenotype of offspring (sex, size, growth, survival, emergence behaviour, morphotype, pigmentation and locomotor performance) was not as seriously affected. Furthermore, some phenotypic measures altered over the first few months of neonatal life. These data suggest that: 1) implications of climate change scenarios are not always easy to predict, and 2) phenotypic response may be lessened in temperate-zone lizard. Although a link between basking regime and phenotype has been reported in viviparous lizards, this is the first study to suggest a potential negative influence of climate change on offspring production. Thus, changes in basking opportunity through increased cloud cover may have detrimental and long-lasting impacts on the population dynamics of live-bearing temperate-zone species.

1.5 Harris, D*; Gregory, S; Bull, L; Courchamp, F; University Paris XI, CNRS, Orsay; *franck.courchamp@u-psud.fr*

Island prioritization for alien invasive species eradications

Invasive alien species eradications are increasing, both in numbers and success rate. Yet, invasive alien species remain the greatest threat to insular biodiversity. A consensus is emerging that we need to undertake eradications strategically to minimize insular biodiversity loss. In response to this, we present a very simple framework for prioritizing islands for invasive alien species eradication, with an emphasis on reinvasion risk as the primary threat to long-term conservation potential. To construct a prioritization list, managers need only to assign weights to importance levels of reinvasion risk factors (we make an important distinction between natural and human-aided reinvasion), conservation value and any other factors of choice. The framework can also be used to compare conservation gain per unit eradication effort under different management scenarios, such as implementing biosecurity to reduce human-aided reinvasion risk. The resulting priority list will be able to maximize conservation outputs in the long term. It may also be useful to help raise funds for eradications, or to direct collection of missing data. We illustrate our system with the case of invasive rodents in New Caledonia but our framework can be generalized to any invasive taxon able to disperse naturally between islands, and to any archipelago.

19.6 Harrison, A-L*; Costa, DP; Block, BA; Shaffer, SA; Jonsen, I; University of California, Santa Cruz, Stanford University, San Jose State University, Dalhousie University; *harrison@biology.ucsc.edu*

Marine predators, projections, and global conservation targets

High seas marine conservation planning is coming of age. The Convention on Biological Diversity in 2004 catalyzed a major conservation planning exercise to establish an ecologically representative network of marine protected areas by 2012. Traditional conservation strategies focus on where biodiversity is and incorporating variability and estimating effects of climate change on species distributions are now important steps in conservation planning. The efficacy of traditional place-based approaches to open ocean conservation thus depend on species-environmental relationships. Here we undertook an effort to describe the distribution of 10 species of Pacific Ocean top predators in the high seas, characterize the spatio-temporal relationship between species and their environment, identify multi-species hotspots, and estimate hotspot occurrence under IPCC climate change scenarios. We utilized electronic tagging technology to describe the movements of wide-ranging marine predators including Laysan and black-footed albatrosses, northern elephant seals, sooty shearwaters, and salmon and white sharks from 2004-2008. We processed data with a state-space model, described species distribution and identified hotspots with weighted density plots, kernel density and Moran's I statistics, modelled species-environment relationships using Environmental Niche Factor Analysis, and estimated distributions and hotspot occurrence under IPCC scenarios. We identified seasonally dynamic multi-species hotspots in the North Pacific Transition Zone; sea surface temperature was a primary correlate. Species distribution and hotspot occurrence and timing shifted under climate change scenarios. Incorporating variability in marine conservation planning will be one of the major challenges in establishing a "representative network," particularly with respect to wide-ranging marine predators.

SP9.12 Harting, A.L.*; Baker, J.D.; Littnan, C.L.; Harting Biological Consulting, NMFS, Pacific Islands Fisheries Science Center ; *harting@mcn.net*

Stochastic Modeling to Design Appropriate Interventions to Promote Recovery of the Hawaiian Monk Seal

We use stochastic simulation modeling to explore a novel two-stage translocation strategy for improving the population status of the endangered Hawaiian monk seal. Approximately 80% of the roughly 1,100 monk seals reside in six remote Northwestern Hawaiian Islands (NWHI) subpopulations, where abundance is declining 4% annually, due to poor juvenile survival. In contrast, the remainder of the seals inhabits the main Hawaiian Islands (MHI), where abundance is increasing 7% per year and juvenile survival is quite high. We model scenarios in which weaned female pups from the NWHI are translocated to the MHI where they stay until age 3 yr, thus boosting the proportion surviving the juvenile phase. Thereafter, these seals are returned to the NWHI, where sub-adult and adult survival rates are comparable to the MHI. We evaluate the potential positive impacts of such actions on metrics such as abundance and population reproductive value. We also track potential negative impacts on individual subpopulation depletion and sex ratio. These simulations will help us to formulate effective intervention strategies that will aid recovery while also informing us about the magnitude of the expected benefits that will accrue from their application.

SP3.6 Hastings, JG; Duke University; *jesse.hastings@yahoo.com*

Non-governmental Organizations and Multi-Sited Marine Conservation Science: A Case Study

The study of how non-governmental organizations (NGOs) interact with local, national, and international actors to play a role in multi-scalar marine environmental solutions has grown in popularity in the academic literature. However, despite the growing body of NGO literature, little has examined the structure, function, and outcomes of NGO initiatives that primarily focus on marine science production, with a full analysis of the local, national, and international drivers of programmatic decisions and outcomes. This study has examined the processes of a major NGO initiative that has had the goals of producing marine protected area science, building local capacity, and influencing marine policy at four main sites: Belize, Brazil, Panama, and Fiji. Multi-sited international research has uncovered processes and outcomes unique to particular countries as well as those that are systematic. Methods have included participant observation, semi-structured interviews, document analysis, and social-network analysis. Preliminary results reveal that (1) marine research is more effective in moving policy when rolled into ongoing, in-country processes, (2) strong partnerships with in-country organizations, established at the earliest possible point in research design, are essential to get local buy-in into projects, and (3) integrated multi-disciplinary research initiatives that include social science are more useful to local stakeholders than those that focus on biological studies alone.

SY60 Haugen-Kozyra, K.; ; *karenhk62@gmail.com*

The Nexus Between Conservation Practices and Carbon Markets: What counts now and where, and where will things count in the future

The global carbon market is growing rapidly and is currently valued at over $126 B USD (World Bank 2009) - a tripling over the last few years. Carbon markets are established by government's choosing to place a price on carbon or greenhouse gas emissions through regulatory mechanisms known as emissions trading systems. Many jurisdictions, particularly in North America, are also considering allowing Carbon Offsets in a Cap and Trade emissions trading system. Offsets are GHG emission reductions undertaken by companies outside of the capped sectors (ie, actions taken voluntarily by those who do not have regulated targets, like the agriculture sector). Regulated companies can offset their emissions by purchasing these offset credits from others who have reduced their greenhouse gas emissions or have sequestered soil carbon, through Offset Projects. In this way, conservation agriculture, forestry or habitat projects can provide offsets to large emitters of greenhouse gases who are regulated. The role biological systems can play in reducing carbon is significant. The IPCC 4th Assessment Report, Volume 3 indicated that if the global Agriculture and Forestry sectors were mobilized with a price of carbon at $100/tonne, over 50% of the manmade fossil fuel emissions could be removed from the atmosphere on an annual basis (over 3 Gt of CO_2 emissions) -simply by carbon sequestration in soils, forests and other biological systems. Agriculture and Forestry activities are a key component of all Offset Systems either in place or under consideration worldwide, both voluntary and compliance-based - indeed, they have been a pivotal cornerstone of Bills in both US congressional houses. Conservation, improved management and restoration of these systems are all part of the mix. However, the trick is the accounting process and the policy criteria that defines an eligible offset. Quantification methods, policy decisions, and program criteria needed to generate compliance-quality offsets are in development. This presentation will discuss these issues and more as it explores the nexus between conservation and carbon.

P1.164 Haughland, Diane*; Boutin, Stan; Bayne, Erin; University of Alberta; *dianeh@ualberta.ca*

First to Go or Last to Show? Comparing Turnover Rates of Multiple Taxa in Response to Human Disturbance

Predicting which components of biotic communities are lost first in response to human-caused habitat loss is vital in conservation and land management, however, we lack data on how species turnover rates compare between taxa. To address this deficit for the boreal forest of Alberta, we compare the community structure of five taxa (vascular plants, lichen, moss, birds and soil mites) at pristine sites to sites with increasing amounts of disturbance. Rapid, standardized survey methods were used to measure occurrence and relative abundance, and turnover rates were calculated using distance/similarity metrics. Over 85% of the samples were collected from sites within a systematic provincial grid monitored by the Alberta Biodiversity Monitoring Institute; the remaining 15% were chosen to supplement the human disturbance gradients. In addition to comparing the sensitivity of different taxa to disturbance, we address whether rare species exhibit greater turnover than common species. This is an important extension of the categorical comparisons and limited taxonomic depth of most disturbance studies. In addition, recent research has focused on defining critical thresholds for individual species. Our analyses extend threshold theory into potentially a more powerful direction, where there is more information on the trajectories of altered communities that managers can use to define biologically-informed targets.

P1.82 HAUZER, MELISSA*; Dearden, Philip; Geography Department, University of Victoria; *mhauzer@uvic.ca*

Artisanal Fisheries Management, Conservation, and Livelihoods in the Comoros islands

Tropical small-scale fisheries represent the main livelihood and protein source for a substantial portion of the global population. Growing pressures on marine resources, however, have left many fishing communities faced with declining catches and increased environmental degradation. Effective management strategies are thus critically important, yet few studies offer feasible solutions for traditional managers in lesser developed nations. This study took place on the island of Ngazidja in the Union of the Comoros. The purpose was to determine how effective fishing communities are at managing their fisheries, and why certain approaches are more effective than others. Qualitative methods were used to collect data on local knowledge and beliefs, management structures, and resource conflicts in four major fishing villages. Results show that marine resources and habitats have declined significantly over the past generation. Local fishing associations responded to the decline by imposing informal gear restrictions. Compliance rates to local regulations are high, primarily due to participatory decision-making, self-monitoring, and strong feelings of solidarity among fishers. Perceptions of the benefits of these regulations are also high. This suggests that by working within these pre-established informal management systems, as opposed to the more orthodox approach of instigating exogenous, formal management systems, improved conservation and livelihood outcomes should result.

P1.195 Hayrapetyan, TA*; Yavruyan, EG; Scientific center of Zoology and Hydroecology, National Academy of Science of Armenia, Armenian-Russian (Slavonian) University; *shelinberg@yahoo.com*

Snow vole in Armenia: one or three species?

It is known that there is a one species of snow vole dwelling in Armenia. It is European snow vole (Chionomys nivalis; Thomas, 1906). Chionomys gud (Satunin, 1909) and Cheonomys roberti (Martins, 1842) are living in South-west Georgia and North-east Turkey, Azerbaijan. The main habitats of these species are forests and grasslands. The North-west region (Shirak Marz) of Armenia has boarder with both Georgia and Turkey. Ecological and zoogeographical parameters of this region are compatible with parameters which need Chionomys gud and Cheonomys roperti species. But there are not any data about these species in Shirak Marz. It's because of not enough research. Now we will try to identify key areas for snow voles in Armenia and by using the new genetic and biochemical methods to find out the possibility of presence of Chionomys gud and Cheonomys roperti in Armenia.

24.8 He, F.; ; *fangliang.he@ales.ualberta.ca*

Estimating extinction rates: Habitat loss, species-area curves and the "extinction-debt"

Accurate forecasting of species extinction from habitat loss is of fundamental importance to biological conservation. Because of the lack of reliable direct methods for verifying extinctions, there is considerable uncertainty in extinction rate estimates. The most widely used indirect method estimates extinction rates by reversing the species-area accumulation curve, running it "backwards" to smaller areas to calculate expected species loss. However, this method yields estimates of extinction rates that are typically much higher than those observed. The overestimation arises because the sampling problem when constructing a species-area curve is very different from the inverse sampling problem when loss of habitat occurs due to patchy or geographically scattered habitat destruction. Only in the special case when species are randomly and independently distributed is the species loss rate the exact inverse of the species addition rate. Because most species are aggregated in geographic distribution, the extinction rate estimated using the usual approach is the maximum theoretical rate, often far exceeding the actual extinction rate at equilibrium for a given loss of area. Here we present a novel, simple method for estimating species extinctions due to habitat destruction.

SP4.3 Heather M. Kharouba*; Jenny L. McCune; Wilfried Thuiller; Brian Huntley; University of British Columbia, UniversitÃ© Joseph Fourier, University of Durham; *kharouba@zoology.ubc.ca*

Are the ranges of some taxonomic groups more in equilibrium with climate than others? A global meta-analysis

Key applications of species distribution models (SDM) include guiding conservation efforts and predicting future shifts of species ranges in response to forecasted climate change; however, a major assumption of SDMs is that present-day species' ranges are in equilibrium with climate. Given the variation in physiological tolerance and life history strategies among taxonomic groups, they likely vary in their distance from equilibrium with climate. To test this hypothesis, we conducted a comprehensive meta-analysis using accuracy statistics from SDMs based only on climate, as an estimate of the mismatch between a species' distribution and climate. The analysis revealed a significant difference between taxonomic groups in model accuracy, where birds and mammals were the most accurately modeled of all groups, while butterflies were furthest from equilibrium. Therefore, we can not expect the same degree of accuracy in predictions of future suitable habitat across groups of different species if only broad-scale climatic factors are used. We also explored potential hypotheses for these taxonomic differences and found that the spatial scale and latitude of the SDM were important methodological considerations. We propose that interactions between dispersal limitation, model resolution and microclimate variation could explain taxonomic differences in equilibrium with climate and could provide insights into improving predictions of species' range shifts in response to future climate change.

SY63 Hebblewhite, Mark*; Aldridge, Cameron; Schmiegelow, Fiona; Wildlife Biology Program, University of Montana, , Colorado State University, & US Geological Survey , University of Alberta; *mark.hebblewhite@umontana.edu*

Reviewing the Conservation Science of Critical Habitat

One of the challenges in the implementation of critical habitat is the scientific problem of defining it for an endangered species. After reviewing the individual cases of critical habitat designation challenges for Canada lynx, Sage grouse, killer whales, spotted owls, Banff springs snail, and other examples in this symposium, our goal in this paper is to review the conceptual definition of critical habitat to identify the scientific implementation gaps in critical habitat science. Starting from niche theory and the theory of density dependent habitat selection, we develop a quantitative definition of habitat quality for endangered species. We then extend habitat quality to an operational definition of critical habitat by considering concepts of minimum viable populations, thresholds for extinction, and other general conservation biology â rules' for preventing extinction. This emphasizes that critical habitat itself does not conceptually exist in the absence of a population target or goal, as recognized in both SARA and the ESA in the link between critical habitat and a recovery goal. Therefore, the concept of critical habitat is ultimately tied to the recovery goal, and so we conclude by reviewing some of the different standards of â recovery' as exemplified in the various case studies discussed in the symposium. For the science of critical habitat to develop, more focus on the link between populations and habitats is needed, one of the most challenging scientific aspects of endangered species recovery.

SA2 Heber, S*; Briskie, JV; University of Canterbury; *sol.heber@pg.canterbury.ac.nz*

Reciprocal translocations and 'genetic rescue' of bottlenecked populations of the New Zealand robin

Many endangered species around the world have passed through severe population bottlenecks due to anthropogenic influences such as habitat loss or fragmentation, the introduction of exotic predators, and excessive hunting. As a result, inbreeding is expected to increase as gene flow between populations is interrupted and survivors are more likely to mate with relatives. Conservationists are thus faced with the problem of protecting a number of fragmented and inbred populations. Theoretical models suggest that crossing individuals from one inbred population with those of a second inbred population should decrease the severity of inbreeding depression in the hybrid offspring. To test the applicability of this method for the conservation of endangered species, we conducted experimental reciprocal translocations between two isolated, inbred populations of the New Zealand robin. A total of 33 females were translocated and differences in reproductive success, parasite burdens, immunocompetence, fluctuating asymmetry, gamete quality, and male song complexity were compared between "hybrid" offspring (crosses of the two populations) and inbred control offspring. Preliminary results suggest increases in a variety of measures of reproductive success among the hybrid young but whether these persist in future generations is not clear. For endangered species that survive only in small, inbred populations, crosses of inbred birds from different populations may be the only method to â rescue' an inbred population through the introduction of novel alleles. Our results suggest such methods may be worth trying in species showing severe inbreeding depression.

19.8 Heck, Nadine*; Dearden, Philip; University of Leeds, UK, University of Victoria, British Columbia, Canada; *gynh@leeds.ac.uk*

Local stakeholders' opinion on MPA success for a proposed National Marine Conservation Area in the Southern Strait of Georgia, British Columbia

Marine protected areas (MPAs) are increasingly established worldwide following a call for a global system of MPA networks by 2012 (United Nations 2003). In order to prevent the establishment of so called "paper parks" or ineffective MPAs, clear statements are needed by management agencies of the outcome they expect to achieve by creating MPA's and how they will demonstrate MPA success over time. Based on different stakeholder groups' opinion, MPA success indicators for a proposed National Marine Conservation Area on the West coast of Canada are identified. The application of the framework for assessing management effectiveness of protected areas developed by Hockings et al (2006) illustrates that the framework is not only useful for evaluating existing MPAs but also to define MPA success prior to the establishment of a new protected area. Success indicators for all management cycle stages of the framework are outlined including stakeholders' opinion on the design and planning process as well as expected outcomes that should be achieved by the proposed marine protected area. Results further show that local stakeholders identify MPA success equally in terms of good governance indicating how the area will be managed and future achievements of expected environmental and social outcomes. Hockings, M., S. Stolton, F. Leverington, N. Dudley, and J. Courrau. 2006. Evaluating Effectiveness. 2nd edition. IUCN, Gland.

SY71 Heinemeyer, Kimberly S.*; Griffin, Paul C.; Round River Conservation Studies, Wildlife Program, University of Montana; *kimhein@earthlink.net*

Linear Density Estimation for Population Monitoring of Grizzly Bear along Salmon Rivers

Sampling requirements for population estimation can be a significant barrier to the use of DNA-based mark-recapture approaches in remote landscapes, particularly for relatively low density species such as grizzly bear (Ursus arctos horribilis). We took advantage of seasonal grizzly bear concentrations along rivers supporting spawning Pacific salmon (Oncorhynchus spp.) and a noninvasive DNA sampling design to develop linear population density estimate using a mark-recapture framework. The approach significantly reduces the logistical requirements compared to an area-based estimate. Linear arrays of hair snares were monitored along the Taku River (British Columbia, Canada) within two study areas: Upper River (UR) and Lower River (LR). Genotyping of DNA and the capture-recapture histories of individuals were used in closed population models. Resulting annual abundance estimates (+SE) in the LR were 19.8 (+11.1), 19.5 (+9.0), and 25.0 (+3.8) and abundance estimates for the UR were 52.3 (+32.5), 62.6 (+11.9), and 84.2 (+30.7) for 2000, 2001, and 2003, respectively. We used estimated bear movement distances along the river corridor to calculate a linear density estimate, which ranged from 0.34 - 0.44 grizzly bears/km and 1.08 - 1.45 grizzly bears/km for the LR and UR, respectively. The difference in population densities between the two study areas is explored.

SA2 Heinrichs, JA*; Bender, DJ; Gummer, DL; Schumaker, NH; Department of Biological Sciences, University of Calgary, Calgary, Alberta, Canada, Department of Geography, University of Calgary, Calgary, Alberta, Canada, Western and Northern Service Centre, Parks Canada, Western Ecology Division, U.S. EPA; *j.a.heinrichs@gmail.com*

Assessing critical habitat: Evaluating the relative contribution of habitats to population persistence

A principal challenge of species conservation is to identify the specific habitats that are essential for long-term persistence or recovery of imperiled species. However, many approaches to identifying important habitats do not provide direct insight into the contribution of habitats to population persistence. To assess how habitats contribute to overall population viability and characterize their relative importance, a spatially-explicit population viability model was used to integrate a species occurrence model with habitat quality and demographic information to simulate the population dynamics of the Ord's kangaroo rat in Alberta, Canada. Long-term productivity (births-deaths) in each patch was simulated and iterative habitat removal experiments generated estimates of the relative contribution of habitat types to overall population viability. Both methods provided the basis for prioritizing habitats for conservation. Our approach was particularly useful for identifying habitats that did not contribute to population viability. 39% of habitat represented sinks and their removal increased estimated population viability. This approach can be invaluable when assessing critical habitat, particularly in regions with variable habitat quality. Approaches that do not incorporate population dynamics may undermine conservation efforts by under- or over-estimating the value of habitat patches, erroneously protecting sink habitats, or failing to prioritize key source habitats.

SY65 HELEN E. FOX*; Kelly M. Haisfield; Sangeeta Mangubhai; Peter J. Mous; Sheen Yen; Conservation Science Program, WWF-US, WWF-US & University of Maryland, The Nature Conservancy, People & Nature Consulting International , Krannert School of Management, Purdue University; *Helen.Fox@wwfus.org*

Cost-effectiveness of MPA Enforcement Relative to Coral Reef Rehabilitation: An Ounce of Prevention is Worth a Pound of Cure

Coral reefs, among the most diverse ecosystems on the planet, are in accelerating global decline, threatened by climate change, pollution, disease, overfishing, and destructive fishing. Blast fishing has destroyed many coral reefs in Southeast Asia by creating large fields of dead coral rubble where new coral recruits settle but cannot survive and grow. Possible management responses include reef rehabilitation of damaged areas, and/or increased enforcement to protect still-living ones. Here we show that in Komodo National Park, a marine protected area (MPA) in Indonesia, rehabilitation by installing locally-quarried rocks on blasted rubble fields can be relatively low-cost (~US$4.80/m2), but unlikely to be economically viable at large scales. Although rehabilitation without enforcement is unlikely to be effective, we compared rehabilitation data (costs and coral growth over 8 years) and enforcement costs to conduct three economic analyses: cost-per-area calculations, a cost-effectiveness model over 7 years, and a willingness-to-visit "thought experiment." We found that rehabilitation costs ~70 and ~5-times more, respectively, than marine patrols to enforce blast fishing bans. Hence, we recommend that MPA managers prioritize investment in achieving compliance with regulations above investment in rehabilitation to better enable reefs to generate biodiversity and fisheries benefits and tourist revenues.

P2.34 Henderson, A. E.*; Davis, S. K.; University of Saskatchewan, Canadian Wildlife Service; *aeh112@mail.usask.ca*

Is Livestock Production for the Birds? : Grassland Songbird Conservation through Grazing Management

In Saskatchewan, remaining native prairie supports livestock production and provides important habitat for grassland songbirds, including Species at Risk like Sprague's Pipit (Anthus spragueii) and McCown's Longspur (Calcarius mccownii). Native prairie management, in particular grazing management, plays an important role in securing grassland songbird habitat and preventing its further loss and degradation. In our research, we examine how grazing management decisions of livestock producers influence grassland songbird habitat and relative abundance. Our goals are 1) to identify socio-ecological factors that influence grazing management decisions, 2) to examine ecological relationships between rangeland health and songbird abundance and 3) to identify options for engaging livestock producers in songbird recovery and conservation. We use vegetation measures to assign indices of range health, point count surveys to estimate grassland songbird abundance and personal face-to-face interviews to gather information from livestock producers. We will present preliminary results that offer insight into how livestock producers contribute to grassland songbird recovery in south-western Saskatchewan.

SP6.5 Hendricks, Jeanette N.*; Horn, Mike H.; California State University, Fullerton; *jhendricks@fullerton.edu*

Foraging response of a specialized seabird to restored marine habitat

Establishing new foraging habitat for seabirds is an integral part of recent major restorations of diminished coastal wetlands. The recently restored Bolsa Chica Ecological Reserve (BCER) is the largest coastal wetland restoration in southern California. It resulted in 235-ha of new marine habitat adjacent to areas used by seabirds for nesting. Immediately following the restoration, we studied the foraging habitat and diet of the Elegant Tern (Thalasseus elegans), an ocean forager with a narrow diet and the most abundant nesting seabird at BCER. Foraging habitat was recorded during the 2007 and 2008 nesting seasons by counting terns that flew from the ocean and the new marine area toward the nesting island with fish. Of the 24,970 returning birds, only 1.8% had foraged in the new marine habitat. Chick diets at the nests were determined by identifying fish in adult bill-loads, those regurgitated and dropped by the birds, and through video recordings of adult-to-chick transfers. Over 90% of the fish identified in the diet were pelagic species, which were not correlated with the fish assemblage identified in the new marine area. From our data on both foraging habitat and diet, we found that the Elegant Tern was not feeding in the new habitat that was created as a result of the restoration. Understanding the foraging ecology of individual species can help designate important areas for restoration in addition to learning how species are using habitats once they are restored.

SY77 Henle, K *; Henry, P-Y; Lengyel, S; Schmeller D; Kotarac, M; UFZ, MusÃ©um National d`Histoire Naturelle, Paris, France, Department of Ecology, University of Debrecen, Hungary, Station d'Ecologie ExpÃ©rimentale du CNRS Ã Moulis, France, Centre for Cartography of Fauna and Flora, Ljubljana, Slovenia; *klaus.henle@ufz.de*

European Biodiversity Monitoring Practice - An Overview and Future Challenges

The presentation provides an overview of biodiversity monitoring activities in Europe and challenges that can be derived from current practices. In Europe, a large number of biodiversity monitoring activities exist but until recently no overview existed. The project EuMon EU-wide monitoring methods and systems of surveillance for species and habitats of Community interest synthesized information on biodiversity monitoring schemes in Europe. Currently 612 schemes (species: 444; habitats:168) are described in a meta-database available online (DaEuMon). A web-based tool (BioMAT) has been developed to extract monitoring schemes that fulfil user-defined criteria and to create overview graphs on their characteristics. Although coverage is somewhat biased, some robust, general patterns emerge. Taxonomic groups are unequally monitored with bird schemes, as expected, dominating. Approx. 40% of schemes were launched because of national or international obligations. Volunteers play an important role in species but not in habitat monitoring. Volunteer-based schemes do not perform worse than professional ones for most quality criteria. Monitoring schemes differ strongly in their design. For more information on EuMon and European biodiversity monitoring, or to register your monitoring schemes, see http://eumon.ckff.si. Based on illustarted overviews, challenges for the improvement of biodiversity monitoring and for their matching with policy requirements are identified.

SY25 HENRY TRAVERS*; Tom Clements; Aidan Keane; EJ Milner-Gulland; 1.Centre for Environmental Policy & Division of Biology, Imperial College London, Silwood Park, Buckhurst Road, Ascot, SL5 7PY, UK , 1.Centre for Environmental Policy & Division of Biology, Imperial College London, Silwood Park, Buckhurst Road, Ascot, SL5 7PY, UK 2. Department of Zoology, University of Cambridge, Downing Street, Cambridge, CB2 3EJ, UK 3. Wildlife Conservation Society,; *henry.travers@gmail.com*

Rules of the game: incentives for rule compliance under different institutional structures

Resource extraction, from hunting to the expansion of agricultural land-use, remains a major threat to the planet's wildlife and natural landscapes. The institutions which are charged with governing these resources typically depend on systems of formal and informal rules for their success. Here we present the results of experimental economic games investigating human behaviour under different institutional conditions. A series of experimental treatments were employed to mimic some of the policy interventions commonly used in conservation to provide incentives for rule compliance, including social sanctioning, enforcement penalties and individual and collective financial payment agreements. The responses measured demonstrate the importance of the ability of the targets of such interventions to self-organise: to devise, monitor and enforce their own system of rules. In addition we show that the imposition of weakly enforced rules by external agents, a condition commonly found in conservation throughout much of the tropics, performs poorly in comparison to the other interventions considered. We conclude that a greater consideration of the effects of rule enforcement on human behaviour is required.

SY26 Henry, EH*; Schultz, CB; Washington State University; *henry_eh@yahoo.com*

Uncovering the Secret Life of an Imperiled Butterfly: Mardon Skipper Oviposition Selection

Lack of basic biological information about at-risk species is a key limiting factor in butterfly conservation. The habitat requirements of the Washington state endangered mardon skipper (Polites mardon) have only been studied in the southern Washington Cascades. To examine oviposition selection in the Puget Sound prairies, we observed eighty-eight oviposition events during the 2009 flight season. We sampled vegetation at oviposition (n=88) and random locations (n=88), measuring 22 habitat variables with respect to the oviposition plant, vegetation structure, and the plant community. Eighty-six of the eighty-eight eggs were laid on Festuca roemeri, a native, perennial bunchgrass. Discriminant function analysis revealed selection of egg-laying sites based on habitat structure. Females laid eggs in small F. roemeri bunches in sparsely vegetated (low vertical vegetation structure, high moss cover) areas of the prairie. These results are contrary to those in the Cascades where mardon are generalists and females oviposit in densely vegetated areas suggesting that the species has geographically specific habitat requirements. In the south Puget Sound, mardon habitat is severely degraded and understanding the factors influencing oviposition selection is crucial to develop effective restoration strategies. Our results emphasize the importance of managing for appropriate habitat structure in addition to hostplant and nectar resources to maintain viable mardon populations.

P1.129 Hermanutz, L*; Squires, SE; Pelley, D; Nicholls, W; Dept of Biology, Memorial University, St.John's NL, Dept of Biology, Memorial University, St.John's NL and NL Dept of Environment & Conservation, Wildlife Division, Corner Brook, NL, Botanical Garden, Memorial University, St. John's, NL; *lhermanu@mun.ca*

Restoration of boreal limestone barrens - what will success look like?

Globally limestone habitats suffer a high rate of conversion associated with human use; yet few ecological restoration techniques are available. On the island of Newfoundland (Canada) limestone barrens are highly fragmented, treeless open ridges dominated by cold-soil processes. These northern limestone barrens are hotspots of native biodiversity harbouring 3 nationally listed endemic plant species (Braya longii, B. fernaldii, Salix jejuna) and many rare plant species but comprise 65%) over the short term, but compaction represents a significant challenge. The need to restore large-scale disturbances presents significant challenges including restoring natural hydrology, soil formation processes, and biological diversity.

SP11.2 Hernandez-Santin, L*; Harveson, P.M.; McKinney, B.R. ; Onorato, D.P. ; Borderlands Research Institute for Natural Resource Management, Sul Ross State University, Box C-16, Alpine, Texas, 79832, USA, Cemex-El Carmen Project, P.O. Box 420608 Del Rio, Texas 78842, Research Institute, Florida Fish and Wildlife Conservation Commission, Naples, Florida, 34114, USA; *lornahs@yahoo.com*

Distribution Model for Black Bear in the Chihuahuan Desert Ecoregion of Texas and Northern Mexico: Implications for Recolonization

Black bears (Ursus americanus) were heavily persecuted and consequently eliminated from Texas and almost eradicated from Mexico by 1960's. However, their numbers have bounced back in northern Mexico and Texas, resulting in a natural expansion to their former range starting in the late 1980s. We used MaxEnt to create a model that predicts black bear potential distribution in Texas and its bordering states in Mexico (Chihuahua, Coahuila, Nuevo Leon, and Tamaulipas). For this, we used telemetry data from two studies conducted in west Texas, and digital maps readily available (elevation, NDVI, Vegetation Continuous Field, world climate data, Landsat images, and vegetation and soil maps), and coverage layers we generated in ArcGIS (hillshade, slope, Vector Ruggedness Measure, and distance and density to rivers, roads, and cities). Our models performed well within the Chihuahuan Desert Ecoregion and its surroundings (semiarid plains and prairies, and dry tropical forests), where predicted suitable habitat coincided with historic and current black bear records. This model represents a stepping stone to adequately asses their current and potential distribution, as shaped by their ecological needs and anthropogenic limitations. Our model will aid in the management of black bears as they continue to naturally recolonize the region.

P1.146 Hernandez-Santin, L *; Lemons, R; Harveson, PM; Warnock, BJ; Natural Resource Management, Sul Ross State University, Box C-16, Alpine, Texas, 79832, USA; *lornahs@yahoo.com*

Mapping and Monitoring of Native and Exotic Vegetation in Trans-Pecos, Texas

Over the last century, many factors have influenced the hydrology of the Rio Grande Basin (RGB), with desertification and land-use change being the more influential. What used to be productive grasslands, savannahs, and woodlands have now changed to erodible shrublands with low grass production. Brush encroachment alters the ecosystem's structure and function. Brush species are considered invasive in most grassland ecosystems because they consume more water than grasses and are less effective for water infiltration. Eventually, native grasslands succumb. This holds true for the fragile riparian habitats; for example, the Asian salt cedar (Tamarisk spp) has become a dominant element in the Rio Grande corridor. Landscape changes are difficult to quantify due to large temporal and spatial scales where vegetation and land-use changes are detectable. Thanks to remotely sensed data scientists are now able to quantify such alterations, providing essential information that aids the creation of better conservation and restoration strategies. The objective of this ongoing project is to evaluate vegetation changes in the RGB including native and exotic invasive vegetation. This project is divided in two parts: 1) vegetation mapping and 2) assessment of invasive brush encroachment. Vegetation mapping is possible through eCogniton software using satellite imagery, aerial photos, soil survey and ecological site maps. Historical analysis of invasive brush encroachment will be assessed by comparing historical satellite images to current images using soil/vegetation indices and change detection techniques.

SP9.9 Hettinga, PN*; Manseau, M; Bradley, M; Neufeld, L; Wilson, P; Natural Resources Institute, University of Manitoba, 70 Dysart Road Winnipeg, MB Canada R3T 2N2, Natural Resources Institute, University of Manitoba, 70 Dysart Road Winnipeg, MB Canada R3T 2N2; Parks Canada, 145 McDermot Avenue, Winnipeg, MB Canada R3B 0R9, Parks Canada, Jasper National Park, Box 10, Jasper, Alberta, Canada, T0E 1E0, Parks Canada, Jasper National Park, Box 10, Jasper, Alberta, Canada, T0E 1E0, Natural Resources DNA Profiling and Forensic Centre, Trent University, 1600 East Bank Drive, Peterborough, ON Canada K9J 7B8 ; *peternhettinga@yahoo.com*

Genetic sampling of woodland caribou populations in Jasper National Park using winter-collected fecal pellets to estimate population demographics

Following the extirpation of caribou from Banff National Park in 2009, the most southerly ranging mountain caribou populations in Alberta are now in Jasper National Park (JNP). In order to assess genetic population structure and population sizes of the JNP populations (Maligne, Brazeau, Tonquin and A la Peche), we utilized noninvasive genetic sampling. Fecal pellets were systematically collected in late fall and microsatellite DNA was amplified to identify unique individuals and sexes. Weak levels of genetic differentiation were found between populations indicating that these populations may have only recently become isolated. Since past radio-telemetry work indicated some movement between Maligne and Brazeau and one male genotype was observed on both ranges, these two populations were treated as one sampling unit. For the Maligne-Brazeau population, we used a census of genotypes and found 28 unique individuals in 2006 and 2007. For the Tonquin and A la Peche, we used mark-recapture models. The Tonquin population size was estimated at 91 animals (95% CI : 72,171) in 2006 and 66 animals (95% CI: 51, 89) in 2007. The A la Peche was estimated at 112 animals (95% CI: 93-168) in 2007. In using closed population models, changing capture probabilities and demographic stochasticity affected the accuracy and precision of the estimates. These results suggest that noninvasively sampled DNA is an alternative and reliable method to acquire demographic information on at-risk caribou populations.

SY57 Hickey, V; World Bank; *vhickey@worldbank.org*

Convenient Solutions to an Inconvenient Truth: Advocating ecosystem-based approaches to climate change from a development perspective

The World s Bank s mission is to alleviate poverty and support sustainable development. The world s poorest people live at the rural frontier. They depend directly on the utilities and goods that ecosystems provide. They are also most vulnerable to the effects of climate change. However, current efforts to address climate change focus mainly on reducing GHG emissions by adopting cleaner energy strategies and on reducing risk by improving infrastructure to meet new energy and water needs. Examples from the World Bank portfolio provide a compelling development argument for including ecosystem-based approaches as an essential pillar in strategies to address climate change. Such strategies offer cost-effective, proven, and sustainable solutions that contribute to, and complement, other national and regional adaptation strategies.

6.4 Hickman, L.*; Desserud, P.; Adams, B.; Gates, C.; University of Calgary, University of Alberta, Alberta Sustainable Resource Development; *lkhickma@ucalgary.ca*

Reclamation outcomes on energy development footprints in silver sagebrush (Artemisia cana) communities in the dry mixedgrass subregion of south-east Alberta

Most of the remaining native prairie in Alberta and Canada is located in the Dry Mixedgrass subregion. Within this area, restoration specialists are increasingly interested in the reestablishment of silver sagebrush ecosystems due in part to the large number of common, declining or endangered wildlife species that are partial if not complete sagebrush obligates (e.g. sage-grouse, sage thrasher, pronghorn). Accumulating footprints from transportation networks and energy development are a concern in remaining prairie grassland habitats because they cause habitat loss and reduce habitat effectiveness for wildlife. In this study, reclaimed energy development footprints were assessed to identify management practices that achieve effective reclamation of disturbed sites in silver sagebrush communities. We assessed variations in plant species cover and range health using a paired transect design for reclaimed and control sites. Cluster analysis, ordination and statistical comparison of paired sites highlighted a difference in responses of silver sagebrush communities in overflow (mesic) and blowout (high bare soil) ecological range types. Variations in plant community responses were interpreted using a state and transition conceptual framework. Results can be used by land managers to direct footprint placement and support natural recovery principles for sagebrush communities in the Dry Mixedgrass prairie.

SY23 Hicks, C C*; Cinner, J E; James Cook University; *christina.c.hicks@gmail.com*
Identifying key trade-offs in ecosystem service values under alternate management regimes in the Western Indian Ocean
Managing trade-offs, across scales and user groups, is increasingly inevitable in conservation. Trade-offs occur as a result of conscious, or unconscious, attempts to maximize key ecosystem services at the cost of those considered less â desirable'. Here we attempt to make those trade-offs, within coral reef conservation, explicit. Nineteen communities, across a range of management regimes, were examined. Values were assigned using a combination of conventional and newly developed valuation techniques at an individual, group and community level. Where conservation management had been implemented at a national scale, such as was the case with conventional no-take marine reserves, some fishery benefits were evident in the proximate communities at an individual level. However, the greatest benefits were felt in recreation services at a national level. In addition, this appeared at the cost of a wide range of individual and community values, including bequest, option, other cultural services, perceived habitat and biological control. More recent attempts at management, a result of the devolution of fisheries governance to fishing communities, have resulted in community initiated and controlled no-take areas springing up. Here, key social characteristics are found to relate significantly to which ecosystem services are considered a priority and hence the motivation for the initiation of these conservation measures. Decisions concerning natural resource conservation and management need to consider the motivations and values of individuals involved to avoid unexpected and undesirable trade-offs within the surrounding landor seascape.

SY7 Higgins, K; Quest University Canada; *kellina.higgins@questu.ca*
A proposal to reduce agriculture's impact on the environment in the form of two environmental taxes
Agricultural land use and associated artificial fertilizer applications respectively divert land from natural ecosystems and cause eutrophication of surrounding ecosystems. There are alternative options that reduce the environmental impact of agriculture, such as consuming products that require less land and using farming methods that conserve soil and reduce the need for chemical fertilizer. However, these alternatives are currently not cost effective because the market does not reflect the full environmental impact. Taxes can provide financial incentives for consumers and farmers to shift towards more sustainable practices. Here, I propose two environmental taxes on agricultural inputs as well as public policy measures. The first is a tax on land use by crop (in ha/kg) and the second is on artificial fertilizer use (per kg of fertilizer). For six sources of protein, I calculated average land use (in ha/kg), average fertilizer use (in kg fertilizer/kg crop) and average retail prices ($/kg) with preliminary data on Canada. Using that data, I did a sensitivity analysis to evaluate how much of an effect applying the taxes would have on prices. These preliminary results suggest that such environmental taxes may prove to be an effective price mechanism to represent the full cost of agricultural production. The taxes might encourage consumers and producers to reduce the environmental impact of agriculture.

SY73 Hik, DS; University of Alberta; *dhik@ualberta.ca*
Conserving Canada's Taiga Plains, Taiga Shield, Taiga Cordillera, and Hudson Plains: Still intact, but for how long?
The vast subarctic conifer and shrub-dominated Taiga regions of northern Canada extend from Labrador to Yukon. Sandwiched between boreal ecoregions to the south and Arctic tundra to the north, the landscapes and species of the Taiga are experiencing rapid changes associated with climate warming and increased human activity. Although most of these landscapes are still intact, they have and will continue to experience industrial development associated with dams, pipelines, petroleum and mineral exploration, and road construction. Natural forces will also have a marked influence on the biodiversity of these ecoregions, including those associated with increasing thawing of permafrost and forest fire frequency; the advancing phenology of river, lake and sea-ice; and changes in the numbers and distribution of animals (e.g. geese, caribou) and plants (e.g. woody shrubs). Issues requiring greater attention in the northern Taiga and Hudson Plains include: invasive species; bioaccumulation of contaminants; the influence of increased or decreased primary production; and human needs (e.g. subsistence harvest, ecosystem services). This region also contains two poorly known northern great lakes. In recent decades, several new protected areas have been established but there has been little commitment to sustained monitoring or collection of baseline ecological information. However, there is some potential to make better use of existing research and monitoring efforts.

P2.93 Hik, DS; University of Alberta; *dhik@ualberta.ca*
Life without snow: a conservation challenge for alpine herbivore populations in the 21st Century?
Accumulating evidence suggests that the extent and phenology of seasonal snowcover plays a critical role in determining the demography, behaviour and growth of mammalian herbivores in northern alpine environments. Stochastic, periodic and directional variation in seasonal temperature and precipitation may have very different effects on mammalian herbivores depending upon their life history strategies and capacity to adapt to variable and changing conditions. I will present an analysis of the responses of four herbivores living in alpine environments of the Yukon, (collared pikas, hoary marmots, arctic ground squirrels and Dall sheep) to interannual and decadal patterns of temperature and precipitation. In various ways, the timing of snowmelt appears to directly influence overwinter survival, reproduction and growth of these species. At a larger scale, the best predictor of these responses is the Pacific Decadal Oscillation index. Recent efforts to improve measurement of snowcover and to better integrate the role of snow on the dynamics of arctic and alpine herbivore populations will help to determine if the anticipated reduction in snowcover during the next decades will create significant conservation challenges in these ecosystems.

SY25 Hilborn, R; University of Washington; *rayh@u.washington.edu*
Conservation impacts of wild meat harvest in the Serengeti Ecosystem
Wild meat harvest has been identified as a serious threat to conservation, both within and outside of protected areas. Using census numbers from the Serengeti Ecosystem we estimated the amount of wild meat harvest for buffalo and wildebeest. Using the ratio of carcasses recovered in ranger patrols we estimated the level of harvest for other abundant herbivores. Harvest increased dramatically in 1978 when the budget for anti-poaching activities was greatly reduced. Beginning in the 1990s harvest declined when budgets increased. There was a direct relationship between the level of expenditure on anti-poaching and the resultant wild meat harvest. At its peak wild meat harvest was a serious conservation threat for most resident species, but not for the migratory or plains oriented species. At present levels of funding for anti-poaching, wild meat harvest does not appear to be a conservation concern for the primary herbivores, but may locally reduce resident herbivores and be an ongoing threat to rare herbivores and predators.

22.7 Hill, NAO*; Milner-Gulland, EJ; Rowcliffe, JM; Koldewey, HJ; Project Seahorse, ZSL and Imperial College London, Imperial College London, Institute of Zoology, Zoological Society of London, Project Seahorse, ZSL; *nickaohill@gmail.com*
Can alternative livelihoods help to achieve conservation goals?
Alternative livelihoods (ALs) are frequently implemented as a means of reducing environmentally damaging behaviours by subsistence communities, but quantitative assessments of their efficacy are rare; anecdotal reports raise concerns that ALs may even subsidize damaging activities. In a case study from the Danajon Bank, central Philippines, we assess the effectiveness of an AL promoted by government (seaweed farming) in reducing the intensity of fishing on and around coral reefs. We monitored the activities and production of 80 households from two communities over a year using 24hr recall to determine the relationship between seaweed farming and fishing. We then looked at the effect of seaweed farming on the number of fishers in 10 communities and related this to management history and socio-economic parameters. Results show that seaweed farming is now popular as a livelihood option, aided by ready access to global markets. Whilst some households and communities do appear to reduce their fishing effort due to seaweed farming, results are mixed and depend on socio-economic context. As a result, reductions in effort may not scale up to reduce overall fishing pressure. We conclude that ALs do have potential as a conservation tool in this context, but to gain maximum benefit they should be targeted at compensating communities for fishing opportunities lost through more stringent fishing regulations or larger Marine Protected Areas.

SY9 Hilty, Jodi A*; Kretser, Heidi E; Wildlife Conservation Society; *jhilty@wcs.org*
Reducing impacts of adjacent sprawl on native fauna within protected area boundaries: overcoming multi-jurisdictional challenges
Increasing bodies of evidence suggest that existing protected areas are inadequate to protect biodiversity in the long-term. One of the main factors exacerbating impacts on species within intact habitats is increasing human activities and development on adjacent lands. Hardening of boundaries through residential development means a smaller de facto area for species to survive and decreases connectivity between larger patches of habitat. Additionally, the impacts of human activities spill across boundaries altering species distributions and abundance. Although management strategies and policy tools such as establishing buffer zones, land-use planning and educating landowners exist, the challenge of working across multiple jurisdictions stymies broader consistent landscape approaches. We review challenges and opportunities within two landscapes, the Greater Yellowstone Ecosystem and the Adirondacks to illustrate lessons learned from these systems. Top-down approaches, while relatively quick to implement, tend to create distrust among local residents and may further backlash against conservation planning. Whereas bottom-up approaches require long-term staff and resources commitment of working with multiple municipal governing boards to effect appropriate and acceptable management changes. We consider strategies to incorporate acceptable landscape-level planning that is easily implemented at a local (county and town) level.

P2.131 Hird, J; Castilla, G; McLane, A; Linke, J; McDermid, G*; University of Calgary; *gcastill@ucalgary.ca*
Is a Sampling Approach Sufficient to Monitor the Human Footprint on the Boreal Forest?
The human footprint of a natural region can be summarized both by the proportion of the region transformed or altered to serve some human use (e.g., surface mining, forestry) and by the density of different infrastructures within the region (e.g., roads, gas and oil wells). This may be estimated by a complete census based on full coverage data, or through a sampling approach wherein only a small part of the region is monitored. The latter approach has obvious economic advantages, but how accurate are the resulting estimates? We answer this question for the boreal forest of Alberta and for natural subregions within it, by deriving estimates of their most common human footprint features (forest clear-cuts, seismic cutlines, well-sites and roads) under different sampling intensities, from 0.25% to 16%, applied to full coverage datasets. The standard error of the estimates follows an inverse power law when plotted against sampling intensity. The sampling intensity required to achieve a 90% accuracy decreased with the size and the uniformity of the spatial distribution of the human footprint features within the region. Our results indicate that the sampling approach, while suitable for the entire boreal region, may not be sufficient for monitoring the human footprint at the management (local) scale, i.e. for small regions, or even for larger regions if the feature being monitored is unevenly distributed across the region.

SY76 HjÃ¤ltÃ©n J*; Stenbacka F; Andersson J; Department of Wildlife, Fish, and Environmental Studies, Swedish University of Agricultural Sciences, UmeÃ¥, Sweden; *joakim.hjalten@vfm.slu.se*

Strategies for Maintaining Saproxylic Biodiversity in a Future Characterized by Intensified Forestry

One consequence of modern forestry is a dramatic decrease in the amount and diversity of dead wood in many forest ecosystems. This has had negative effects on biodiversity, especially for wood living (saproxylic) species, because different forms of dead wood are among the most important structural components for maintaining biodiversity. Recent changes in legal demands and certification requirements, resulting in more conservation oriented forest practises, are likely to mitigate these negative effects. However, the political ambitions to reduce our dependence of fossil fuels by using forest products for energy production, along with an overall ambition to increase forest production by, e.g. fertilization, use of exotic species, harvest of short stumps and slash, are likely to put additional strain on biodiversity. In this presentation, we will discuss changes that are likely to occur in Fennoscandian forestry in the near future and how this might influence biodiversity. Our focus will mainly be on saproxylic species and we will present results from the few studies currently available that address the ecological consequences of intensified forestry. The preliminary evaluation from these studies indicates strong negative effects on biodiversity at local/stand level, whereas the landscape effects are difficult to predict. The latter is depending on uncertainties regarding the proportion of the forest landscape subjected to intensified forestry. We suggest strategies to reduce overall species losses in managed forest landscapes.

SY63 Hoberg, George; Department of Forest Resources Management, University of British Columbia; *george.hoberg@ubc.ca*

Delineating the Science-Policy Gap in Critical Habit Designation: Social Science Insights

Conservation biologists, as well as other scientists in similar situations, are frequently frustrated when governments fail to act, or act promptly, when science demonstrates the existence of a clear problem demanding a management response. While the metaphor of the "bridging the science-policy gap" suggests mutual responsibility between scientists and government resource managers, the complexity of the constraints on effective government action are frequently not appreciated. This paper uses the social science literature on "science in policy" to help delineate the nature of this gap. At least three different types of constraints can occur: uncertainty in science, political resistance, and an unfavourable legal framework. After synthesizing the theoretical basis for each constraint, the paper will develop operational measures for each constraint and apply them to two cases of species at risk shared by Canada and the United States.

16.5 Hocking,MD*; Reynolds,JD; Simon Fraser University; *mhocking@sfu.ca*

Pacific salmon subsidize riparian plant communities

Spawning Pacific salmon provide a large subsidy of marine-derived nutrients to terrestrial habitats. Declining salmon populations and the loss of nutrient subsidies are a concern for conservation and management because they may ultimately lead to shifts in key ecosystem processes. For example, bears and other top predators may function as ecosystem engineers by transporting salmon carcasses into forests and controlling the spatial distribution of nutrient subsidies to riparian plants. We use a combination of experimental additions of salmon carcasses and vegetation surveys across 50 watersheds in coastal British Columbia to test how salmon may influence: 1) nitrogen resource use (%N, Î´15N) in indicator plant species, and 2) riparian plant community structure. We observe increased plant foliar nitrogen content and Î´15N signatures as a result of both experimental additions and watershed-level gradients in salmon density. These effects are stronger in species that are more abundant on nitrogen-rich sites. Within 35m of the stream channel, the combination of canopy community and salmon density best predict understory plant community structure. Overall, salmon can increase the nutrients available to riparian plants and shift community dominance towards species that can compete effectively for these nutrients. Conserving intact salmon runs, and their associated top predators, is necessary to maintain the biodiversity and ecosystem processes of linked terrestrial-marine systems.

SY53 Hodges, KE; University of British Columbia Okanagan; *karen.hodges@ubc.ca*

Critical habitat: possible ways forward

Habitat loss is a dominant threat to species worldwide. Both the US Endangered Species Act and the Canadian Species at Risk Act require protection of the critical habitat of listed species. Although this insistence on habitat protection is based on sound biology, the designation and protection of critical habitat have been deeply problematic under both laws. Effective designation requires sound biological information as well as consistent and transparent application of that information to the policy decision of what to include and exclude. There have been problems on both of these fronts, precipitating a number of lawsuits with respect to critical habitat. Resolving \'the critical habitat problem\' will require much better consistency in using existing biological information than has occurred so far. We propose that the Society for Conservation Biology take a lead role in developing a working group that will address specific questions that have emerged with respect to critical habitat as a way to bring sustained and unified effort to bear on improving our management of imperilled species via habitat protection.

SY73 Hodges, KE; University of British Columbia Okanagan; *karen.hodges@ubc.ca*
Boreal and montana cordilleras
The montane and boreal cordilleras encompass the mountain ranges and associated plateaus and deep valleys of western Alberta, central and eastern British Columbia, and much of the southern Yukon. These ecozones contain a wide range of microclimates that result from both latitudinal variation and the highly variable topography; in turn, these microclimates collectively support a high diversity of species. Although several large provincial and national parks occur throughout the ecozone (including Banff, Jasper, Yoho, and Kootenai National Parks in the southeastern montane cordillera), unprotected parts of these ecozones are used for forestry, mining, and cattle grazing. In addition to these substantive human impacts, other major threats within these ecozones include climate change, mountain pine beetle outbreaks, invasive species, and even increased pressures from tourism. Aquatic systems are under strain, with changes in hydrology via damming and diversions disrupting salmon migrations and affecting other freshwater species. Another major concern is the ongoing severe declines of mountain caribou herds, which are negatively affected by habitat loss, changing predator-prey dynamics, and human activities.

SP9.6 Hojnowski, C.*; Hotte, M.; Murzin, A.; Miquelle, D.; Wildlife Conservation Society, Tigris Foundation, Wildlife Conservation Society, Pacific Institute of Geography; *cherylhojnowski@gmail.com*
Implementing Institutional Change to Address Long-Term Conservation Threats: Reducing Impact of Fires on Leopards and Tigers in Primorsky Krai, Russia
Reversing long-term, human-induced patterns of habitat transformation is an especially difficult task because it requires lasting changes in policy and human behavior. Southwest Primorsky Krai is one of Russia's biodiversity hotspots, the last refuge of the critically endangered Far Eastern leopard and a small, isolated population of Amur tigers that is a potential source population for re-colonization of Northeast China. However, the forests of this region are gradually being destroyed by a long history of man-made fires. Originally set to clear land for agriculture, ground fires in Southwest Primorsky Krai have become a tradition tolerated by local and regional administrations, and until recently, ignored by conservationists. We used remote-sensing data from 1996 to demonstrate the impact of fires not only to wildlife habitat, but to human welfare as well, and then worked collaboratively with willing local stakeholders to demonstrate that fires can be controlled in a model project site. We believe that current trends can be reversed but that doing so will require significant effort, a combination of education and enforcement, and effective cooperation between the numerous local landowners and government agencies in the region to induce institutional change.

2.3 Holzer, KA; City of Portland; *holzer.katie@gmail.com*
Amphibians in the City: Factors Influencing Pond-breeding Frogs and Salamanders in Portland, OR
Urban environments are increasing in number, size, and intensity around the world. As many organisms are able to persist within these areas, it is important to determine what habitat factors benefit urban wildlife populations. I measured the abundances and densities of eggs and tadpoles of six pond-breeding amphibian species in Portland, OR in 83 ponds. In these ponds I also measured 21 physical, chemical, and location factors. I conducted statistical analyses to determine which factors were influential for which species. I found no difference between the abundance and densities of amphibians in natural vs. man-made ponds. Native species were more abundant and more dense in ponds with greater amounts of aquatic vegetation and physical refugia. Ponds with high nitrate levels had lower densities of tadpoles. Two species of concern (Rana aurora aurora and Ambystoma gracile) were more dense in ponds with pH

5.4 HOMSTOL, LORI*; St. Clair, Colleen Cassady; University of Alberta; *homstol@ualberta.ca*
Whistles and sling shots may increase the wariness of American Black Bears
In British Columbia, bear managers kill approximately 800 black bears and 35 grizzly bears annually because of conflicts with humans. Municipalities are under increasing pressure to manage non-lethally, typically using aversive conditioning (AC). We tested two novel techniques intended to increase the efficacy and practicality of AC by alternately assigning 19 black bears in conflict to one of three treatment groups: one that paired pain with sound (whistles), one with pain alone, and a control group. Whistles were used to signal pain delivery because such an association could subsequently be used to dissuade bears temporarily from attractants to prevent the food conditioning that leads to conflict. . Our second innovation was to induce pain with marbles fired from sling shots, which we compared to rubber bullets fired from shotguns. Bears quickly associated whistles and pain and were as likely to run from marbles as from rubber bullets. After conditioning, treated bears were significantly more wary than control. Our results suggest that AC efficacy might be increased by exploiting a sound-pain association and by using a non-registered form of projectile to increase the number of people, and hence frequency, with which bears in conflict could be treated.

SY71 Honeyman, J.; Royal Roads University; *jayh@telusplanet.net*

A retrospective evaluation of the effectiveness of aversive conditioning on grizzly bears in Peter Lougheed Provincial Park, Alberta

Using a post hoc study design, I evaluate the effectiveness of aversive conditioning (AC) as a non-lethal management technique to reduce bear-human conflict, and ultimately reduce bear mortality. I found a decrease in developed site use by radio-collared grizzly bears in Peter Lougheed Provincial Park (PLPP) after the onset of AC. Also, wariness of collared bears increased with application of AC, both short-term and long-term. Wariness of non-collared grizzly bears also increased after application of AC. Grizzly bear mortality and relocation rates in the period after AC began decreased by half within PLPP, while at the same time increasing five-fold on adjacent lands where AC was not a commonly used tool. Finally, there was a decrease in the number of bear-related facility management actions after the onset of AC. I conclude that AC is an effective management tool to reduce human conflicts with grizzly bears and promote bear population stability.

3.1 Hood, GA*; Bayley, SE; University of Alberta, Augustana, University of Alberta; *glynnis.hood@ualberta.ca*

Beaver (Castor canadensis) mitigate the effects of drought on the area of open water wetlands

Wetlands provide critical habitat for numerous species, yet they have become increasingly vulnerable to drought and warming temperatures and are often reduced in size and depth or disappear during drought. We examined how temperature, precipitation and beaver (Castor canadensis) activity influenced the area of open water over a 54-year period in the mixed-wood boreal region of east-central Alberta, Canada. This glacial landscape, with intermittently connected drainage patterns and shallow wetland lakes, lost all beaver in the 19th century, with beaver returning to the study area in 1954. We assessed the area of open water in wetlands and shallow lakes using 12 aerial photo mosaics from 1948 to 2002, which covered wet and dry periods, when beaver were absent on the landscape to a time when they had become well established. The number of active beaver lodges explained over 80% of the variability in the area of open water during that period. Temperature, precipitation and climatic variables were much less important than beaver in maintaining open water. In addition, during wet and dry years, the presence of beaver was associated with a 9ï –fold increase in open water area than when beaver were absent from those same sites. Thus, beaver have a dramatic influence on the creation and maintenance of wetlands and shallow lakes even during extreme drought. Given the important role of beaver in water preservation and in light of a drying climate in this region, their removal should be considered a landscape disturbance that should be avoided.

P1.78 Hsing-Sheng Tai*; Wu-Long Jhuang; Shyang-Woei Lin; National Dong Hwa University, Taiwan; *hstai@mail.ndhu.edu.tw*

Applying GPS tracking to indigenous hunting and its implications for wildlife conservation in Taiwan

Indigenous hunting and its impact on wildlife represents one of the most controversial conservation issues in Taiwan. This study aims to track the geographic distribution of hunting activities of the Truku Tribe in Taiwan, through applying Global Positioning Systems (GPS) methods. The results show that, compared to the Truku's traditional hunting territory, the current hunting zone of the studied Truku area has shrunk to a great extent in recent years. The hunting zone currently lies in the eastern half of the area between the central edge and eastern edge of the Central Mountain Chain. The dramatic decline of the hunting zone can be attributed to complex interactions among numerous factors, including traditional hunting territories, internal hunting norms of the Truku society, traffic accessibility, governmental institutions, and wildlife abundance; governmental conservation institutions play a pivotal role. Based on empirical findings, we draft a re-designation of strictly protected and sustainable use areas that may secure both wildlife conservation and indigenous rights.

12.3 Huber, PR*; Schumaker, NH; Greco, SE; Hobbs, J; University of California, Davis, U.S. EPA, California Department of Fish and Game; *prhuber@ucdavis.edu*

Spatially Explicit Population Modeling and the Reintroduction of a Native Ungulate: Using HexSim to Evaluate Release Alternatives

The tule elk (Cervus elaphus nannodes), a subspecies of ungulate endemic to central California, was nearly brought to extinction in the 19th century and is still extirpated from most of its natural range. As part of an ongoing restoration program, we evaluated a portion of its former range in the Central Valley for potential reintroduction of a free-ranging herd. We used a new spatially explicit population model (HexSim) to analyze four different elk release scenarios. Each scenario corresponded to a different release location, and the model was used to compare simulated elk population dynamics 25 years into the future. We also used HexSim to identify likely locations of human-elk conflict. Population forecasts after the 25-year period were highest (mean female population size of 169.6 per iteration) and potentially harmful barrier interactions were lowest (mean 8.6 per iteration) at the East Bear Creek site. These results point to the East Bear Creek site release scenario as the most likely to result in a successful elk reintroduction. We found HexSim to be a very useful tool for this type of reintroduction planning and believe that it will prove to be successful for other conservation planning studies as well.

P2.208 Hudgens, BR*; Haddad, NH; Fields, W; Thurgate, N; Frock, C; Kuefler, DC; Morris, WF; Jobe, RT; Institute for Wildlife Studies, North Carolina State University, University of Guelph, Duke University, University of North Carolina; *hudgens@iws.org*

Using movement behaviors to assess dispersal routes in complex landscapes.

Wetland species often use isolated habitat patches, so effective management requires identifying how changes in land cover affect potential dispersal corridors and barriers. We demonstrate a simplified approach to quantifying dispersal across a landscape for two sets of species inhabiting wetlands on Ft. Bragg, NC. Our approach addresses a significant challenge to understanding dispersal: because dispersal is a rare event, it is difficult to measure directly. To overcome this challenge, we use movement simulations of individual movements by wetland butterflies and amphibians to project potential dispersal routes. To fully characterize dispersal through the landscape, we calibrated our models from observations of short-term movement in different habitats and at habitat edges. We use the model to identify isolated habitat patches, connected habitat patches and focal landscape features that promote or inhibit dispersal. We found an important role for upland forests in promoting dispersal for both butterflies and amphibians. In contrast, we found that riparian corridors promote dispersal for wetland butterflies but act as dispersal barriers to ephemeral pond-breeding amphibians. The latter result highlights a major challenge in managing landscapes for multiple species- different species perceive the landscape in different ways so that landscape features that may promote or inhibit dispersal of one species may have little or opposing effects on dispersal of another.

SY7 Huettmann, F; University of Alaska; *fhuettmann@alaska.edu*

Projected Developments in Alaska's Economic Geography: Implications for Wildlife

Alaska and its related ecosystems offer diverse and unique landscapes, and which are widely perceived as untouched wilderness. However, Economic Growth issues linger all over the state affecting wildlife and habitats on land and sea. Based on previous experience and studies elsewhere, scientific case studies and reviews are shown where the careless promotion of Economic Growth has already created major problems for Alaska's wildlife, habitat and wilderness. Future development issues are presented based on regionalized IPCC (Intergovernmental Panel on Climate Change) and known development scenarios, and their effects are predicted, e.g. using aspatial and GIS data, as well as Remote Sensing imagery and statistically advanced ensemble (RandomForest) models assessing the human footprint and its sustainability for biodiversity. Since Alaska's wilderness can get used as a global role model, a comparison is made with adjacent Yukon, Sakhalin Island, Sea of Okhotsk, and British Columbia, where economic activities have also hugely increased over the last years. Finally, GIS experiences from the Circumpolar Arctic are presented for what happens to a region when these problems are not addressed efficiently. Outlooks are provided until 2100, and they indicate spatial changes, serious extinction trends and request a significant change in the way â how we do business'.

5.7 Hufty, Marc*; Gagnon, Sandra; IHEID; *marc.hufty@graduateinstitute.ch*

Does participation improve conservation and livelihoods?

Local population participation has become an almost compulsory principle for conservation projects or protected areas. It is now included in most PAs in many forms (participatory management, co-management, community-based management, ICDPs, etc.). But it is seriously contested form two streams of arguments. On one side livelihoods objectives sought after by local populations compete with conservation and make it ineffectual. On the other side, it is dismissed as a trick to make conservation acceptable to locals. The problem is that there are few evidence-based studies to establish the facts, no standard methodology to do so, and not even a consensus on the approaches that can be considered as participative and those that cannot. Based on a research (EEPA) in collaboration with IUCN, IUCN-Sur, MAB, WCPA, and IRD, we have (1) developed clear criteria to define and assess participation; (2) developed a methodology to observe the links between participation, conservation and livelihoods; (3) developed a political ecology and governance perspective on participation and conservation; (4) tested this approach in 10 protected areas in Latin America (among them 5 biosphere reserves). Results confirm the confusion in the definition of participation and the practical difficulties to implement participatory schemes. Success-stories have been found only in community-driven conservation projects.

P2.124 Huggard, David*; Schieck, Jim; Alberta Biodiversity Monitoring Institute; *huggard@interchange.ubc.ca*

Biodiversity evaluations for individual managed sites

As part of programs to assess ecological sustainability, management agencies must evaluate the condition of biodiversity in reclaimed or restored areas, at conservation offset sites, or as part of adaptive resource management. We developed a new likelihood-based method that uses relationships between species and levels of visible human disturbance ("footprint") to assign a biodiversity-based measure of human disturbance level to individual sites. The underlying relationships between biota and human footprint levels are derived from regional monitoring programs, and can include covariates for ecosystem type and geographic location. The method uses one or more standardized surveys of biota at the target site, and includes estimates of uncertainty in the human disturbance level. The method highlights the information value of single or multiple surveys of different taxa, which can be used to design a cost-effective survey of the target site. The equivalent human disturbance measure can be standardized to a 0-100 scale of intactness that is easily interpreted by managers and the general public, and can be used to assess the management agency's success at conserving or restoring native biodiversity. We demonstrate the approach using information on vascular plants, mosses, lichens, birds and soil arthropods collected by the Alberta Biodiversity Monitoring Institute (ABMI) to assess ecological condition at 191 sites in the boreal forest of Alberta.

SY12 Hutchings, Jeffrey A; Department of Biology, Dalhousie University; *Jeff.Hutchings@Dal.Ca*

COSEWIC and SARA: A Canadian Model For Linking Conservation Science With the Listing of Species at Risk

The Species at Risk Act (SARA, 2003) fulfilled a key obligation by Canada to the Convention on Biological Diversity. Under the auspices of this national legislation, the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) was legally established as an independent national advisory body responsible for the assessment of species at risk in Canada. Although membership is inclusive of a broad swathe of expertise (including academia, government, aboriginal knowledge, ENGOs), species assessment advice is based on the best available science, independently of members' professional affiliations and irrespective of the political and socio-economic consequences of the advice. COSEWIC's assessments are communicated to the public at the same time that they are communicated to government. Receipt of COSEWIC's advice by the federal Minister of the Environment triggers a process culminating in a legal listing decision by the national government. From 1977 to 2009, COSEWIC had assessed 598 species as being at risk. With the exception of most northern and exploited marine species, COSEWIC's listing advice has generally been accepted (>85% of assessments). As a means of linking conservation science with public policy, COSEWIC may be unique in its breadth of mandated responsibilities, extent of membership in and outside of government, incorporation of aboriginal traditional knowledge, and capability to assess species status.

SY73 Hutchings, Jeffrey A.; Dalhousie University; *jeff.hutchings@dal.ca*

Trends in the Ecosystem and Biodiversity Health of Canada's Three Oceans

The UN has declared 2010 to be the International Year of Biodiversity in response to initiatives by the Convention on Biological Diversity (CBD) to: (i) conserve biological diversity; (ii) use biological diversity in a sustainable fashion; and (iii) share the benefits of biological diversity fairly and equitably. As a party to the CBD, Canada is obligated to develop a national biodiversity strategy, one element of which is the Biodiversity Outcomes Framework. Under the auspices of this framework, the Ecosystem Status and Trends Report is intended, among other objectives, to assess the status of, and quantify biodiversity trends in, Canada's nine marine ecosystems. The primary objective of this presentation is to describe trends in various ecosystem functions and processes in the Canadian Arctic, Atlantic, and Pacific marine environments, including temporal changes in the abundance and at-risk status of marine fishes and mammals.

P1.138 Hvenegaard, GT*; Banack, SA; Tremblay, CA; University of Alberta; *glen.hvenegaard@ualberta.ca*

Motivations and barriers for individuals promoting biodiversity in urban and rural areas of east-central Alberta, Canada

The long-term success of many biodiversity conservation initiatives depends on the active involvement of willing participants, such as volunteers and landowners. In order to enhance their satisfaction and retention, the goal of this study was to determine and evaluate the motivations and barriers of participants who promote biodiversity. Using snowball sampling, we conducted semi-structured interviews with nine rural landowners and eleven urban Purple Martin landlords in east-central Alberta (13-60 minutes each). Participants promoted biodiversity in various ways, including maintaining bird nest boxes, direct seeding, rotational grazing, rotating crops, and reducing the use of pesticides and fertilizers. Almost all participants wanted to engage in more biodiversity-friendly practices on their properties. Participants were motivated by moral or religious obligations, consideration of future generations, self-fulfillment, personal stimulation, recognition by peers, social interactions, interactions with wildlife, and, rarely, economics. However, landowners faced several barriers in promoting biodiversity, such as social ridicule and the lack of money, time, and knowledge. This study will help organizers manage volunteers or landowners involved in biodiversity conservation projects. Organizers of such programs can increase recruitment, satisfaction, and retention by addressing participants' motivations and barriers, ultimately supporting long-term biodiversity conservation objectives.

SY15 Igoe, James; Dartmouth College; *james.j.igoe@dartmouth.edu*

The Promises and Perils of Paying for Conservation in a Changing World: a Conceptual Overview

In our rapidly changing world ecologies and economies are increasingly intertwined. Conservation finance has become more dependent upon economic growth. But economic growth is implicated in our current ecological crises. Can we escape these difficulties by making economic growth compatible with ecological stewardship through payments for ecosystem services? This is certainly the assumption behind initiatives such as UN-REDD and the cap and trade movement. It is also an increasingly pervasive assumption at conferences, congresses, and other professional/policy forums. The promise of a green, sustainable and prosperous future is no doubt and enticing one. But is it really possible to manage processes and relationships at so many scales and locations, and are markets really the best mechanisms for making this happen? This is a vital question in light of the current state of world markets and the poor prognosis for their recovery. At the very least it is worthwhile to consider whether we may be foreclosing possibilities of imagining and implementing alternatives to market-driven conservation if it turns out ultimately that this is not the best way to go.

P2.79 Igor Davydenko; Valentin Serebryakov*; Kyiv National Taras Shevchenko University, Kyiv National Shevchenko University; *i_davidenko@ukr.net*

The water bodies in the Kyiv city and vicinities as main places for waterbirds conservations (Ukraine)

In the territory of the Kyiv city many natural and artificial water bodies are located such as rivers (the largest among them is the Dnipro river), lakes, ponds, reservoir coolers, channels and some others. During the last decades, some changes in water birds occurred. In the places, where human impact is less, Mallard Anas platyrhynchos, Black-Headed Gull Larus ridibundus, Moorhen Gallinula chloropus and others are breeding usually in the spring-summer period. Numbers of birds increase during the season migrations on the city water bodies (especially on the Dnipro river) mostly for the expense of the transit birds. In winter time, due to the fact that water bodies are not frozen by a hot water discharge, streams and some other factors, many wetlands birds are wintering on these territory. Namely it is Mallard, Garganey Anas querquedula, Pochard Aythya ferina, Tufted Duck Aythya fuligula, Goldeneye Bucephala clangula, Coot, Moorhen, Water Rail Rallus aquaticus, Grey Heron Ardea cinerea, Great White Egret Egretta alba, Green Sandpiper Tringa ochropus, Kingfisher Alcedo atthis, Cormorant Phalacrocorax carbo, Little Grebe Podiceps ruficollis, Yellow-legged Gull Larus cachinnans, Common Gull Larus canus, Black-Headed Gull and White-tailed Eagle Haliaeetus albicilla, and in the reed beds - Bearded Tit Panurus biarmicus. All this can be the result not only the human activities impact, but climate changes as well.

SY26 Innes, JG*; Overton, JMcC; Landcare Research, Hamilton, New Zealand; *innesj@landcareresearch.co.nz*

Effective conservation of New Zealand forest birds - what has worked and what is needed

Forty eight percent (32/67) of New Zealand forest birds present at the time of first human contact are extinct; another five species have been extirpated from the 'mainland' (the two largest islands) and persist only on small islands, and 17 have known or perceived declines, caused mainly by predation by introduced pest mammals. Island pest eradications and translocating threatened birds to islands have been key strategies for bird conservation. Maintaining these isolated populations is still crucial, but there is increasing focus on restoring mainland populations, communities and ecosystems. Mainland sanctuaries of various kinds (15% pest-fenced) now total about 64,000 ha, almost twice the area of pest-free islands (36,500 ha). However, sanctuary area is still only 0.24% of the New Zealand land area, and sites for sanctuaries have been selected serendipitously, with no national framework to maximise biodiversity gain. Species subject to detailed ecological and demographic research invariably can be recovered at local population level; however, none have yet changed Red List category as a result, and integration between species is generally poor. We argue that conservation of forest birds and other taxa in New Zealand requires a vast increase in the scale and intensity of mammal pest control, more strategic selection of environments and sites for restoration, and stronger integration between species programmes to enable restoration of communities and ecosystems.

SY68 Innes, Larry; Canadian Boreal Initiative; *linnes@borealcanada.ca*

Empowering Aboriginal Approaches to Conservation in Canada

Historically, protected areas establishment in Canada has primarily been driven by political expediency, system-level ecological representation goals, or by wilderness advocates. This is changing as Aboriginal peoples are now actively asserting their own land use objectives. The consequence of this shift for conservation outcomes in Canada is profound. The author examines several examples of successful partnerships in current conservation planning practice in Canada's Boreal Forest region, and concludes that empowering Aboriginal approaches leads to better conservation outcomes.

P1.18 Isabella, SA*; Paulo, Salles; Gustavo, Leite; Rossano, Ramos; University of Brasilia; *isabellagontijo@gmail.com*

WHEN IS A POPULATION A METAPOPULATION? a conceptual modelling approach to conservation principles learning

Implementing plans for biodiversity and natural resources conservation requires better understanding of how accelerating changes imposed by human activities influence natural landscapes and population dynamics. Qualitative Reasoning modelling may be useful in this case, as it has been considered a valuable tool for exploring and integrating conceptual knowledge about ecological systems (see an updated overview in Ecological Informatics, 4(5-6): 261-412) and population dynamics (see Ecological Modelling, 195(1-2),114-128). A set of qualitative simulation models was developed to capture and formalize knowledge expressed in the main principles of conservation biology involved in the metapopulation theory. These models main goal is to improve in educational contexts learners' understanding of metapopulation dynamics. The fundamental message to be taken is that a metapopulation can persist and stabilize as a result of the balance between random extinction and colonization, even under the influence of land use change impacts on natural landscapes and habitat quality. The models and the simulation results provide explicit representations of how causality operates when the landscape is modified and deforestation and urbanization cause habitat loss. In this context, this work shows how conservation efforts in fragmented areas may oppose destructive tendencies.(This paper received financial support from Project DynaLearn (EU-FP7 contract 231526). Visit www.dynalearn.eu).

P1.31 Islam, Mohammad Zahirul; Ehsan, Faysal*; Adnan, Rafat; Marinelife Alliance, Chittagong University ; *marinelife_al@yahoo.com*

Marine life conservation effort at south eastern coast and marine areas of Bangladesh

South eastern coastal areas of Bangladesh is Ecologically Critical Area (ECA) declared by Government of Bangladesh in 1999. The area is quite a biodiversity hotspot. To restore the charismatic megafauna and other endangered species MarineLife Alliance has taken initiative to conserve the marine biodiversity. Current programs are taken to conserve sea turtle, cetaceans, water birds, and coral habitat. Included are monitoring and conservation of sea turtle, cetacean, whale shark and water bird as a major group. we conduct scientific monitoring, habitat restoration and protection through community participation. With education, training and awareness to the community. More than two thousand school children has been motivated and educated thought community education, offshore fishermen has been trained for bycatch reduction. More than seven thousand local people have been motivated by awareness program. Further initiative under this program is setting up education and research center, remote monitoring station, museum along the entire coast. Five education and research center has been established. MarineLife Alliance is going to establish education centers along the entire coast to establish community based sustainable marine conservation. Around 90,000 olive ridley and green turtle hatchlings have been released so far during Oct 2005- Jan 2010 into the Bay of Bengal.

P2.61 Jackson, DS*; Murdoch, J; Oberlin College/Fulbright Foundation, University of Vermont; *daniel.seth.jackson@gmail.com*

Patterns of livestock depredation by wolves in central Mongolia

Active persecution by humans in retribution for real or perceived livestock depredation by wolves represents a driver of wolf decline worldwide. In Mongolia, little information exists on the extent and magnitude of depredation. An understanding of the factors affecting livestock depredation are crucial for developing wolf conservation strategies and mitigating human-wildlife conflict. We elucidate relationships between landscape features and conflict occurrence in the vicinity of Ikh Nart Nature Reserve Mongolia. We conducted a questionnaire survey in 2007, which canvassed all households (n=43) in the northern part of the reserve. Respondents reported 182 domestic animals killed by wolves over 61 separate incidents during the summer of 2006 through the summer of 2007. Depredations were in all habitat types, but occurred significantly more in rugged, rocky terrain than other habitat types when accounting for habitat availability. This trend is probably explained by the cover afforded to wolves in rocky habitat, which allows them to approach prey undetected, and more effectively avoid herders. Depredation ocurred predominantly in winter and spring. Our results suggest that conservation efforts should involve reducing livestock numbers and increasing herder vigilance in rocky areas, especially during winter, and improving husbandry practices to reduce overgrazing and wild ungulate habitat loss.

SY76 Jacobs, J.M.*; Paradis, S. ; Work. T.T.; UniversitÃ© du QuÃ©bec Ã MontrÃ©al; *email@joshuajacobs.org*

Testing the cohort management approach for the conservation of arthropod biodiversity in black spruce boreal forests of Quebec, Canada

Current forest management practices in Canada typically consist of full even-age stand management leading to landscape level patterns that greatly differ from those patterns resulting from natural fire cycles. Management by cohorts has been proposed to maintain landscape level patterns similar to natural landscapes by utilizing alternative silvicultural practices to favour the development of stands that reflect the natural range of variability. We used pitfall traps and flight intercept traps to sample the epigaeic and saproxylic insect and spider communities along a 700 year chronosequence and forest stands managed using either typical management strategies or partial cutting techniques to favor the development of stands with characteristics of older cohorts. We collected a total of 30 species of ground beetles (Coleoptera: Carabidae), 140 species of spiders and 250 species of saproxylic beetles. Cohort management had little to no conservation value over the typical harvest strategies used in the area. Arthropod assemblages after both cutting techniques no longer resembled assemblages from the natural range of variation found along the chronosequence. The cohort management approach did not work for the conservation of forest arthropods because it failed to adequately recreate the unique habitat characteristics required by these communities in older cohorts.

SP6.10 Jacobs, JF*; Deguchi, T; Suryan, R; Balogh, G; U.S. Fish and Wildlife Service, yamashina Institute for Ornithology, Oregon State University; *judy_jacobs@fws.gov*

Short-tailed albatross Recovery: Results of chick translocation and rearing project

The endangered short-tailed albatross (Phoebastria albatrus), was nearly exterminated by feather and egg collectors by the turn of the twentieth century. Now protected, the breeding population has built to an estimated 500-550 pairs, nesting on two Japanese islands. One of these is not accessible for political reasons, and Torishima, the main breeding site, is an active volcano. The Short-Tailed Albatross (STAL) Recovery Team has indicated that additional STAL breeding colonies must be established in order to achieve recovery. Our objective is to facilitate new colony formation by rearing STAL chicks on a new safe colony site, where they will hopefully return to breed when mature. This project, a collaboration between the U.S. Fish and Wildlife Service and the Yamashina Institute for Ornithology, began in 2006, with translocation and rearing of ten post-guard stage Laysan albatross (Phoebastria immutabilis) chicks in Hawaii. Only four fledged, and methodologies were revised. In 2007, ten black-footed albatross (Phoebastria nigripes) chicks were moved to Mukojima, a small island in the Bonin (Ogasawara) chain where a new colony site had been prepared. Nine of these chicks fledged. In February 2008, ten STAL chicks were moved to the Mukojima site, and all fledged in May 2008. In February 2009, 15 STAL chicks were moved to Mukojima, and all fledged. In 2010, 15 chicks again will be moved and reared. Here we report the results of all five years of efforts, including satellite telemetry data from fledged STAL chicks. This effort represents the first successful long-term rearing of a surface-nesting seabird. The methodologies developed are relevant to future attempts to establish or supplement colonies of other rare or declining surface-nesting seabird species.

SP1.2 Jacome-Flores, ME *; Blazquez, MC; Maya-Delgado, Y; Sosa-Fernandez,V; CIBNOR, INECOL; *mjacome@cibnor.mx*

Spacial model to predict distribution patterns of Orange Throat Whiptail lizard (Aspidoscelis hyperythra) in Mexico

One of the most important tools for conservation biology and planning management is the detailed knowledge of ecologic and geographic distribution of the native species. The current geographic and ecological distribution of the species allows understand the evolutionary and ecologic constraints for the adaptation, fitness and survival of the species in one area along the time; and it also provides information concerning the spatial patterns of the biodiversity in certain region. General Linear Models (GLM) constitute one of the most flexible family regression models which predict individual's occurrence probability in large areas based on environmental variables, and their results can be added to a geographic information system (GIS) by diverse techniques of spatial interpolation. We conducted a research about the current distribution of Orange Throat Whiptail (Aspidoscelis hyperythra: Teiidae) in 318 localities of South Baja California, Mexico. The species is native and endemic of Baja California peninsula and its distribution and phylogeography remains unclear. We obtained the values of vegetation, soil, elevation, slope, average precipitation and temperature range for each locality from digital maps with a GIS. We use the R software to generate two types of GLM, with binomial and Poisson distribution, using the environmental variables as explanatory variables and the presence/absence and abundance information as dependant variables. Finally we use a Kriging interpolation to the models results to generate an occurrence map and a most probable abundance map.

SY23 James Watson*; Josie Carwardine; Richard Fuller; Liana Jospeh; Dan Segan; Rod Fensham; Hugh Possingham; Spatial Ecology Lab, University of Queensland, rod.fensham@derm.qld.gov.au; *james.jameswatson@gmail.com*

What is the capacity of Australia's protected area system to conserve threatened species?

Protected areas are an important tool in threatened species conservation. However, acquisition of new protected areas are often based on ecosystem criteria, and it is unclear how well threatened species are conserved within protected area networks. Here, we assess how effectively Australia's protected areas (89 million ha, 11.6% of the continent) overlap with the geographic distributions threatened species and compare this against both a null (random) and a spatially â efficient' solution, using the spatial prioritization tool Marxan. We define minimum area targets for each species based on range size and level of vulnerability. While the current configuration of protected areas performs better than a random solution, 167 threatened species (12%) occur entirely outside protected areas and only 223 (16.8%) achieve target levels of protection. Critically Endangered species are among those most under-represented, with 21% occurring entirely outside protected areas. Spatial prioritization analysis revealed that an efficient protected area system of the same size (11.6% of Australia) could meet representation targets for 64% of threatened species and at least partially represent all threatened species within protected areas. Moreover, we show that by protecting 18.6% of Australia, all threatened species could achieve target levels of representation, assuming all current reserves are retained.

P2.66 James, Joanna*; Mineau, Pierre; Boutin, Celine; Dept. of Biology, Carleton University, National Wildlife Research Centre, Environment Canada; *joanna.a.james@gmail.com*

Native bee diversity in organic and conventional hedgerows in eastern Ontario

Agricultural intensification has resulted in reduced biodiversity on farmland. A serious consequence of this decline is the potential loss of essential ecosystem services. Native bees provide pollination services to many wild plants as well as crops, but the effects of intensification on native bees in agricultural habitats are not well understood. The objective of this study is to compare native bee diversity in hedgerows on conventional and organic farms in order to assess how different management techniques affect bee populations. Bees were sampled by pan trapping in hedgerows adjacent to soybean fields on 9 pairs of organic and conventional farms in eastern Ontario, Canada during the summer of 2009. Preliminary results indicate that bee diversity is significantly higher on conventional farms than on organic farms. This suggests that the relatively low pesticide inputs in the soybean systems under study are less important than other variables, such as repeated tillage on organic farms. These data will be analyzed in relation to other field management variables, floral diversity and landscape structure. The results from this study will be used to make recommendations regarding native bee conservation in agricultural landscapes.

10.1 JAMES, NATALIE*; de Blois, Sylvie; Darveau, Marcel; Department of Plant Science and the McGill School of the Environment, McGill University; and Ducks Unlimited Canada, Department of Plant Science and McGill School of the Environment, McGill University, Ducks Unlimited Canada; *natalie.james@mail.mcgill.ca*

Modelling the Effects of Climate Change on the Distribution of Wetland Plants in Quebec

At coarse resolutions the geographic ranges of plant species can be modelled using climate variables (Pearson et al. 2002). The aim of this study is to develop predictive models that quantify the climatic and edaphic tolerances of wetland plant species in northeastern North America, and to predict the potential geographic shifts of the environmental envelope of these species according to future climate change scenarios. Plant species occurrence records were compiled from forestry and riparian inventories, species at risk databases, and natural history collections. Obligate wetland plant species were selected based on ecological criteria such as associated wetland type (marsh, swamp, peatland) and the extent of their geographic range. Climate data consists of recent (1961-1990), interpolated, weather station data (Rehfeldt, 2006) and future (2041-2070, 2071-2100) projections by global and regional climate models. Edaphic data was obtained from forestry surveys in Quebec and the Soil Survey Geographic Database in the US. A combination of regression, classification, and machine learning methods are used within the BIOMOD platform to construct species distribution models (Thuiller et al. 2009). Due to the particular nature of wetlands, the results will serve first, to identify gaps in ecological modelling for wetland conservation, and ultimately to help inform wetland managers in a context of rapid climatic changes. This research is conducted in collaboration with Ducks Unlimited Canada. Pearson, R. G., T. P. Dawson, P. M. Berry, and P. A. Harrison. 2002. SPECIES: A Spatial Evaluation of Climate Impact on the Envelope of Species. Ecological Modelling 154:289-300. Rehfeldt, G. E. 2006. A spline model of climate for the western United States. United States Department of Agriculture Forest Service, Fort Collins, Colorado. 21 p. Thuiller, W., B. Lafourcade, R. Engler, and M. B. AraÃºjo. 2009. BIOMOD - a platform for ensemble forecasting of species distributions. Ecography 32:369-373.

P1.178 Jansujwicz, Jessica Spelke*; Calhoun, Aram JK; Lilieholm, Robert J.; Ecology and Environmental Science Program, University of Maine, Department of Wildlife Ecology, University of Maine, School of Forest Resources, University of Maine; *jessica.jansujwicz@maine.edu*

Cooperation and Natural Resource Management: Community-Based Vernal Pool Conservation Planning in Maine, USA

Vernal pools are a management challenge. They are small, ephemeral, widely distributed, difficult to remotely identify, and species depending on them require both wetland and terrestrial habitat. Regulatory restrictions protecting vernal pools on private land generate considerable controversy, and significant socio-economic barriers impede full implementation of legislative protections. In Maine, Significant Vernal Pools are regulated at the state level, but enforcement agencies do not have the personnel to handle the demand for vernal pool assessments or to monitor permits once they have been granted. Residential development pressures, concerns over private property rights, and a strong tradition of local home rule further impede regulatory compliance. In response, Maine Audubon Society and the University of Maine jointly initiated a community-based education and outreach project to assist municipalities in proactively mapping and assessing vernal pools using trained citizen scientists. This project provides a unique opportunity to examine the conditions under which municipalities and landowners will participate in proactive conservation planning. By understanding the behavior of landowners, town officials, and community members, we document the extent to which multi-stakeholder engagement in natural resource planning influences land use decisions at the local level and suggest strategies to increase stakeholder cooperation and improve conservation outcomes.

SP3.9 Jantke, K; Research Unit Sustainability and Global Change, University of Hamburg; *kerstin.jantke@zmaw.de*

Gap Analysis of European Wetland Species - a Method to Work with Coarse Scale Biodiversity Data

Protected areas in the European Union under the Natura 2000 reserve system cover about 20 percent of the total land area. Systematic evaluations of the effectiveness of the current reserve system have been scarce and restricted to regional assessments. One reason for that may be the poor availability of comprehensive fine scale biodiversity data for the densely human-populated European continent. We introduce a novel method applying principles from systematic conservation planning to conduct a detailed gap analysis using coarse scale species occurrence data. The applied mathematical programming model employs mixed integer programming techniques. First, we evaluate the performance of the current Natura 2000 system in covering endangered wetland vertebrate species. Second, we present options to expand the network to move toward complete coverage for the considered species. We include fine scale wetland habitat data as well as species-specific proxies for minimum viable population sizes. Results show that area-demanding vertebrates such as birds of prey are severely underrepresented in the current Natura 2000 system. We conclude that the network needs to be strengthened and complemented by additional conservation areas. We present priority regions for expanding the reserve network cost-effectively.

SP4.1 Jenkins, CN*; Dunn, RR; Weiser, MD; Sanders, NJ; Fitzpatrick, MC; University of Maryland, North Carolina State University, University of Tennessee, University of Maryland Center for Environmental Science; *cnjenkin@umd.edu*

Ant Diversity and the Potential Consequences of Climate Change

Insects are the dominant form of terrestrial animal life, yet are perhaps the least known. Of the insects, ants are exceptionally influential in the functioning of ecosystems because they are often prevalent at several trophic levels. Consequently, understanding the diversity and abundance of ants is key to understanding biodiversity in general. We produced a fine-scaled continuous map of global ant richness, the first such map for a major insect taxon. Producing this map highlighted the limits to our knowledge of ant diversity and identified priority areas where new surveys could most effectively expand our knowledge of ant diversity. While climate is a strong predictor of ant diversity, the relationship varies geographically. This suggests that historical factors in diversification are evident in contemporary patterns of diversity. Predictions of ant diversity under climate change scenarios suggest that the world may become more suitable for ants. However, while the world in general may become more suitable, it is still unknown how the pace of climate change may affect individual ant species.

SY19 Jeo, RM *; Brown, JF; The Nature Conservancy; *rjeo@tnc.org*

Linking Human Well-Being and Ecological Integrity in the Great Bear Rainforest, British Columbia, Canada

Over the past decade, coastal British Columbia (i.e. the Great Bear Rainforest) has been the focus of considerable conservation effort. These efforts have culminated in agreements, between First Nation and Provincial governments (in both 2006 and 2009), that delineated a network of protected areas and a sustainable management system that sets explicit thresholds for old growth forest and freshwater ecosystem protection outside of protected areas. A driver of these agreements was a recognition, by both NGOs and governments, that the dire economic situation of Coastal First Nation communities had to be addressed in the context of any conservation plan; indeed, there was recognition that improving human-well being would be essential to the success of any conservation agreement. In response, the Nature Conservancy, together with US and Canadian private foundations, and the Canadian federal and BC governments, established a $120 million public-private fund for conservation and sustainable economic development in First Nation communities. These funds are now managed by a new foundation, the Coast Opportunities Funds, which supports conservation work by First Nations as well as the establishment of a broad range of environmentally-compatible business ventures. While conservation goals in an ecological context have been well developed, human well-being and economic development goals, that are directly linked to ecological integrity, have not. We present a framework for integrating human well-being into biodiversity conservation strategies and measures.

P2.142 Jessica Price*; Janet Silbernagel; Nicholas Miller; Randy Swaty; Gaylord Nelson Institute for Environmental Studies, University of Wisconsin at Madison, Landscape Architecture & Gaylord Nelson Institute for Environmental Studies, University of Wisconsin at Madison, The Nature Conservancy, Wisconsin Field Office, The Nature Conservancy, LANDFIRE Team; *jmprice2@wisc.edu*

Evaluating the Effectiveness of Conservation Strategies through Collaborative Scenario Building and Landscape Modeling

Conservation and land management organizations are developing conservation strategies to distribute protection efforts over large areas and a broad range of ownership and management techniques. These â distributed conservation strategies,' such as working forest conservation easements, are based on the premise that blending resource extraction and conservation should yield socioeconomic benefits without compromising biodiversity or ecosystem service conservation. However, evaluating the efficacy of such strategies remains difficult, as traditional monitoring efforts span decades or longer. Therefore, we developed an integrated scenario-building and landscape modeling approach to provide insight into the potential outcome of different conservation strategies in response to anthropogenic and climate change pressures. We applied this approach in two large study sites in the Northern Great Lakes region of the U.S. Via in-person and online workshops, scientists, local experts, and stakeholders collaboratively defined scenario conditions and parameters for landscape models and selected a suite of biodiversity and ecosystem service targets. By comparing potential outcomes of different strategies on selected targets, this approach enables informed conservation decision-making about how to best utilize scarce financial resources, reduce risks associated with innovative strategies, and determine when and where concentrated versus distributed conservation may be most effective.

SP6.12 Jhunjhunwala,S; DuttaGupta, A*; Centre for Environment Education, Ark Foundation; *sjhunjhunwala2@rediffmail.com*

Impact of outreach programmes on community response to cash incentives for Conservation of a Globally Threatened Bird Species Sypheotides indica.

A site-based approach may not be appropriate for the conservation of widely dispersed threatened species that share part or whole of their habitat with humans. The Lesser Florican Sypheotides indica is Endangered and Endemic to the Indian Subcontinent with an estimated global population of less than 2,500. It is primarily threatened by habitat loss and hunting. Involvement of local communities is essential to its survival. The local Forest Department announced an economic incentive scheme for sighting of the florican where the land owner receives a reward of about a hundred US $.Our conservation education programme since its onset in 2005 succeeded in increasing increase community stewardship for the species drawing 371% more stakeholders to participate in an incentive scheme to report floricans around Sailan Sanctuary in India.In the control site at Sardarpur Sanctuary where we have not conducted outreach programmes the number of sightings reported have actually decreased by over 50% even though Sardarpur is 2.9 times bigger than Sailana. Our findings are that economic incentives must be supported by conservation education and outreach programmes. It is urgent to develop a policy for widely dispersed threatened species that encompasses conservation education, economic incentives, and a mosaic of protected areas and landscape conservation.

SP3.11 JOAN AUMA OTENGO; KENYA WETALNDS FORUM SECRETARIAT C/O EAST AFRICA WILDIFE SOCIETY; *joanotengo@yahoo.co.uk*

Impacts of proposed large scale monoculture developing projects on wetalnds and wetlands dependant comunities (Ecosystems - wetlands conservation) Kenya

TITLE: IMPACTS OF PROPOSED LARGE SCALE MONOCULTURE DEVELOPING PROJECTS ON WETALNDS AND WETLANDS DEPENDANT COMMUNITIES (ECOSYSTEM - WETALNDS CONSERVATION) KENYA. STUDY PROBLEM: The detriments that have been caused/will be caused to Tana Delta wetlands and its biodiversity by proposed monoculture schemes. OBJECTIVE: To have a master plan which contains the rich and diverseness resources of the Tana delta with a defined and functional development and conservation multiple uses where all stakeholders are involved. METHODS: Literature review, Reconnaissance and observation and discussion. Introduction: The Tana Delta wetland is located in the new district called Tana Delta which was hived from the larger Tana Delta River District. Tana delta is estimated to cover about 130,000ha of which 69,000 are regularly inundated. Proposed industrial shrimp aquaculture: This project was planned take place in the western side of Tana Delta by Coastal Aquaculture. It would make the local community suffer poverty since it was not to be labour intensive and the only available employment would be casuals in the preparatory stages only to be followed by watchmen to guard the ponds. The Collapsed Tana River Rice Irrigation Scheme:-This was put into practice in Eastern side of the Delta. The collapsed manual long water weirs and reservoir have dried up and rusted. Community members lost their sites of cultural value and historical sites. The Jatropher farming: Since majority of the Indigenous community are vulnerable, they have started to accept the offer for Jatropher plantation farming. The Tinum mining: Proposed mining in Tana Delta. Oil and Gas exploration: The proposed oil and Gas exploration in Lamu District The proposed 40,000hactares of Tana Delta land for horticulture farming by Qatar Government in exchange for a second port in Lamu Coast Province Kenya: The scheme will cause physical destruction of the floodplain habitat which livestock herding is dependent upon. The depletion of grazing resources following the implementation of the proposed scheme will increase the grazing pressures in the remaining portion of the delta and erstwhile very arid and semi arid environment surrounding the delta. Community social welfare and livelihood will be lost for ever and it will displace 18 to 50,000 people in the delta. Results: A clear Tana Delta wetlands strategy that recognizes the inherent rights, dependence and role of community in the overall well of the ecosystem. Conclusion: Need for commitment from the stakeholders to the ideals of a development master plan will ensure that future environmental conservation developmental work follow agreed priorities.

P1.183 Johansen, K; Lemelin, R.H.,*; Lakehead University , Lakehead University; *harvey.lemelin@lakeheadu.ca*

Reviewing the Role of Insects and Spiders in Interdisciplinary Journals: A Content Analysis

This study utilized a mixed-methods approach to undertake a social sciences inventory and content analysis of peer reviewed and published journal articles relating to insect and spider conservation. A mixed-methods approach was selected for this research because it allowed for the effective and systematic analysis of text through the use of established content analysis techniques. A socio-environmental inventory of interdisciplinary journal articles was conducted in a multi-phase process which included a review of such journals as Conservation Biology and Society and Natural Resources. Individual journal articles were identified and selected according for the content analysis based on their inclusion and discussion of key concepts in insect and spider conservation. The objective of this presentation is to discuss the findings of the content analysis while integrating them in a larger discussion on taxonomic bias and insect and spider conservation strategies.

SY43 John Fitzgerald; Society for Conservation Biology; *jfitzgerald@conbio.org*
Improving and Using Existing International and Domestic Law to Recover Endangered Species, Restore Ecosystems and Mitigate Climate Change
Within the Convention on Biological Diversity, especially articles 3 and 8(l), other international conservation and trade law, and existing domestic law, such as the U.S. Endangered Species and Clean Air Acts, we have most of what we need to greatly reduce greenhouse gas emissions and restore biological diversity much more quickly and efficiently than most people realize. In the U.S., for example, as long as Congress does not block or weaken existing laws, we can file scientifically-documented petitions for rules and persuade the Executive Branch to adopt regulations to better implement these laws. For example, we can increase efficiency, back out coal-fired power plants fairly quickly, and restore and connect ecosystems to sequester more greenhouse gases. Nations and other actors can minimize net emissions in the developed and developing worlds and reflect these policies fairly in our trade practices. The knowledge and technology are available. This will require creative use of existing treaties, statues, customary and common law (e.g., public nuisance actions). It will require timely filing of comments, petitions or other actions to present that knowledge in powerful ways. SCB and our allies can lay out the plan and begin a series of actions to get us there.

SY12 John Fitzgerald; Society for Conservation Biology; *jfitzgerald@conbio.org*
***When and How Can Scientists Inform Policy Makers and Help Form and Implement Policies: ***
Public Policy is like a public contract. In forming a marriage contract, the opportunity for public comment is once and brief at best. Scientists must know when to speak and how, and do so, or it seems, forever hold their peace. The US Administrative Procedures Act forces the expert executive agencies to use rulemaking procedures for adopting regulations to implement in detail the general principles set out in legislation. This process provides several opportunities for scientists to inform agencies and then the courts that review what agencies do. These procedures use well-understood standards of evidence and proof. Litigation over policy or harm it may cause is also controlled by a generally open and established set of rules for review. When a legislative or international negotiating body acts, it generally only has a very limited amount of direct review. In the US a bill faces only the possibility of a Presidential Veto. Very detailed legislation is often difficult to understand fully during the days or weeks devoted to its public debate or even during judicial review years later. We could improve our limited controls over the legislative and negotiating process by setting up review procedures for the science used, but for now, the best time to educate legislators, negotiators (and their constituents) is before they begin to "mark-up" or consider legislation or treaties and protocols actively. I will draw lessons about this process from each speaker.

SY72 John Francis; National Geographic Society; *jfrancis@ngs.org*
Reaching the unconverted: Using the Great Migrations series as a hook for corridor conservation
In these days of a thousand channel universe how does one build a constituency for migratory species and the healthy ecosystems upon which they, and we, depend? This talk covers an upcoming program that leverages a high investment TV series with strategic multimedia coverage and partnerships to deliver conservation commitment and action. In this case, viewers inspired by high-def, thousand-frames-a-second glory of animal migration replete with challenges will be directed to bear witness and act locally (through Freedom to Roam) in response to a global call. Books, games, magazine articles, educational products, plus broadband and social media will converge on the topic of animal migrations to reach the broadest possible audience. With long-term planning and diverse partners, responsible programming can help move the masses and make our natural systems whole.

18.1 Johns, D ; Portland State University; *johnsd@pdx.edu*
What Do Social Movements Have to Teach Us?--Learning From Movements Against Apartheid and War, and for Democarcy, Civil Rights & Others
As the results from Copenhagen suggest, conservationists' influence continues to lag significantly behind stated goals, despite significant achievements. The human footprint continues to grow and on a finite planet that means the loss of biodiversity and ecological richness. What can conservationists do to increase their effectiveness? Among other things they can evaluate the lessons of important social movements-labor, anti-apartheid, pro-democracy, civil rights, and women's-for their applicability to conservation. They can also take better stock of their own history of successes and failures. Research into other movements and conservation history suggests that the most important factors in achieving goals are building the capacity to reward and punish decision makers and the willingness to use it, combining outsider and insider strategies, creating organizations that are communities and not just organizations, perseverance, flexibility in means while maintaining a clear and uncompromising focus on goals, effective use of divisions among opponents and elites, and taking advantage of crises.

P2.4 Johnson, OW*; Elz, A; Neely, K; Hard, JJ; StewarT, DC; NOAA, Northwest Fisheries Science Center, Northwest Region Fish Research and Monitoring Section , Oregon Department of Fish and Wildlife; *orlay.johnson@noaa.gov*

Hanging in there: Population Changes and Genetics of Chum Salmon in the Southern Extent of their Range - Impacts of Climate and Other Changes

Spawning populations of chum salmon (Oncorhynchus keta) historically extended as far south as the San Lorenzo River in California and 322 km upstream in the Sacramento River. In 1905-06 chum salmon juveniles were the most abundant salmon species in streams surveyed between the Sacramento and Columbia rivers. Today, these populations have greatly declined, and in the Columbia River are now listed under the ESA as a threatened species. Little life history, genetic, or other biological information has been developed on these fish. In cooperation with ODFW, WDFW, USFWS; we collected life history, genetic, and demographic data (such as presence or absence of spawning populations and timing of migrations) from 2003 through 2009. Preliminary microsatellite genetic data indicate population structure among coastal populations is different from interior and Puget Sound runs. Run timing and other life history traits are also different between these southern populations and others. This information is important as southern runs may represent remnants of historical populations and contain unique genotypes and adaptations essential to the successful restoration of depleted other present-day salmonid populations.

SY13 Jonathan Baillie; Carly Waterman*; Ben Collen; Zoological Society of London; *ben.collen@ioz.ac.uk*

Investing in Evolutionary History

Under the impact of human activity, global extinction rates are thought to have risen up to a thousand times higher than shown by the fossil record, and could climb an order of magnitude in the near future. The resources available for conservation are insufficient to prevent the loss of much of the world's threatened biodiversity during this crisis. Conservation planners have been forced to prioritise their protective activities, in the context of great uncertainty - this has become known as â the agony of choice'. A range of different methods have been proposed for prioritizing species for conservation attention (e.g. threatened species, restricted-range endemics, flagship species, umbrella species, keystone species). However, conservation actions tend to be skewed towards large charismatic species and species of commercial value, while many lesser known species continue to slide unnoticed towards extinction. The EDGE of Existence programme is an innovative new conservation initiative that prioritizes species according to their degree of unique evolutionary history (Evolutionary Distinctiveness) weighted by conservation urgency (Global Endangerment, representing threat status according to the IUCN Red List). The world's most Evolutionarily Distinct and Globally Endangered (EDGE) species are highlighted as immediate priorities for conservation attention. The programme has identified a major gap in current conservation schemes, as 70% of the world's top 100 EDGE mammals are currently receiving little or no conservation attention. This alarming figure is likely to be even higher in other taxonomic groups. The EDGE of Existence programme aims to complement other priority-setting schemes to ensure that these forgotten species are no longer overlooked.

SY14 Jones, JPG*; Gibbons, JM; Sommerville, M; Milner-Gulland, EJ; Bangor University, Imperial College, Imperial College; *julia.jones@bangor.ac.uk*

Monitoring for success: the importance of power

If you have ever thrown a quadrat, walked a transect, or got up at dawn to extract birds from mist nets and care that you aren't wasting your time then you need to care about power. Statistical power is the probability that an analysis will reject a null hypothesis which is false. In the context of monitoring, it is the probability that an analysis will correctly conclude that there is a trend when a trend exists. While this may sound like something only of interest to statisticians; in fact the concept is of central importance to anyone concerned with conservation monitoring. We illustrate the role that power analysis should play in a variety of different conservation decisions: 1) The decision to start a monitoring programme (can useful power be obtained with the resources available?); 2) The decision of how to carry out monitoring (will participatory monitoring give the information required for robust decision making?); 3) The decision of how to structure a payments for ecosystem services scheme to conserve biodiversity (given the challenges of monitoring species populations, habitat extent or pressures, what should the payments be based upon?). Resources for conservation will always be limited, and this must influence how we think about monitoring. Because investment in monitoring trades off with other conservation interventions, bad monitoring is worse than no monitoring and we should use power analysis to ensure that monitoring can give us the information we need.

SY12 Joseph M. Northrup*; Justin Pitt; Tyler Muhly; Gordon B. Stenhouse; Marco Musiani; Mark S. Boyce; University of Alberta, University of Calgary, Foothills Research Institute, University of Calgary; *jnorthru@ualberta.ca*

Conservation of grizzly bears using access management

Grizzly bears avoid roads in some areas but select areas near roads in others. This is driven by mechanisms such as traffic patterns and food resources near roads. Understanding what mechanisms drive the relationship between grizzly bears and roads is of particular importance in Alberta where the majority of grizzly bear mortalities occur within 500 m of a road. We modelled a suite of potential mechanisms underlying grizzly bear selection or avoidance of roads and tested which of these best predicted grizzly bear habitat use and movement around roads. A combination of food, traffic, and large-scale landscape variables best predicted grizzly bear distribution. We used these results to simulate the impacts of road access changes as a result of road construction, reclamation, or gating. Our findings highlight the importance of examining the mechanisms driving habitat use and movement of large mammals in human altered landscapes. Access management, the closing of roads during certain times of the year, soon will be implemented in Alberta to conserve grizzly bear populations. Understanding the mechanisms behind grizzly bear use of roaded areas will be essential in choosing which roads to close and when to close them.

SY23 Joseph, LN*; Watson, JEM; Maloney, R; Possingham, HP; University of Queensland, Department of Conservation; *l.joseph@uq.edu.au*

Strategies for effective management of threatened species in Australia and New Zealand

After nearly two decades of "recovery planning" in Australia and New Zealand, we are no closer to recovering our threatened fauna and flora. In fact, every year more species are added to the threatened species lists and the status of others deteriorate further. To recover the greatest number of threatened species, government, NGOs and communities must be engaged to effectively and efficiently manage both on- and off-reserve populations. In this presentation, I will discuss the projects that we are working on in collaboration with government departments in Australia and New Zealand to evaluate past plans and deliver new strategies for threatened species recovery. Firstly, we review the Australian recovery planning process and identify correlates of success. We develop a set of recommendations which includes identifying recovery planning systems that have demonstrated to be effective in the past and developing methodology to integrate these successful practices into a nationally-lead plan for management of all threatened species. Secondly, we develop a methodology for identifying priority actions that will guide the spending of government, NGOs and community groups. The Department of Conservation in New Zealand is well down the track of identifying priority actions for recovery of over 600 of the nation's most threatened species using this technique. I will discuss the national strategic plan for threatened species in New Zealand.

24.3 Josh Nowak; Steve Cumming*; Eliot McIntire; UniversitÃ© Laval; *stevec@sbf.ulaval.ca*

Demographic models of woodland caribou populations under historical disturbance regimes.

Several recent studies have boreal woodland caribou populations have modelled demographic parameters as functions of the levels of disturbances on mapped ranges. Although these models describe between-herd variation in the response variables quite well, are they consistent with the survival of these herds to the present day, given the actual histories of industrial development and the fire regimes? We evaluated one model by projecting six Alberta caribou populations under simulated and historical fire regimes and a reconstruction of the industrial footprint since 1940. We used the cumulative annual density of drilled oil and gas wells as a surrogate for industrial activity. We simulated natural disturbance regimes by sampling from beta distributions fit to archival fire data, corrected for fire suppression. We found that caribou populations would persist under natural conditions and would be expected to have survived to the present under the actual history of industrial development. However, the future persistence of most herds is highly unlikely, even if no further development occurs. If such models are to be used for caribou management, reliable estimates of the natural population densities are needed. We also recommend that histories of industrial development be estimated, for example from time-series aerial photography.

P1.17 Joyner, L; Director Lafeber Conservation; *amoloros@juno.com*

An Overview of Socioscience as an Emerging Tool in Conservation

Socioscience urges human beings to become full global citizens in organizations attuned to ethical concerns. This emerging field helps conservation team members incorporate self and organizational development in conservation protocols . Specific tools of socioscience include those of social and emotional intelligence (psychology, religion, ethno-biography, communication skills, leadership and organization functioning), understanding animal nature (cognitive ethology), understanding human nature (anthropology, history, and cognitive/emotive functioning), and frameworks for respectful discourse across differences of view, identities, religion, culture, and experiences. By developing these intrapersonal and interpersonal skills, conservationists increase their capacity to sustain their work and maximize their efforts in difficult and ethically complicated situations.

P2.168 Juan Carlos Flores Villarreal*; Fernando GonzÃ¡lez Saldivar; CÃ©sar CantÃº Ayala; JosÃ© I. Uvalle Sauceda; Facultad de Ciencias Forestales U.A.N.L.; *toti486@yahoo.com.mx*

HABITAT SELECTION AND TROPHIC BEHAVIOR OF COYOTE (Canis latrans) AND BOBCAT (Lynx rufus) IN NORTHEAST TAMAULIPAS, MÃ XICO

We assessed habitat selection and trophic behavior of coyote (Canis latrans) and bobcat (Lynx rufus) in a grassland ecosystem of northeast Tamaulipas, MÃ©xico, during the winter of 2007-2008 and summer 2008. Habitat selection was analyzed in winter only by sampling traces of both species along a trail of 144.9 km within study area, of which 44.1% comprised open areas habitats, 32.9% xeric scrub habitats, and 23.0% border areas. We determined the winter and summer diet of both coyote and bobcat by analyzing 132 scats samples. Moreover, we assessed the availability of lagomorphs and rodents as prey for both predators to construct selection indices. We concluded that coyote and bobcat have significant differences in terms of diet and habitat usage. Bobcat selected positively scrub habitat and negatively open areas habitat, while coyote used habitat opportunistically during the winter period, as expected. The coyoteÂ´s diet consisted mainly of rodents in winter and fruits in summer, while bobcat consumed mostly lagomorphs in both seasons. However, both predators selected mainly same species of rodents and lagomorphs in winter 2007-2008 and summer 2008.

3.5 Juliann Aukema*; Deb McCullough; Brian Leung; Kent Kovacs; Betsy Von Holle; Tom Holmes; Corey Chivers; Andrew Liebhold; The Nature Conservancy, Michigan State University, McGill University, University of Nevada, Reno, University of Central Florida, U.S.D.A. Forest Service, McGill University; *jaukema@tnc.org*

Forest Pest Invasions: Trends and Impacts

Non-indigenous forest insects and pathogens affect a range of ecosystems, industries, and communities in the United States. Evaluating temporal patterns in the accumulation of non-indigenous forest pests and quantifying their impacts and costs are critical to informing regulatory and policy decisions. We compiled a comprehensive species list to assess the accumulation rate of non-indigenous forest insects and pathogens established in the US and used this information as part of a novel approach to estimating costs. We separated our analysis by pest guilds and cost categories and calculated total average costs. Approximately 2.5 established non-indigenous forest insects were detected in the US annually between 1860 and 2006. At least 14% of these insects and all 16 pathogens have caused notable damage to trees. Detections of insects that feed on phloem or wood have increased markedly in recent years; these insects are also causing an order of magnitude more economic damage than the other guilds.

P1.198 Julio Cesar Martinez*; Carolina Franco Espinosa; Aminta Jauregui ; Javier HernÃ¡ndez FernÃ¡ndez; 1GENÃ TICA, BIOLOGÃ A MOLECULAR & BIOINFORMÃ TICA" LABORATORIO DE BIOLOGÃ A MOLECULAR, CARRERA DE BIOLOGÃ A MARINA, FACULTAD DE CIENCIAS UNIVERSIDAD JORGE TADEO LOZANO Cra. 4 No 22-61, BogotÃ¡, Colombia; *javier.hernandez@utadeo.edu.co*

RAPD-PCR TO DETERMINE THE GENETIC DIVERSITY OF THE LOHGGERHEAD TURTLE Caretta caretta (TESTUDINES:CHELONIIDAE)

The longgerhead turtle Caretta caretta has been listed as endangered species, due to different selective pressures including anthropogenic. In this study RAPDs markers conditions were standardized determining the species genetic diversity. Using turtle samples from Cartagena and Santa Marta (Colombian, Caribbean) sea aquariums. The DNA was isolated and quantified obtaining 50-100 ng/Âµl, further the Taguchi method was used in order to reduce the number of reactions maximizing RAPDs. The genetic diversity was determined using band richness (Margalef index), showing values of 3,64 - 4,43 for Santa Marta and 2,16 - 1,44 for Cartagena population. The Shannon diversity shows the lower values (2,48-0,69). According to the pileouÂ´s uniformity it is possible infer about the similitude of individual genetic characteristics, thus inter-population and intra-population variations are minimal. This is the first assessment to the knowledge of diversity of longgerhead turtle in Colombia.

P2.114 Kahler, JS*; Gore, ML; Michigan State University; *kahlerj1@msu.edu*

Stakeholder Perceptions of Risk and Vulnerability Associated with Human-Wildlife Conflicts in Namibian Conservancies

In Namibia, human-wildlife conflicts (HWCs) create management challenges for conservancies mandated to conserve wildlife and promote sustainable economic development. The aim of this research was to investigate stakeholder's risk perceptions and vulnerability associated with HWC, in order to foster deeper understanding of HWC-related decision-making. Our objectives were: 1) characterize local perceptions of HWC-related risks and; (2) investigate the extent to which conservancy characteristics, gender, and expertise influenced attitudes about HWC-related risks. We used participatory risk ranking in a case study approach to explore factors influencing local HWC-related risk perceptions and vulnerability to livelihoods and wildlife in two conservancies in Caprivi, Namibia (n = 50). Expertise, gender and conservancy influenced perceptions of HWC risk severity and acuteness to livelihoods and to wildlife. Non-HWC-related risks (e.g., lack of employment) were cited as exacerbating both human and wildlife vulnerability to HWC. Results provide baseline information about stakeholder attitudes associated with HWC and assert that in community-based management systems successful HWC mitigation may be more broadly tied to improvements in local livelihoods and well-being. Understanding perceptions of risk to and from wildlife and factors that influence vulnerability can help managers design HWC related interventions that more effectively reduce risks to livelihoods and biodiversity.

SY68 Kallick, S*; Stewart, G; Pew Environment Group, International Boreal Conservation Campaign; *skallick@pewtrusts.org*

Canada's Boreal Forest: Will it become the world's best protected forest ecosystem?

Globally, few intact forest ecosystems exist. Extending well over 6,000,000 sq. km. (1,000,000,000 acres), Canada's Boreal Forest ranks with the Amazon Basin and Siberian Taiga as one of the three remaining tracts of large, primary forest and possesses natural values of comparable global significance, including healthy populations of wildlife, extensive freshwater reserves, and some of the world's richest soil carbon stocks. It also harbors world class mineral, oil, gas, timber and hydropower resources. Because it is located in a wealthy nation with strong rule of law, extensive public land ownership, and a tradition of conservation, the Canadian Boreal Forest presents a globally unique opportunity to use Aboriginal and science-based land use planning to maintain ecosystem health even as industrial development and climate change increasingly impact the forest. Over the last decade an unlikely coalition of scientists and conservationists, aboriginal peoples, and progressive resource development corporations have joined forces to create and promote a conservation and sustainable development plan for this ecosystem, calling for establishment of strictly protected areas covering at least 50 percent of the area and application of world leading protective industrial development standards on the remainder. In recent years, substantial progress has been made toward this goal. The authors will discuss the genesis of this initiative, its challenges and the prognosis for its ultimate success.

SP11.11 Kanchan Thapa; Virginia Polytechnic Institute and State University; *kanchan1@vt.edu*

Relationship Between in Tiger and Leopard Population in Dry and Disturbed Ecosystem: A Case study from Parsa Wildlife Reserve- Nepal

Parsa Wildlife Reserve has a low density tiger population in comparison to other protected areas in low land area of Nepal. Recent camera trap survey showed estimated population of 4 adult tigers with an estimated density of 0.72 (SE 3.23) tigers/100 km2. Leopard is other big cats found sharing same habitat with tigers in parsa wildlife reserve. Comparison of spatial distribution of leopard and tigers showed some pattern in occurrence of cats and their habitat was found to be over lapping in the reserve. However, based on the same camera trap study, population density of leopard was found to be higher than in comparison to tiger population. Inverse relationship was found between population estimates of tiger and leopard when compared to population in Suklaphanta Wildlife Reserve. Beside prey density, dominance effect may be cause for this inverse relationship between two co-predators.

SP10.1 Kardos, M.K.*; Amish, S.J.; Dewey S.; Stephenson J. ; Luikart G. ; University of Montana, Grand Teton National Park, Grand Teton National Park; *martykardos@gmail.com*

Fine scale genetic structure of bighorn sheep suggests an important role of behavior in determining population subdivision

Knowledge of factors that affect population subdivision (which affects genetic variation and the potential response to selection) can help to develop strategies to assess connectivity between populations and to manage landscapes for optimal connectivity. The goal of this study was to assess the fine-scale genetic structure of bighorn sheep in Grand Teton National Park. We genotyped 22 microsatellites on 57 individuals from two bands of bighorn with overlapping distributions in the Teton mountain range and 66 individuals in the Jackson herd just outside of the Park. The Teton and Jackson herds (separated by a large valley) were genetically differentiated (Fst = 0.18). Our results also showed substantial genetic differentiation between the two bands of sheep in the Tetons, whose ranges overlap (Fst = 0.12). Our data show strong fine-scale genetic structure in a mountain ungulate in the absence of significant spatial separation or physical barriers to movement (i.e. areas of low habitat quality). The genetic structure of sheep in the Tetons suggests that bighorn may have very strong philopatry even over very short distances connected by high quality habitat. This suggests that philopatry may be as important as habitat fragmentation in determining the strong population structure of bighorn observed over larger spatial scales. Other studies of fine-scale genetic structure should be done to determine if the pattern of strong philopatry is common across the range of bighorn sheep.

P1.204 Kashivakura, CK*; Kutz, S; Veitch, AM; Colwell, D; Lysyk, T; Elkin, B; Ward, R; Massolo; University of Calgary, Government of the Northwest Territories, Lethbridge Research Centre, Government of the Northwest Territories, Yukon Department of Environment

Impacts of climate change on the life cycle, distribution, and host range of the winter tick (Dermacentor albipictus) in the Arctic and Subarctic

Fluctuations in climate can directly affect the ecology and phenology of animals and plants, including ticks. Dermacentor albipictus, the â winter tick' (WT) is an important parasite of deer, elk, woodland caribou, and moose. During the 1980s its northern distribution was limited to southern Yukon (62o25'49"N; 140o19'32"W); however, in recent years, it has been detected further north. This expansion may be associated with climate change driven shifts in WT life cycle and host distribution, and may pose threats to the barrenground caribou (BGC) population in the Canadian north that are facing a significant decline. The objectives of this research are:(1) to develop a serological assay to detect eventual exposure to WT in BGC; (2) to determine current WT host range and geographic distribution, and (3) and evaluate climate factors linked to WT distribution. 19 engorged females ticks are being raised in laboratory conditions to lay eggs until become larvae. Captive reindeer will be experimentally infested and used as model species to validate the test. The serological technique will be developed extracting a protein from WT saliva using Western blot; and the protein will be used as antigen in ELISA test to detect WT exposure on BGC serum. Chemical digestion of hides from hunted moose and BGC together with serology will be used to delineate current WT distribution in Northwest Territories and Yukon, as well as to define its host range and the climate constraints to its potential expansion.

P1.157 Kashkarov, R.D.*; Kreuzberg, E.A.; Marmazinskaya, N.V.; National Uzbekistan University, Tashkent, Uzbekistan, Geomatic and Landscape ecology Laboratory, Carleton University, Ottawa, Canada, Samarkand Museum of Nature, Samarkand, Uzbekistan; *eakreuzberg@gmail.com*

Impact of Agriculture Development on Status of Common Pheasant Phasianus colchicus in Central Asia

Eight subspecies of Common Pheasant Phasianus colchicus, historically found in river gallery forests in Central Asia, provided the valuable hunting resource for local needs. Sharp decline of species populations in the region, observed in 1960s - 1970s, was resulted by loss of natural habitats followed to development of cotton monoculture, over-exploitation and natural periodic fluctuations. Cotton production led to over-consumption of water- resources from rivers and to destruction of riparian forests. However, cultivation of new agricultural fields created additional supplementary habitats, where the primary numbers of pheasants were insignificant due to poor life conditions and high application of pesticides for crop production. Spring point count of displaying males and fall count of youth gain give the more precise assessment of population trends. Permanent monitoring of pheasant in hunting concessions and wildlife surveys, conducted in Uzbekistan, detected increasing of its numbers from early 1990s and its dispersal through agricultural zones, provided them new habitats. Dispersal of pheasant across such zones must lead to hybridization between different subspecies and loss of their unique morphological traits. Without any doubts, that this process needs more attention and should be studied in view of genetic diversity and adaptation of wild subspecies to agricultural landscapes.

P2.46 Kasim, M; Haluoleo University; *marufkasim@hotmail.com*

The effect of community based Marine Protected Area establishment on Fish population and coral reef condition in Indonesia

Coral reef condition and fish population were observed in 39 community based Marine Protected Areas (MPA) in Southeast Sulawesi Eastern Indonesia. During our research in MPA in eastern Indonesia, in 2007 there are 30.16 % of live coral, 40 % of dead coral, 17.23% of other fauna, 10.46 % of abiotic (sands and stones), and 2.15 % of macro algae covered entire coral reef in the region observed. In 2008, the covered of live coral reef have become 33.3 %, dead coral have become 36 %, other fauna have become 6.6 %, abiotic (sands and stones) have become 19.5 % and algae have become 4.9 %. This figures describe that within 1 year, community involvement through this program, have successfully increase 3.14% of live coral, 4% decreasing of dead coral, 10.6 % decreasing of other fauna, 9 % increasing of abiotik (sands and stones) and 2.8% increasing of algae. The amount of species of fish target increase from 52 species in 2007 to become 62 species in 2008 and 108 species in 2009. Community marine protected areas were provides the best protection for species of coral reef, fish and wildlife. This is one of the excellent strategies on marine conservation in Indonesia.

SY25 Keane, A.*; Jones, J.P.G.; Milner-Gulland, E.J.; Imperial College London, Bangor University; *aidan.keane05@imperial.ac.uk*

Modelling approaches to understanding rule-breaking behaviour and enforcement in conservation

There is a large body of theory concerning the enforcement of and compliance with rules, spread over several disciplines, including psychology, economics and sociology. To open the symposium, I review approaches to understanding why individuals break rules and how optimal policy choices can reduce rule-breaking, highlighting research which has specifically dealt with natural resources. Despite the importance to conservation success of achieving compliance with rules, there have been few attempts to extend existing theories of compliance to conservation applications and consequently there is little practical guidance for managers and conservation planners on the optimal design of enforcement programmes. The difficulty of studying rule-breaking behaviour directly means that much of our understanding of the factors which affect compliance with rules comes from models of human behaviour. Consequently, there an urgent need to establish new techniques and empirical approaches to understanding the decision-making processes which lead to rule-breaking, and alter incentives towards compliance. There is also considerable scope for novel approaches to interpreting empirical data in the light of theoretical models. I illustrate this with the example of a â virtual ranger' simulation model which can be used to interpret patrol data and explore robust strategies for law enforcement.

SY61 Keenleyside, K*; Dumouchel, C; Johnson, M; McLennan, D; Pellatt, M; Woodley, S; Wong, M; Parks Canada; *Karen.Keenleyside@pc.gc.ca*

Policy Directions for Climate Change and Protected Areas in Canada: A Perspective from Parks Canada

Increasingly, individual countries, the scientific community, and conservation organizations are recognizing that healthy, well-managed natural ecosystems, including parks and other protected areas, are an essential part of the response to climate change. Actions that enhance ecosystem resilience also enhance the capacity of these systems, and the communities and economies that depend on them, to adapt to change. In refining its own policies, and in contributing to the development of Canada's climate change agenda, Parks Canada is bringing focus to the importance in Canada of ecosystem-based adaptation approaches that include a key role for well-connected, well-managed, resilient networks of parks and other protected areas. The Agency is examining how its programs can adapt to climate change. It is also identifying the potential contribution of protected area establishment, monitoring, and restoration efforts to enhancing Canada's resilience and adaptive capacity more broadly and it is examining policy options that will contribute to enhancing this role. While maintaining a focus on the role of national parks and other protected areas in contributing to climate change adaptation, Parks Canada is also evaluating potential synergies between actions that contribute to climate change adaptation and those that contribute to climate change mitigation through, for example, carbon storage and sequestration.

SP1.12 Keim, JL; De Witt, PD*; Lele, SR; Matrix Solutions Inc., University of Alberta; *pdewitt@matrix-solutions.com*

What is the Value of Prey Habitat in Predator Conservation?

Managers often use resource selection models to identify strategies for wildlife conservation, frequently under the assumption that certain resources are selected because they provide animals with protection, shelter, or food. This is particularly true for predator studies that assume prey habitats represent prey encounter rates. We consider whether snowshoe hare habitat is a viable surrogate for encounters between Canada lynx and their primary prey, snowshoe hare. We simultaneously collected winter track data for lynx and hare in two study areas. A resource selection probability function (RSPF) for hare was fit using habitat-based covariates. We used information criterion to determine whether selection by lynx is best characterized by hare RSPF or by the rate of hare encounters. Results show that lynx selection is better explained by the rate of hare encounters (BIC =-57.7) than by hare RSPF (BIC =-14.4). Although hare encounters correlate with hare RSPF (Correlation = 0.30, P

SY35 Keith Aune; The Wildlife Conservation Society; *kaune@wcs.org*

Ecologically Restoring Plains Bison to Large Landscapes in Western North America: Current Opportunities and Challenges.

Gone are the millions of bison hooves thundering across undeveloped prairies. The past, however, is alive as bison remain a unique icon of North America culture and natural history. There are over 450,000 plains bison today, yet less than 10,000 occur in conservation herds with high genetic integrity, experience natural selection, and influence ecosystem dynamics as they did historically. Based on expert opinion WCS identified some of the priority landscapes where bison might be ecologically restored within 20, 50 and 100 years (Sanderson et al 2002). Through additional screening of potential landscapes and a review of published grassland assessments several priority landscapes become evident where bison might be restored within 20 years. There are less than 10 sites where restoration strategies could be applied within relatively short time frames to restore the ecological function of bison at various scales. Three important strategies could lead to ecological restoration including: 1) reintroducing genetically reputable bison to large intact grasslands under a mulit-jurisdictional framework 2) expanding numbers and range of existing bison herds to fully occupy large multi-jurisdictional landscapes, 3) designing and implementing intermediate sized reintroduction projects anticipating they could be incrementally expanded over a longer time frame. Bison restoration in North America could rapidly advance using each strategic approach on 5-6 appropriate western landscapes.

P2.57 Kelly, ELA*; Smith, JE; Scripps Institution of Oceanography, UCSD; *elkelly@ucsd.edu*

Can herbivores mitigate the effects of nutrient loading on coral reefs? Assessment of impacts and future implications for coral recovery on Maui

Phase shifts from coral to algal-dominated reef ecosystems have occurred on coral reefs around the world as a result of human impacts. Coral cover at Kahekili Reef, Maui has declined from 55% to 33% over the past 15 years while algal abundance has increased, likely due to two local stressors: land-based nutrient loading and overfishing. In July 2009, the Hawaii Division of Aquatic Resources designated Kahekili an Herbivore Fisheries Management Area (HFMA), which banned the removal of herbivorous fish and urchin species in an effort to reverse the decline in coral cover on this reef. Algal growth rates, herbivore grazing rates, and algal production were assessed upon the designation of the HFMA. Current data on herbivore grazing rate and preference of algae species show that the most significant blooming algal species were grazed an order of magnitude faster than non-blooming algae, which suggests that the ban could be effective in reducing algal cover. However, algal production on the reef exceeds the grazing capability of the current fish population on Kahekili. Therefore, future increase in herbivorous fish biomass on the reef will be essential to return the reef to a coral-dominated ecosystem and to increase the resilience of this reef system to global stressors like climate change. The success of the HFMA could provide a model for coral reef area management.

SY32 Kelly, Erin C.*; Bliss, John C.; Oregon State University , Oregon State University; *erin.kelly@oregonstate.edu*

Serendipity, Adaptability, and Political Horse Trading in Collaborative Conservation

Across the U.S., disintegration of the industrial forestland base has created opportunities for alternative forest tenures to emerge. In this paper we analyze factors leading to development of one such innovative ownership, the 12,000-ha Skyline Community Forest, at the edge of Bend, Oregon. Recognizing opportunity in the collapse of the existing forest ownership pattern and the imminent threat of parcelization, a local land trust led creation of a community forest to maintain wildlife habitat, to provide recreation access, and to protect an economically valuable viewshed. While the Skyline Community Forest deal has yet to be completed, its story illustrates the complex, messy process commonly hidden beneath genteel monikers such as "collaborative conservation." Working with strategic allies from the forestry and investment sectors, the land trust formed an adaptive local network that could respond to multiple political pressures and opportunities. The network was not entirely inclusive, nor did it function with ideological purity, but it capitalized upon, and changed with, emerging contingencies. We identify key factors that contributed to the development of the Skyline, including local leadership, political savvy, risk-taking, and human and social capital, among others. We conclude with lessons about collaboration in an era of unprecedented formerly industrial forest land availability and rising land trust prominence.

20.4 KERBIRIOU C*; BAS Y; DUFRENE L; ROBERT A; JULIEN JF; CERSP MNHN-UPMC-CNRS; *kerbiriou@mnhn.fr*

Long term trends monitoring of bats, from biodiversity indicator production to species specialization assessment

In order to reach the goal for significant decrease of the biodiversity loss rate, the use of biodiversity indicators is proven to be necessary to monitor the actual loss and determine the actions to take in the following years. In this context, the National History Museum of Paris initiated a set of national monitoring programs, focusing on common species of birds, butterflies, amphibians and bats. The program of common bat species is based on standardized recordings of time expanded echolocation bat calls. Nevertheless, this monitoring does not assess direct measures of population but an index of bat activity, so we assess the influence of meteorological parameters within season or among years, influence of proximity of breeding roost and also biases coming from observer's identification errors. Yet, accounting to this bias, we assess abundance variations among time, space and habitat with the aim to provide a sensitive indicator of various pressures on ecosystem such as agriculture intensification, forest management or climate change. According to the accurate and mass of data we used this monitoring for assessing species habitat specialization, thermal specialization and then evaluate niche overlap between species. Finally we found a relationship between species specialization and current threat status.

SY73 Kerr, Jeremy T*; Coristine, Laura; University of Ottawa; *jkerr@uottawa.ca*
Habitat loss, climate change, and the evidence of their impacts on ecosystems and species at risk across Canada.
In Canada, habitat loss and climate change are exerting disproportionate effects on native flora and fauna due to the unique intersection of species richness gradients, climatic gradients, and patterns of habitat loss. The vast majority of Canada's species at risk are found in the south, a highly agricultural region with expanding urban areas. As climate change accelerates, altitudinal and elevational shifts in range will become increasingly necessary for species. However, the loss of habitat connectivity throughout Canada's southern areas could slow northward range expansion, particularly for species at risk. Even without the limits on dispersal ability imposed by highly concentrated habitat losses, climate change will impose dispersal requirements on many species that exceed their maximum capacities. Furthermore, climate change is causing phenological shifts and the resulting disparity between trophic levels lowers reproductive success. It is evident that habitat loss and climate change, individually and through their interaction, could disrupt biological systems pervasively in Canada, a trend that evidence indicates is currently underway.

SY42 Kessler, Winifred; BC Habitat Conservation Trust Foundation; *nutwood@gci.net*
Hunting and Conservation: a Lifetime of Lessons Learned
The sustainable use of wildlife is a pillar and major driving force for conservation. Not raised in a hunting family, I have gained this understanding through a lifelong career in the management, use, and conservation of wildlife and their habitats. During 17 years as a professional member of the Boone & Crockett Club and 13 years on the Board of the Habitat Conservation Trust Foundation, I ve had the privilege of helping hunters, anglers, trappers, and guides invest tens of millions of their donated money in conservation projects, research, and environmental education. Experiences in India, Siberia, Mongolia, and southern Africa helped forge my understanding of the essential linkages between rural people, land health, biodiversity, and the sustainable use of wildlife. Similar relationships of rural people intent on conserving the health of lands and wild populations that they, in turn, rely on for economic and cultural sustenance were pivotal in my past decade as a natural resource manager in Alaska. A life s journey of professional experience, observation, and personal reflection has brought me to the inescapable conclusion: biodiversity conservation is possible only if people care enough, and the sustainable use of wildlife is an essential part of the equation.

5.1 KESSLER, AIMEE E.*; Gilroy, David J.; Luvsandash Chuluunchimeg; Dorjkhuu Enkhtuyaa; Smith, Andrew T.; School of Life Sciences, Arizona State University, Tempe AZ 85281, USA, Rocky Mountain Youth Corps, Taos NM 87571, The Tributary Fund, Ulaanbaatar, Mongolia, Hobsgol Aimag, Mongolia; *Mimi.Kessler@ASU.edu*
Community-Based Research and Education as Strategies for the Conservation of Hunted Species: Experiences with Great Bustard in Mongolia
Illegal hunting is a serious threat to the survival of populations of the Great Bustard in Mongolia. Research has found poaching of this large bird to occur at stopovers on the lengthy migration undertaken by some populations. Substantial variation in migratory routes and stopovers has been observed between individuals, and from year to year. Traditional conservation activities, such as the establishment of protected areas and increase in anti-poaching enforcement have only limited effectiveness when bustards are found only for short periods of time, in low densities, across a wide distribution. We find that under these conditions, conservation goals must be accomplished through the engagement of local residents. We have prioritized community involvement in research at our field site in northern Mongolia. Here, we offer our experiences, which include the incorporation of local adults and children in research activities, informal and formal programs with schoolchildren and interested citizens, capacity-building and media outreach as an example of community engagement in species conservation. We also include further experience with Mongolian Taimen, a large salmonid, which reaffirms that community involvement in conservation and research efforts has multiple benefits, including wildlife protection, sharing of knowledge, and increased understanding of the role of research.

P2.143 Keuler, NS*; Hawbaker, TJ; Gavier-Pizarro, GI; Radeloff, VC; Department of Statistics, University of Wisconsin-Madison, Madison WI, USA, Rocky Mountain Geographic Science Center, US Geological Survey, Denver CO, USA, Instituto de Recursos Biologicos (CNIA-CIRN), Instituto Nacional de Tecnologia Agropecuaria (INTA), Buenos Aires Argentina, Department of Forest and Wildlife Ecology, University of Wisconsin-Madison, Madison WI, USA; *nskeuler@wisc.edu*
Effects of cross-validation methods and model properties on the accuracy of estimated prediction errors in multiple linear regression
Cross-validation (CV) is widely and increasingly used by conservation biologists to assess the predictive ability of habitat models. The problem is that there remains little guidance for choosing an appropriate CV method, and it is unclear how parameter choices affect results. We used simulations to determine how estimates of prediction error (PE) depend on CV method. Using multiple linear regression, we varied sample size (n = 10, 30, 100, or 1000), number of variables in the model (1, 3, or 6), and co-linearity (two variables having correlations of 0.3, 0.6, or 0.9, or all variables independent). For each combination of model properties, we simulated 1000 data sets, and implemented 7 CV methods: k-folding with k = 2, 3, 5, 10, or n; and the standard and 0.632+ bootstraps, each with 1000 re-samplings. Mean estimates over all simulations were compared to the true PEs. The standard bootstrap had the best overall accuracy (maximum absolute deviation from true PE of 2%), though 10-folding also performed well (maximum deviation 5.7%). Sample size was the most important property. For n = 1000, 100, 30, and 10, the maximum deviations were approximately 0.3%, 2%, 7%, and 15%, respectively. Accuracy was higher when the ratio of variables in the model to the sample size was small. We recommend limiting the number of predictors relative to sample size, and cross-validating models using the bootstrap or a k-folding procedure with a large number of folds.

SP10.7 Keyghobadi, Nusha*; Weintraub, Jason; Fonseca, Dina; University of Western Ontario, Academy of Natural Sciences Philadelphia, Rutgers University; *nkeyghob@uwo.ca*
Historical specimens reveal past relationships, and current conservation status, of populations in a declining species: the regal fritillary butterfly
Identifying distinct populations, or groups of populations, within a threatened species is a critical step in conservation planning. Regardless of the criteria used to define subspecific units for conservation, good decisions are critically dependent on sufficient and appropriate sampling across the geographic range of the species being considered. Where populations within a species range have recently become extinct, our ability to accurately infer the phylogeographic history from remaining extant populations may be impeded. This, in turn has implications for, or can hinder, the designation of taxonomic and/or management units. In such situations, analysis of historical specimens from extinct populations may be critical for the designation of such units. We have used morphological and genetic data from historical specimens representing extinct populations, in addition to data from extant populations, to infer the historical relationships among, and conservation status of, populations of a declining butterfly, the regal fritillary, Speyeria idalia. This species provides a case study of how data from populations that have very recently become extinct may be necessary to inform the definition of taxonomic and management units, and thereby conservation strategies for remaining populations.

P1.190 Khan, MZ*; Hussain, B; Ghalib, SA; Zehra, A; Department of Zoology - Wildlife and Fisheries, University of Karachi, Karachi, Department of Zoology - Wildlife and Fisheries, University of Karachi, Karachi-75270, Department of Zoology - Wildlife and Fisheries, University of Karachi, Karachi-75270; *zaheerk2k@yahoo.com*
Reptilian Fauna of Coastal Areas of Karachi
In Pakistan, reptiles are a blend of Palaearctic, Indo-Malayan and Ethiopian forms, and have 179 species of reptilian fauna consisting of turtles, tortoises, crocodile, gavial, lizards and snakes. Pakistan also has long been known to support a large population of Green Turtles (Chelonia mydas) in Sindh and Balochistan coastal areas. In this study, total twenty seven reptilian species including 3 turtle species, Green Turtle (Chelonia mydas), Olive Ridley (Lepidochelys olivacea), and Hawksbill Turtle (Eretmochelys imbricata), 9 lizard species such as Common Tree Lizard (Calotes versicolor versicolor), Spotted Barn Gecko (Hemidactylus brooki), Yellow Bellied Common House Gecko (Hemidactylus flaviviridis), Persian House Gecko (Hemidactylus persicus), Blotched House Gecko (Hamidactylus triedrus), Mediterranean House Gecko (Hamidactylus turcicus), Blue Tail Sand Lizard (Acanthodactylus cantoris), Spotted Lacerta (Mesalina watsonana), and Bengal Monitor (Varanus bengalensis) were recorded from Manora, Sandspit, Hawksbay and Cape Monze areas. Fifteen snakes species viz Beaked Sea Snake (Enhydrina schistosa), Blue Green Sea Snake (Hydrophis caerulescens), Annulated Sea Snake (Hydrophis cyanocinctus), Persian Sea Snake (Hydrophis lapemoides), Broad Band Sea Snake (Hydrophis mamillaris), Reef Sea Snake (Hydrophis ornatus), Yellow Sea Snake (Hydrophis spiralis), Pygmy Sea Snake (Lapemis curtus), Spotted Small Headed Sea Snake (Microcephalophis cantrois), Pelagic Sea Snake (Pelamis platurus), Spotted Viperine Sea Snake (Praescutata viperina), and Blotched Diadem Snake (Sphalerosophis diadema diadema) were recorded, while three species Cliff Racer (Platyceps rhodorachis) Saw-scaled Viper (Echis carinatus) and Black Cobra (Naja naja) were recorded from Manora, Hawkesbay and Cape Monze area only.

SY9 Kihslinger, RL*; Wilkinson, JB; Meyer, D; The Environmental Law Institute, Bernuth & Williamson ; *kihslinger@eli.org*
Making the case for habitat conservation - communications tools for planners and the public
In the United States, local planners make most of the decisions concerning the pattern and extent of development, significantly influencing the amount of land conserved for habitat. However, most of these development decisions are made without the participation of conservation experts. We conducted extensive market research - including 60 targeted interviews and a survey of over 500 planning professionals, elected officials, planning board members, and conservation biologists - to determine how to motivate local decision-makers to make conservation-minded land use decisions. We found that community planners are often eager to incorporate conservation into their community's vision, plans, and policies, but that they can be significantly hindered by a lack of political will as well as a failure of conservation experts to participate in the process. We also found that conservation experts need to be better informed and engaged in the planning process if they want their information to be applied. In order to better integrate conservation principles into land use planning, planners need information to help them make the case for conservation; case studies about how nature conservation has been successfully incorporated in other communities' visions and plans; and connections to conservation experts who are willing to participate in the planning process.

13.1 Kindlmann, P.; Institute of Systems Biology and Ecology Academy of Sciences of the Czech Republic ; *pavel.kindlmann@centrum.cz*
Challenges to wildlife conservation posed by hunting in non-protected areas north of the Bardia National Park
The hunting of wildlife for subsistence and trade is a serious threat to conservation. It is widespread in the non-protected areas. However, there is no understanding of the nature and trends in hunting and their consequences for protected areas. The nature and scale of hunting north of the Bardia National Park were assessed in order to determine the spatial variations in hunting intensity. Focal group discussions with forest user groups and transect surveys were used to determine the abundance of wildlife. Detailed interviews with hunters were used to explore their hunting patterns. Apart from the information obtained from the interviews, encounters with hunting teams, hunting signs and information from herders were used to identify hunting sites. Hunting is widespread throughout the region, but the intensity of hunting is greater close to the northern edge of the national park, which is associated with the relative abundance there of wildlife. Hunting along the immediate periphery of the national park is increasing. The hunting of common and protected species suggests that it is both for subsistence and trade, which could severely deplete the wild animals in the forests and consequently affect the protected area. Hence, it is necessary to legalize community-based monitoring by forest users groups and establish effective government supervision.

SY42 Klassen, G; Alberta Trappers Association; *trappergord@telus.net*
Furbearer Harvest in Canada: 400 years of Sustainable Wildlife Conservation
Furbearer management in Canada is the oldest sustainable use of wildlife in North America. The number of furbearers today equals or exceeds the numbers that early settlers experienced when Canada was first settled by Europeans. Trapping today employs scientifically proven humane methods and equipment to harvest the 19 furbearing species in Canada. In addition, the wild fur market is strongly regulated by provincial and federal regulations as well as international humane trap standards. Trappers have the role of top predator in the territory they manage. Sustainable management of furbearers relies on harvesting the annual surplus that exceeds a habitat's carrying capacity. By ensuring the habitat is not over-utilized furbearers will continue to thrive and produce healthy young. Sustainable management involves not just harvest but a deep knowledge of animal behaviour and habitat potential. A trapper's connection to the land is strong and consists of decades of knowledge and time spent walking the land. Regulated trapping has left no landscape footprint in all the 400+ years of wild fur harvesting in Canada. Managing a trapline is a lifelong learning experience. No other person in most cases has the ecological appreciation for a given territory than the trapper. Despite maintaining such successful management, trapping continues to be challenged by interest groups that are based on emotion and not science.

SP5.7 Kleier, C. *; Carello, C; Regis University, Denver, CO, Metropolitan State College of Denver, CO; *ckleier@regis.edu*
Willow (Salix planifolia) clipping for ski trail maintenance reduces catkin production but does not decrease biodiversity
To test the overcompensatory and intermediate disturbance hypotheses and to determine if the reproductive potential of willow shrubs (Salix planifolia) was harmed by periodic clipping, we investigated growth, biodiversity, and catkin production in 30 manually clipped and 30 unclipped one-meter square quadrats along six transects. Willows were clipped for maintenance of cross-country ski trails in a subalpine habitat near Breckenridge, CO, USA. We measured growth rate and catkin numbers in 250 unclipped plants and 250 clipped plants throughout the growing season in 2008 and 2009. We found that clipped plants had less growth and lower growth rates than unclipped plants and that catkin production was much lower in clipped plants ($p < 0.01$); thus, the overcompensatory hypothesis was not supported. We also found that biodiversity was not significantly different between clipped and unclipped quadrats in this subalpine meadow.

1.6 Kleppel, GS*; Girard, CB; LaBarge, E; Stonaker, B; University at Albany, SUNY; *gkleppel@albany.edu*
Intensive Rotational Targeted Grazing: An Ecosystem-Based Approach to Invasive Plant Management
Invasive plant control often involves undesirable methods (e.g., herbicide use). Targeted grazing (TG), invasive plant control with livestock, is widely used in grass and rangelands. We are investigating the efficacy of an agricultural method, intensive rotational grazing (IRG) as a TG protocol in wetland and parkland habitats. IRG involves high stocking rates (2-4 times conventional rates) and rapid rotations (2-3 d) through small paddocks, mimicking the spatio-temporal distributions of wild herd-forming ungulates. Our controlled experiments investigated the capacity of Romney sheep (Ovis aries) to manage purple loosestrife (Lythrum salicaria) in a wet meadow (2008, 2009), and the invasive vine, mile-a-minute (Persicaria perfoliata) on parklands (2009). In both studies, the sheep, stocked at 3 X the conventional rate, were rotated through a 4-paddock system at 8-12 d/rotation. Grazed paddocks were compared with adjacent ungrazed sites. In both experiments: (1) several invasive species, rather than the target alone, were grazed; (2) flowering of the targeted invasives was greatly reduced; (3) total ground-cover of targeted invasives declined by 20-40%; (4) species richness, S, in grazed paddocks exceeded that in ungrazed sites; e.g., in the wet meadow, deltaS was 20% in 2008 ($t=5.27$; p

P2.132 Knaga, PS*; Sissons, R. ; Wruth, A; Parks Canada Agency; *paul.knaga@pc.gc.ca*
The How, Where, and Why of Reintroducing Black-footed Ferrets in Canada
In October 2009, Parks Canada Agency, alongside collaborating organizations, reintroduced black-footed ferrets (Mustela nigripes) into Grasslands National Park in southern Saskatchewan. The reintroduction presented Parks Canada with a number of challenging problems to solve. Geographic Information Systems (GIS) were employed to answer these questions by: modelling prey density to predict possible ferret release sites, analysing and correcting survey intensity, and measuring and analysing post-release movement and home-ranges. Black-footed ferret release sites were chosen based on prey density models based on data collected by park biologists on active burrows of the ferret's main prey item, the black-tailed prairie dog (Cynomys ludovicianus). Natural neighbour models were created as a proxy for prey densities. Release sites were chosen based on these prey distribution estimates, known black-footed ferret home-ranges, and the genetic relatedness of individual ferrets. To determine occupancy estimates of black-footed ferrets from monitoring efforts, we corrected ferret locations using spatially-explicit survey intensity models. Finally, post-release ferret movements and home-ranges are being analysed to help understand how this population is re-establishing itself in the Canadian prairies. These methods and preliminary results are presented here to elucidate the importance and utility of GIS in the reintroduction and re-establishment of black-footed ferrets in Canada.

SY28 Knopff AA*; Knopff KH; Boyce MS; St Clair CC; University of Alberta; *aknopff@ualberta.ca*

Cougars in the backyard: preserving ecological integrity in developing landscapes

Maintaining large carnivores and their ecological functions in human-dominated landscapes poses a significant conservation challenge. In these areas, large carnivores are often extirpated by anthropogenic habitat modification or direct persecution by people. Persecution is especially likely when people believe carnivores threaten human lives or property. To better understand how carnivores and humans might co-exist, we studied cougar habitat selection and human perception of cougars simultaneously in west-central Alberta, Canada. Cougars varied in the degree of avoidance they exhibited to human development. Individuals that were exposed to higher levels of anthropogenic development at the home-range scale exhibited less avoidance of anthropogenic features than cougars with limited exposure to development and altered habitat use temporally to accommodate diel variation in human activity. Survey results indicated that west-central Albertans substantially overestimated the risk posed by cougars to humans. Nevertheless, they were tolerant of cougars, provided cougars did not occur near their homes. Our results suggest that cougars can persist in moderately developed rural and exurban landscapes. However, managers must exert caution to avoid exceeding development thresholds and educate the public so that intolerance, which historically drives predator extirpation, is not increased by inflated risk perception.

SY33 Koizumi, I; Hokkaido University; *itsuro@cris.hokudai.ac.jp*

The struggle for survival by native Japanese salmonids versus dams, sediment, introduced species, climate change, and urbanization.

I review the current status of Japanese salmonids, including masu salmon, white-spotted charr and Sakhalin taimen, endemic to Far East, to show how these fishes survive, or not, in such a highly populated country. All Japanese salmonids have suffered from human activities in the past few decades, but the causes and consequences are quite different depending on their life history, habitat, and commercial importance. Although most salmonids have been diminished, population size has been dramatically increased in chum and pink salmon since the 1970\\\'s due to extensive hatchery release. Such hatchery activities have resulted in loss of wild populations, although recent genetic analysis showed that the signature of local genetic structure still remains. Contrary to chum and pink, masu salmon has been declined regardless of hatchery efforts, probably due to stronger dependence in freshwater. Because of hilly topology, there are many erosion control dams in Japan, which have resulted in serious local extinction for white-spotted charr. Japan held the southern-most populations of white-spotted charr and Dolly Varden. Therefore, they are predicted to suffer significant impacts from global warming. The main cause of population degradation of the largest salmonid, Sakhalin taimen, is sediment loading from farmlands, which dramatically reduces spawning sites and egg survival. In addition, many native salmon, charr, and taimen are affected by introduced rainbow, brown and brook trouts.

6.2 Koper, N*; Mozel, KE; Henderson, DC; University of Manitoba, Environment Canada; *koper@cc.umanitoba.ca*

Recent declines in tall-grass prairies in Manitoba and effects of patch structure on community persistence

Tall-grass prairies are one of the most critically endangered ecosystems in North America. We evaluated changes, between 1987-1988 and 2006, in number, size and quality of 65 remnant tall-grass prairies in Manitoba, Canada. In 2007 and 2008 we conducted more detailed surveys of vegetation composition at 580, 0.2 x 0.5 m quadrats within 24 remnant prairies, to evaluate the potential roles of patch structure (prairie size, matrix type and edge effects) on community persistence. We found that northern tall-grass prairies continue to suffer from serious threats: 37% of remnant tall-grass prairies present in 1988 had changed to other habitat types by 2006, and quality of most remaining prairies, particularly small ones, declined over time. Both native and alien species responded more strongly to distance to edge than to prairie size or matrix type. Prairie quality may be lower in smaller remnants because of edge effects. Richness of native plants was also negatively correlated with cover of alien species at both quadrat and patch spatial scales, suggesting that alien species may displace native species. Active management is required to manage and conserve the fragments of native tall-grass prairie that remain.

P1.51 Koscinski, D; Crawford, LA; Keller, HA; Keyghobadi, N*; University of Western Ontario; *daria.koscinski@uwo.ca*

Non-lethal tissue sampling in two butterfly species shows no effects on flight behaviour and survival

Genetic data are increasingly used to inform conservation and management plans for wildlife species. For smaller invertebrate animals, tissue material for genetic analyses is typically sampled by collecting whole individuals (i.e. lethally). Increasingly, researchers around the world are using non-lethal means of tissue collection (e.g. leg, wing clips) within the context of genetic studies on threatened butterflies, although few studies have examined the impact of such sampling. We investigated the effects of non-lethal tissue sampling on flight behaviour and long term survival of two butterflies, the cabbage white (Pieris rapae) and the inornate ringlet (Coenonympha tullia inornata), in the wild in Southwestern Ontario. We applied three treatments: handling and release (control), wing clipping and leg removal. We followed each butterfly immediately after release and measured a variety of flight behaviours. All butterflies were also individually marked for mark-recapture analyses. We found no differences in the number of movements, flight speed, the time spent flying and sitting across treatments in either species. We also found no differences in survival across treatments in either species. Our study suggests that both types of non-lethal sampling have little impact on the flight behaviour and survival of wild butterflies.

SP8.12 Kouderin K.M.*; Adje C.B.; Martin D.M.; CREDI-NGO; *makko25jn@yahoo.fr*

Community protecte areas creation: case of "sitatunga valley" in south of Benin

Community-based natural resource management is a relatively new in Africa. The project of community protected areas creation "sitatunga valley" is an initiative of CREDI-NGO started since 2007 in the south of Benin. Located inside the RAMSAR site 1017, this ecosystem shelters an astonishing and impressive diversity. This project aimed to integrate the riparian populations of this wetland of about 1000Ha in the conservation of its natural resource especially the sitatunga, Tragelaphus speckii registered in IUCN redlist. A dozen of villages with a total population of 17000 habitants live around this ecosystem. The actions of CREDI - NGO are sensitization, biologic resources inventory, development of management tools and setting up of management committee. The main targets group is the hunters who have been organize in a committee of hunters and working for responsible hunt charter development. Otherwise, CREDI-NGO makes advocacy and lobbying by the political authorities for the obtaining an official status of this protected areas. One of the major difficulties of setting this approach is mainly illiteracy of more than 90% of the population whose life depends closely on the natural resources. The similar experiences are welcome so that our project can succeed in Benin.

SY77 KovÃ¡cs, A*; KÅ rÃ¶si, Ã ; Orci, KM; BatÃ¡ry, P; BÃ¡ldi, A; Szent IstvÃ¡n University, PhD School of Environmental Sciences, Animal Ecology Research Group of the Hungarian Academy of Sciences and the Hungarian Natural History Museum, Agroecology, Georg-August University; *kovacsanko@yahoo.co.uk*

Potentials of set-asides in promoting farmland insect and plant diversity in Hungary, Central-Europe

The establishment of set-aside fields might provide important non-cropped habitats for farmland flora and fauna, suffered largely from agriculture intensification in Europe. In Hungary, special agri-environment schemes require the establishment of sown set-asides on 5-10% of the total cropped area of farms. We studied the benefits of these fields for farmland plants, orthopteran (Orthoptera), bee (Apidae) and butterfly (Rhopalocera) fauna, comparing 1, 2 and 3 year-old set-asides, winter cereal fields and semi-natural grasslands in 39 sampling sites. Species richness, abundance and species composition of insects were tested against field type and plant species richness. The wheat fields were the poorest habitats. The species richness and abundance were usually higher in set-aside than in cereal fields with no significant difference between set-aside of different age. We found the highest number of orthopteran species and butterfly individuals in semi-natural grasslands. At community level, field type had a significant effect on the orthopteran and butterfly assemblages, but not on bee communities. Orthopteran assemblages were affected by plant species richness. Our results show that set-asides are important habitat patches for insects, similar to that of semi-natural grasslands. Unfortunately, because of the increasing commodity prices and the need for bioenergy crop plantations, set-asiding was abolished and set-aside fields almost disappeared from the EU during the last years. Respect their high potential in conservation of farmland biodiversity we support the importance of set-asides within the Hungarian agri-environment scheme and suggest set-aside establishment in other Central European countries as well.

P1.173 KozÃ¡k, L.*; JuhÃ¡sz, L; GyÃ¼re, P.; University of Debrecen, Department of Nature Conservation Zoology and Game Management; *kozakla@agr.unideb.hu*

Competition for nesting place between arboricol small rodents and hole nesting birds

Since 2006 we organize the dormouse monitoring program of HortobÃ¡gy National Park. In connection with this work we have been tested the efficiency of two type of nesting boxes (plastic tube and wood made box) and we have been analyzed the competition for nesting place among dormice, forest mice and hole nesting birds. In our sample area (deciduous forest) there are living one dormouse species (Muscardinus avellanarius), two arboricol forest mice species (Apodemus sylvaticus and A. flavicollis) and several hole nesting bird species (potential nesting species in this size of boxes are the tits (Parus caeruleus and P. major). Our data show that the plastic tube are suitable for Muscardinus monitoring because forest mice or birds are used this tubes only in 10% of occupied tubes and they do it only in the young area of the forest where natural holes do not exist. The preference of wood made boxes also by dormice is significant but they used the tubes in the older part of the forest as well. The most powerful competitors are the forest mice: 84 % of nest changing in an occupied box or tube were connected to their occurrence. In 8-8% of occasions the dormice occupied a nest of forest mice or birds. The destroying of the nests or nestlings of inhabited boxes or tubes were recognized only in occupying behavior made by forest mice.

SY42 Krausman, PR*; Niraj, SK; University of Montana, Indian Forest Service; *paul.krausman@umontana.edu*

Perspectives from India: In A Land Without Sustainable Use

India is the world's largest democracy with a rich history of biodiversity that is challenged by an increasing human population. Prior to their independence in 1947 the conservation of wildlife and its habitats was not a national priority. Since then, wildlife has gained national prominence but sustainable use has not been part of India's conservation model. Our objective is to discuss some of the reasons and attitudes that have led to the omission of sustainable use in India that have been expressed by policy makers, conservation scientists, NGO personnel, and field officers. Overall, most stakeholders opposed the use of sustainable use as a conservation model except field officers who could see the merits it presents. Even some decision makers saw the utility of sustainable use in conservation as long as there was adequate information available for species from which to make informed decisions. The major concerns to incorporating sustainable use in conservation models was that the concept could not be feasible due to a lack of regulation, monitoring, and consultation with the public. Although sustainable use is not currently an active part of India's conservation plan, stakeholders are discussing the concept more as they explore different models to manage and conserve their wildlife.

14.2 Kreft, S*; Blatt, J; Strixner, L; Hobson, P; Luthardt, V; Ibisch, PL; Faculty of Forest and Environment, University for Applied Sciences Eberswalde, Alfred-Moeller-Str. 1, 16225 Eberswalde, Germany, Faculty of Land Use and Nature Conservation, University for Applied Sciences Eberswalde, Friedrich-Ebert-Str. 28, 16225 Eberswalde, Germany, School of Sustainable Environments, Writtle College, Chelmsford Essex, CMI 3RR, UK; *skreft@fh-eberswalde.de*

Climate change-enhanced conflicts over the EU's Natura 2000 protected area system call for a shift towards a more adaptive and integrative management

Initially, the EU's Natura 2000 system of protected areas was designed to safeguard the sustainable management of cultural landscapes. Another key objective was to include the wider landscape in targets for biodiversity conservation. The current shift in strategy of Natura 2000 promotes the protection of static representations of narrowly defined targets. A vulnerability analysis of Germany's Natura 2000 sites exposed failings in attempts to resolve conflicts between land use and conservation. Furthermore, spatial and management fragmentation, and lack of documented adaptive management plans also contributed to vulnerability. These issues are compounded by effects of climate change on biodiversity and land use. Conservation problems caused by stakeholder conflict in densely populated Europe can be reduced by returning to the original integrative concept, and by prioritising ecosystem functionality. A proactive strategy of climate change adaptive management that engages land users from the entire landscape would promote ecosystem cohesion thus contributing to a true Natura 2000 network. Participatory strategies recognise the fundamental values of biodiversity in maintaining ecosystem functionality, and the need to conserve and manage it sustainably. Under this system conservation action would work towards goals and targets agreed by all stakeholders, a coalition process that encourages collective responsibility and full participation.

P1.187 Kremer, C*; Vamosi, SM; Rogers, SM; University of Calgary; *cskremer@ucalgary.ca*

GENETIC AND PHENOTYPIC VARIATION IN ALBERTAN BROOK STICKLEBACK (CULAEA INCONSTANS)

Understanding the remarkable fits between organisms and their environment represents a major challenge for evolutionary biologists. In heterogeneous landscapes, populations may be locally adapted and may respond differently to environmental change. In this study we investigated local adaptation in Albertan brook stickleback (Culaea inconstans) populations. We discovered significantly high estimates of phenotypic divergence (PST average = 0.86) in comparison to among population estimates of neutral genetic divergence (FST = 0.14, 95% CI = 0.09, 0.24) estimated with 8 microsatellite loci in four lakes (N = 50 stickleback per lake). These comparative estimates of phenotypic differentiation against neutral expectations revealed pronounced departures in at least nine traits (including geometric shape, dorsal spine number and pelvic girdle length), consistent with the hypothesis that directional selection has driven the divergence of these phenotypic characters between environments. Moreover, genetic population structure estimates revealed evidence for dispersal between lakes despite an apparent lack of inflows or outflows. This divergent selection may be the result of physical characteristics of the lakes, as well as the annual introduction of rainbow trout (Oncorhynchus mykiss) into certain lake systems.

P1.92 Kreuzberg, EA*; Lindsay, K; Geomatic and Landscape Ecology Laboratory, Carleton University, Ottawa, Canada, Canadian Wildlife Service, Environment Canada; *eakreuzberg@gmail.com*

What is farmland bird?

Effects of agriculture on biodiversity have been well-documented in Europe at various spatial and temporal scales. Thirty-three percent of native bird species (150 of 453 species) are classified as dependent on farmland for their persistence; 36 species defined as farmland birds are used by the European Bird Census Council as an environmental indicator. These species have exhibited continent wide declines and continue to be at risk from intensification or farm abandonment. In contrast, in North America, large scale transformation of agriculture is more recent than in Europe, has progressed more rapidly and few refer to farmland birds per se, preferring instead to define species by their original native association such as grassland, forests, shrublands or wetlands. Based on the comparison of existed literature and review by subject experts, we propose a list of 72 species that should be considered as farmland birds in North America. 24 of 28 farmland specialists shown decline in population numbers especially in the regions with intensive agriculture. A Farmland Bird Index as in Europe could be used in North America to monitor effects of agriculture on biodiversity and for designing and implementation large scale management and mitigation measures, such as agri-environmental schemes.

P1.105 Kricsfalusy, VV; of Environment and Sustainability, University of Saskatchewan; *vladimir.k@usask.ca*

Conservation assessment of remnant fescue grasslands in Saskatchewan, Canada

Native grasslands, the most threatened habitat in North America, has experienced dramatic decline as a result of the agricultural intensification and changes in land use. Most of the prairie in Canada is mixed grasslands with small inclusions of native fescue grasslands. These remnant fescue grasslands should be the primarily focus of nature conservation efforts because they are hotspots of biodiversity and possess high richness and occurrence of many rare plant species. Despite the high conservation value of fescue grasslands alteration effects on their flora and vegetation have not been sufficiently quantified and described. Rigorous scientific investigation of habitat conditions, vegetation communities' and plant species' abundance and distributions are required. The objective of our research is to conduct a conservation assessment of remnant fescue grasslands in Saskatchewan with the aim to: 1) identify rare plant species, 2) delimitate rare plant communities, 3) determine threats to rare plant species, communities and their habitats, and 4) prioritise them for conservation plans and monitoring. The short-term research will focus on remnant fescue grasslands at the local and regional levels and intends to assess experimentally the link between habitat disturbance, native plant species decline and exotic species invasion. Our long-term goal is to investigate how these factors affect threatened fescue grasslands in different temperate regions of the world.

SY53 Krofta, DM; US Fish and Wildlife Service; *douglas_krofta@fws.gov*
Critical Habitat Under the United States Endangered Species Act: Lessons Learned From Over 30 Years of Implementation
There is a statutory requirement under the Endangered Species Act (ESA) to designate critical habitat for listed species to the maximum extent prudent and determinable. Extensive confusion and differences of opinion exist regarding the designation process and conservation value of critical habitat that has resulted in significant litigation and expenditure of resources as well as inconsistencies in the designation process. Court rulings and legal opinions have influenced the process further by invalidating regulatory definitions and providing their interpretation of statutory definitions and the designation process. The implementation of a consistent national policy by the Fish and Wildlife Service and National Marine Fisheries Service (Services) that incorporates clear definitions and guidance for specific key terminology, criteria, methodology and procedures would facilitate a more consistent, efficient and defensible approach to designating critical habitat, while focusing expenditures of valuable resources. In short, following over 30 years of implementing the critical habitat provisions of the ESA, the Services have determined that there may be a more efficient manner in which to designate critical habitat under the ESA, and revisions to the current approach are needed.

SY51 Krosby, Meade; University of Washington; *mkrosby@u.washington.edu*
Climate Smart Connectivity Planning for Washington State and the Pacific Northwest
From local to continental scales, efforts to design and implement landscape connectivity plans to counteract the negative effects of habitat fragmentation have risen rapidly in recent years. At the same time, increasing connectivity has become recognized as a valuable tool for biodiversity conservation in a changing climate. This raises the important question of how to design landscape connectivity plans that will continue to provide functional connectivity as climates change, and will furthermore have the capacity to accommodate large-scale, climate-driven shifts in species' geographical ranges. Methods for incorporating climate change into landscape connectivity plans are still in their infancy, and feature a wide variety of possible approaches. Perhaps the most important distinction among approaches is the degree to which models of future climate change and associated species responses are included. We will discuss the Washington Habitat Connectivity Working Group's effort to address such issues as it begins the process of incorporating climate change into its statewide and regional connectivity plans. We will present results from the group's statewide connectivity analysis, and discuss the modeling framework that will be used to incorporate climate change into this analysis, including an overview of preliminary results and plans for future research.

SY28 Krumm, C.E.; Colorado State University; *ckrumm@yahoo.com*
Vulnerability of Chronic Wasting Disease Infected Mule Deer (Odcoileus hemionus) to Mountain Lion (Puma concolor) Predation
The possibility that predators choose prey selectively based on age or condition has been suggested but rarely tested. To test the idea that predators choose sick and weak prey, we examined whether mountain lions (Puma concolor) selectively prey upon mule deer (Odocoileus hemionus) infected with chronic wasting disease (CWD). We estimated CWD prevalence among kill sites from GPS collared mountain lions and compared this to estimated prevalence among sympatric mule deer killed by hunters in the vicinity of those kill sites. Hunter-killed female deer were less likely to be infected than males (odds ratios (OR) 5 0.2, 95% confidence intervals (CI) 5 0.1-0.6; p 5 0.015). However, both female (OR 5 8.5, 95% CI 5 2.3-30.9) and male deer (OR 5 3.2, 95% CI 5 1-10) killed by a mountain lion were more likely to be infected than same sex deer killed in the vicinity by a hunter (p

P2.193 Krupnick, GA*; Kress, WJ; Smithsonian Institution; *krupnickg@si.edu*
Achieving the Goals of Target 2 of the GSPC: Using Data from Herbarium Specimens to Build a Preliminary Conservation Assessment of Plant Species
The Global Strategy for Plant Conservation calls for a preliminary assessment of the conservation status of all known plant species by the year 2010. To date insufficient progress has been made on meeting this target. New efforts are needed to develop a preliminary list beyond using the full IUCN criteria in plant assessments. Here we present an algorithm that provides a preliminary assessment of the conservation status of plant species using spatial, temporal, and abundance data from herbarium records. We use specimen data for species of two economically important, over-harvested plant families (the Cactaceae and the Orchidaceae) as examples of the application of the algorithm. Preliminary results indicate that up to two-thirds of the species are potentially threatened with extinction, but further evaluations using additional data are necessary (e.g., herbarium material, field work and taxonomic expert assessment). Conversely, approximately a third of the species is clearly not threatened and will not require any additional evaluations for full assessment. This methodology provides a rapid means of determining preliminary conservation assessment of a large number of species in a short period of time and greatly decreases the number of species requiring full and labor intensive assessments.

P2.53 Kuhn, Carey; National Marine Mammal Lab/NOAA; *Carey.Kuhn@noaa.gov*

The influence of subsurface thermal structure on the foraging behavior of northern fur seals (Callorhinus ursinus)

Oceanographic features have been shown to influence the distribution and behavior of marine species. In the Bering Sea, one key feature is the summer thermocline that forms from melting winter sea ice. The objective of this study was to determine how this thermal structure influences the dive behavior of the threatened northern fur seal. In 2007 and 2008, fur seals (n=34) from St. Paul Island (AK) were equipped with time-depth recorders that sampled water temperature. For each dive bout, mean dive parameters (e.g. depth and duration) and bout parameters (e.g. dive frequency and bout duration) were compared with respect to thermal characteristics (thermocline presence, intensity, and depth). Fur seals foraged primarily within the water column (74% epipelagic bouts) and in association with strong thermoclines (temp. change â ¥ 5Â°C). The presence of a thermocline did not influence bout type (epipelagic vs. benthic) and most dive parameters did not differ between mixed and stratified water. However, for bouts in stratified water, stronger thermoclines resulted in longer bottom times (22.8% increase, p

16.2 Kuijper, D.P.J*; Cromsigt, J.P.G.M; JÄ drzejewska, B.; MiÅ cicki, S.; Churski, M. ; JÄ drzejewski, W. ; Mammal Research Institute, Polish Academy of Sciences, ul. Waszkiewicza 1d, 17-230, BiaÅ owieÅ¼a, Poland, Center for Ecological and Evolutionary Synthesis, University of Oslo, PO Box 1066 Blindern, 0316 Oslo, Norway, Department of Forest Management, Geomatics and Forest Economics, Forestry, Faculty, Warsaw University of Life Sciences, ul. Nowoursynowska 166, 02-787, Warszawa, Poland; *dkuijper@zbs.bialowieza.pl*

Abiotic conditions and ungulate top-down effects shape tree regeneration in the BiaÅ owieÅ¼a Primeval Forest, Poland

Ungulate populations across Europe have been strongly increasing over the past decades. Simultaneously, concerns about the impact of ungulates on forest systems are gaining ground. As a result, the reintroduction of large predators to regulate ungulate numbers is often discussed. However, knowledge on the role of ungulates in structuring temperate European forests in the presence of their main predators with limited human intervention is rare. We tested the interactions between ungulates and abiotic conditions on tree regeneration using 30 paired exclosure-control plots in one of the most natural forest systems in Europe, the BiaÅ owieÅ¼a Primeval Forest (Poland). This forest hosts the native variety in trees, ungulates (Red deer, Roe deer, Bison, Moose, Wild boar) and their carnivores and excludes human intervention. We analyzed whether exclosure effects interacted with abiotic factors relevant for tree recruitment (canopy cover, ground vegetation cover, soil fertility, and soil wetness). Contrary to our expectations, herbivory only affected recruitment rate of trees and species composition into size classes taller than 50 cm, whereas abiotic factors determined this process in smaller size classes. The study illustrated the context-dependence of herbivore top-down effects. Hence, the reduction of heterogeneity in abiotic and biotic conditions as is the case in many human influenced forest systems may have an important influence on the strength of ungulate top-down effects.

P1.32 Kuijper, D.P.J*; JÄ drzejewska, B.; JÄ drzejewski, W. ; Churski, M. ; Mammal Research Institute, Polish Academy of Sciences, ul. Waszkiewicza 1d, 17-230, BiaÅ owieÅ¼a, Poland; *dkuijper@zbs.bialowieza.pl*

Human-induced changes in a carnivore-ungulate-forest system in a European primeval temperate forest

Previous studies in one of the best preserved European temperate forests, the BiaÅ owieÅ¼a Primeval Forest (Poland), illustrated the top-down effects of carnivores on ungulate populations. When wolf and lynx were strictly protected in the 1990s, their combined predation reduced 75% of the reproduction of red deer and caused 40% of the annual mortality. However, carnivores did not regulate their prey as predation was inversely density dependent. Long-term data (1890-2000) showed large fluctuations in abundances of both ungulates and carnivores, which were driven by humans next to carnivores. Whereas, carnivores flourished during times of political chaos, ungulates were overexploited as a source of food. The opposite occurred during times of political stability. These changes largely influenced tree stand dynamics, measured on permanent transects between 1936 and 2002. Periods with low ungulate numbers coincided with high overall tree recruitment rates. With increasing density of ungulates, recruitment rates in general decreased. Exclosure studies confirmed that these trends were mainly shaped by ungulates. In contrast to previous studies, increasing herbivore numbers were associated with relatively higher recruitment of preferred and browsing tolerant species. Periodical crashes in ungulate numbers, whether human-induced or caused by natural factors, may offer windows of opportunity for regeneration of a range of tree species and facilitate diversity in forest development.

P1.85 Kumordzi, BB*; Oppong SK; Oduro W; Nutsuakor ME; University of Groningen, The Netherlands, KNUST, Kumasi, Ghana, KNUST, Kumasi,Ghana; *brightkumordzi@yahoo.com*

Is there hope for farmers?: Understanding elephant crop raiding in rural regions of Ghana.

Elephants,an endangered species in Africa are one of the nuisance wildlife. As eminent crops destroyers, they cause terribly pains to rural farmers whose livelihood depends entirely on their crops.Using a combination of social survey techniques, field transect and generalised mixed modelling techniques, we determined the relative importance of factors that predicted elephant distribution and crop raiding patterns in the Digya National Park, Ghana. Distance of farm from the park boundary, type of crop cultivated, and location of farm were the most important predictors of elephant crop raiding. Crop raiding was all year round and local people had negative opinion towards elephant conservation. we recommended planting of less preferred crops at the boundary of the protected area as well as programmes designed to actively ward off elephants from the field at night to reduce crop raiding. Raising conservation awareness among farmers is important to conserve elephants in this region.

P1.88 Kuntz, AR*; Root, KV; Bowling Green State University; *akuntz@bgsu.edu*
Deer me! : Assessing White-tailed Deer (Odocoileus virginianus) Impacts and Movement in the Oak Savanna
The Oak Openings Region of northwest Ohio is a unique mosaic of diverse communities that are closely intertwined, from Twigrush wet prairie to Midwest sand barrens. The globally rare oak savanna is important to the federally endangered Karner Blue (Lycaeides melissa samuelis), state endangered Frosted Elfin (Incisalia irus), and state endangered Persius Dusky Wing (Erynnis persius) butterflies as their larvae all feed on the perennial wild blue lupine (Lupinus perennis) that is characteristic of this savanna community. Previously, the effects of the white-tailed deer (Odocoileus virginianus) on this unique, transitional habitat have not been investigated, though deer are common in the region and population statewide is increasing. Deer browse on a wide variety of plants and have been shown to browse oak seedlings even when other forage is available. We evaluated deer abundance, proximity to lupine, and intensity of effect among different sites. We also measured relative abundance of deer using road based surveys. Our data indicate that deer browse opportunistically on lupine and oaks once in a savanna. The effect of the deer on the oak savanna is twofold. Deer help maintain this unique community through consumption of oak seedlings but, they also hinder the growth of lupine by reducing reproduction. Movement of deer was influenced by landscape variables such as roads and trails. This study yields insight into the interactions between deer and the rare oak savanna community.

SP6.11 LAHKAR, KULOJYOTI*; Phukan, Mridu Paban; Risebrough, Robert W.; Wildlife Conservation and Study Centre, The Bodega Bay Institute; *kulojyoti@rediffmail.com*
Persecution of Two Species of Critically Endangered Gyps Vultures in Assam, India
Except for relict populations in northern Cambodia of Gyps tenuirostris, and G. bengalensis, these species and the G. indicus, are approaching extinction in wild in South Asia. Diclofenac, a non-steroidal anti-inflammatory drug (NSAID), and possibly to a lesser extent other NSAIDs with similar properties, are responsible for the sudden and catastrophic declines of the three species. In 2003 we initiated and have since continued a program in Assam, India, to monitor the status of G. tenuirostris and G. bengalensis and of the factors which are currently affecting their survival and which are expected to affect their recovery in the future. We have documented persecution in the form of egg collection for medicinal purposes, destruction of nests and cutting and thinning of nesting trees prompted by superstition, and taking of both adult birds and chicks for meat and for feathers used in theatrical costumes. We have documented deaths caused by the baiting of carcasses with poison to kill rabid dogs and jackals. Vultures feeding on carcasses of animals on roads and railroad tracks are themselves being killed accidentally by speeding vehicles and trains. We conclude: 1) the continuing existence of the small pockets which would be the nuclei for future recovery is threatened by this diversity of persecution and mortality factors; and 2) the future genetic diversity of each species should be maximized by increasing whenever possible the numbers of birds now in captivity.

8.4 Lambert Koizumi, C*; Derocher, AE; Department of Biological Sciences, University of Alberta, Biological Sciences, University of Alberta; *cathlambert@ualberta.ca*
Insights From Gwich'in and Inuvialuit knowledge on predator-prey relationships in a northern alpine ecosystem
Wildlife research in northern Canada often lack in temporal and spatial scales and can be augmented with the knowledge held by Gwich'in and Inuvialuit people, who have inhabited the area for generations. To address the recent decline of a Dall sheep (Ovis dalli dalli) population and investigate the potential predatory impact of grizzly bears (Ursus arctos) and wolves (Canis lupus), we conducted twenty-three semi-directed interviews with elders or active hunters about the trends in abundance, habitat use, diet, limiting factors, and relationships between these species. Gwich'in and Inuvialuit interviewees shared a wide range of knowledge, from specific geographic locations (e.g., lambing areas, mineral licks, den sites), to historical trends in population, foraging and predator avoidance behaviour, traditional and contemporary harvest, as well as anecdotes and cultural beliefs. The breadth of knowledge shared by interviewees was linked to their personal experience, and often related to time spent on the land and harvesting of the species. When paired with findings from scientific techniques such as aerial surveys, GPS-telemetry, and behavioural observations, Gwich'in and Inuvialuit knowledge are an invaluable source of information that can help design future research and build partnership towards a sustainable management and conservation of these species.

17.7 Lancaster, ML*; Cooper, SJB; Carthew, SM; Taylor, AC; School of Earth and Environmental Science, The University of Adelaide, Evolutionary Biology Unit, South Australian Museum, Monash University; *melanie.lancaster@adelaide.edu.au*
Pines and pastures: population connectivity and genetic diversity of an arboreal marsupial, the Common ringtail possum, in a fragmented Australian landscape
Habitat fragmentation can reduce dispersal and lead to a loss of genetic diversity, changes to the social structure and mating system of a species, and an increased risk of local and regional extinction. In south-eastern Australia, land clearing for exotic softwood plantations and agricultural practices has resulted in the fragmentation of continuous eucalypt forests into smaller, isolated patches. We studied the effects of habitat fragmentation in the Common ringtail possum; an arboreal marsupial frequently found in modified or degraded forest habitats. Using genetic markers (15 microsatellites), we explored the connectivity and genetic diversity of possums within 14 remnant patches (seven surrounded by pine and seven by agricultural land) and compared our findings with possums residing in a large, continuous native forest. Both land use types hindered dispersal and gene flow of possums, with a more severe effect observed in the agricultural landscape. The degree of isolation and patch size were important in explaining variation in genetic diversity persisting in remnant forest patches. Identification of dispersal events enabled us to quantify distances possums were capable of moving in both modified landscape types. These findings contribute to our knowledge of species responses to landscape alteration and will be used in the management and conservation of this and related species.

P1.59 Lapin, Katharina*; Bernhardt, Karl Georg; Institute of Botany, Department of Integrative Biology and Biodiversity Research, University of Natural Resources and Applied Life Sciences, Vienna. ; *katharina.lapin@gmx.net*

Developments of biodiversity of natural habitats in the municipality Marchegg focusing on the vegetation of this area

The Central European landscape has been heavily influenced by human intervention. This highly structured cultural landscape is a result of people making use of the land for their own benefit, with technical and socioeconomic factors playing integral roles in its development. This intense manipulation of the landscape caused by general changes in human society has had a noticeable impact on biodiversity. The case study is focused on changes in the distribution of biodiversity in the municipality of Marchegg in Austria. Analysis of historical maps as well as other historical documents made it possible to compare the development of habitats over a period of 200 years of a 590 ha area. Biotope development was evaluated using indicators such as regional distribution of different habitats; predominance; type of fragmentation and compound factors; as well as degree of hemeroby over time and space. The study found that biodiversity of habitats decreased because the land's use changed over time. Notable exceptions to this result include areas protected by the WWF-nature reserve "Marchauen". Further conclusions include social and economic interests changing the natural scenery of the municipality of Marchegg while also affecting the biodiversity of these habitats.

P2.26 Larocque, SM*; Colotelo, AH; Blouin-Demers, G; Cooke, SJ; Carleton University, University of Ottawa; *slarocqu@connect.carleton.ca*

Bycatch Issues Associated with Inland Commercial Fisheries of Southeastern Ontario

One of the main concerns associated with commercial fisheries is the potential mortality of bycatch. Bycatch refers to organisms that are non-targeted species, undersized, or under harvest restrictions. This can include fish, turtles, mammals, and birds, some of which can be threatened. Investigation of fisheries bycatch reduction and survival has primarily focused on marine systems, but with increasing interest in expanding inland commercial fisheries and mitigating their potential impacts, there is need for scientific information to aid in the creation and support of regulations for inland waters. During a typical fishing season in southeastern Ontario, we simulated commercial fishing in small warm water lakes and quantified rates of capture for both bycatch and targeted species. In addition, blood physiology, behavioural impairment, and injury were measured for fish captured in the nets. Turtles represented the largest proportion of non-fish bycatch (i.e. 90%), while non-target fish species represented 11% of the total catch throughout the season. As a result of the capture rate of turtles, including some species at-risk (i.e. northern map turtles), research was conducted to understand the behaviour of turtles captured in the nets and gear modifications have been applied to increase survival of those captured. This research has improved the understanding of the bycatch rates occurring in these fisheries and will be useful for future management and conservation decisions.

3.7 Larsen, F.W. *; LondoÃ±o- Murcia, M. C. ; Turner, W. R. ; Conservation International ; *frankwugtlarsen@gmail.com*

Synergies and trade-offs between global conservation priorities for range-restricted threatened species, carbon storage and freshwater services

Global priorities for biodiversity might align with priorities for ecosystem services, such as freshwater services and carbon storage, which are important for human well-being. Here, we explore the potential for identifying priority areas that ensure a high provision of ecosystem services while retain a high representation of range-restricted threatened species. In addition, we explore the scope for cost-effective solutions to avoid CO2 emissions via deforestation in developing countries to also benefit conservation of threatened species. We found that priority areas identified solely on threatened species only moderately ensure provision of carbon storage (31% of max.) and freshwater services (41% of max.). However, via multi-criteria analysis, priority areas could be identified that both performed well for threatened species and ensured a considerably higher provision of ecosystem services (e.g., 65% of max. for carbon storage). Nonetheless, ensuring a much higher level of ecosystem service provision will come at the cost of a lower representation of threatened species. Finally, we found that cost-effective networks to avoid CO2 emissions could markedly increase species representation if this aspect was taken into account. Although, we found some promising scope for threatened species conservation to benefit ecosystem services and vice versa, important trade-offs exist that needs to be taken explicitly into account when setting global conservation priorities.

P2.172 Lau, M.K.; Northern Arizona University; *mkl48@nau.edu*

Methods for Observing Ecological Interaction Networks and Applications to Species Conservation

Understanding the ecological mechanisms of ecosystem stability is important to species conservation. The cross-disciplinary field of network theory provides useful insights into the relationship between the structure of ecological interaction networks, such as food-webs, plant-pollinator and seed-disperser systems, and the stability of ecosystems. In particular observations of the network structure could aid in making more informed predictions of community dynamics. For example, predictions of species losses can be improved with information about the structure of the whole interaction network in which that species resides. However, the approaches used in most ecological interaction network studies are limited by the amount effort needed to assess linkages and restricted by narrow definitions of interactions. Recent analytical developments are enabling interaction network modeling using repeated measures of species abundances within discrete areas, such as observation plots. One method uses statistical tests of species correlations or distance metrics to analyze the potential for interactions among all pairs of species. A more advanced method uses reverse engineering techniques, developed for modeling protein interaction networks, to produce a species interaction function that is most parsimonious with the data. Regardless of the method, network modeling presents an opportunity to use relatively accessible data and incorporate a network perspective into conservation biology.

SY32 Lauber, TB*; Stedman, RC; Decker, DJ; Knuth, BA; Cornell University; *tbl3@cornell.edu*

Collaborative Implementation of the State Wildlife Action Plans: Tailoring the Network to the Needs

All states and territories in the United States developed State Wildlife Action Plans (SWAPs) to identify ways of protecting species before they become threatened or endangered. Collectively, the SWAPs provide a comprehensive blueprint for fish and wildlife conservation. Nevertheless, because of their comprehensiveness, SWAPs typically call for action beyond the capacity of state wildlife agencies to implement on their own. Collaboration is critically important to the implementation of elements of these plans. We conducted case studies of six collaborative conservation efforts linked to the SWAPs to assess how the structures of partnerships influenced their success. We interviewed individuals who played key roles in these efforts and collected survey data on their collaborative interactions. We found that in contexts where collaborators were initiating activities to protect or restore ecosystems at a larger scale, they depended on more structured and balanced interactions among collaborators. In contexts where collaborators were working to expand and extend existing conservation efforts, particularly at smaller scales, interactions among collaborators were less structured and tended to occur only when essential. We present recommendations for structuring collaborative efforts depending on the scale and status of conservation efforts.

SY43 Lawrence, NSW; Natural Resources Defense Council; *nlawrence@nrdc.org*

Using Biodiversity Science in Natural Resource Law

U.S. law includes an express biodiversity conservation mandate for the 191 million acre National Forest System. Implemented through planning regulations drafted with the advice of a committee of scientists, this requirement has famously preserved habitat for viable populations of species at risk from resource utilization. The regulations also call for maintenance of plant and animal communities, ecologically sound responses to disturbance events, and recommendations for wilderness set-asides, among many other provisions. Procedurally, they also require an interdisciplinary approach and utilization of the best available data. Input from the scientific community has been decisive in implementation of these regulations. After several attempted rewrites, the regulations are again under review. Revision is being proposed, in part, to help meet the challenges of climate change and to promote restoration of degraded lands. Additional broad legal authority, beyond these planning regulations, exists for safeguarding biodiversity on national forest lands. The Secretary of Agriculture has plenary power to adopt rules for their management. The Roadless Area Conservation Rule, adopted to end degradation threats to 58 million acres of federal wildlands, is a case in point. And the President, under the Antiquities Act, can directly protect blocks of land as national monuments for, among other reasons, their "scientific interest."

SY24 Lawson, DM*; Regan, HM; Zedler, PH; Franklin, J; San Diego State University, University of California, Riverside, University of Wisconsin, Madison, Arizona State University, Tempe; *dmlawson@ucdavis.edu*

Evaluating the effect of climate change, altered fire regimes and habitat loss on Ceanothus verrucosus

C. verrucosus, a rare shrub species of coastal southern California, is vulnerable to both long and short fire intervals. Fire, required for germination, kills all adult plants and stands re-establish from seed banks that take decades to restock. In addition to shifts in suitable habitat, climate change poses risks from increases in fire frequency. Its entire U.S. range is embedded in an urbanized landscape, where, since 1955 the average patch has decreased from about 1,900 to 28 ha. Fire regimes, an important driver of ecosystem processes in these systems have been substantially changed by human activities. Climate change is predicted to further alter fire regimes and species distributions, leading to habitat loss and threatening biodiversity. We linked a spatially-explicit stochastic population model to dynamic bioclimate envelopes to investigate the effects of climate change, habitat loss and fragmentation and altered fire regime on population abundances. We tested a range of fire return intervals, two future climate scenarios and further habitat loss and fragmentation based on land identified as developable by local governments. Our results show climate change to be the most serious threat facing obligate seeding shrubs embedded in urban landscapes, resulting in population decline and increased local extirpation, and that likely interactions with other threats increase risks to these species. Taking account of parameter uncertainty did not alter our conclusions.

SY36 Layke, C*; Reyers, B; Walpole, M; World Resources Institute, Council for Scientific and Industrial Research, South Africa, UNEP-World Conservation Monitoring Centre; *christian.layke@wri.org*

Measuring Nature's benefits: current progress in developing ecosystem service indicators

People rely on benefits provided by nature. Our reliance on these ecosystem services is gaining resonance with policy-makers, providing opportunities to shape policies that prioritize healthy ecosystems to meet human needs while also maintaining biodiversity. Metrics and indicators that effectively communicate the quantity and quality of services provided by ecosystems will be a necessary element in fully mainstreaming this approach in public policy. Recent evaluations of ecosystem service indicators used in the global and over 20 sub-global assessments done as part the Millennium Ecosystem Assessment and subsequent work have identified significant gaps that, if left unaddressed, will hinder the uptake of ecosystem service concepts. However, new approaches are being developed and applied in diverse ecosystems and political landscapes. The presentation will focus on three elements: the findings from analyses of existing ecosystem service indicators including the strengths and weaknesses of indicators for different services; a review of concepts in development to fill existing indicator gaps; and an overview of tools helping to develop and apply ecosystem service indicators.

SP6.6 Layusa, CAA*; Oliveros, CH; Garcia, HJD; Follosco, NMG; Isla Biodiversity Conservation; *cynthia.layusa@gmail.com*

Gathering local knowledge in quantifying local pressures on the Calayan Rail (Gallirallus calayanensis)

The Calayan Rail Gallirallus calayanensis is an island-endemic species classified as Vulnerable under IUCN (2009) but may need to be uplisted to Critically Endangered if there are evidences of population decline. Hunting through snares for local consumption or pet trade is one of the threats to the species apart from habitat loss due and introduced predators. Hunting is usually done for subsistence of local families. Although the use of snares is intended for the Red Junglefowl, Calayan Rails are also caught opportunistically wherein one hunter can reportedly trap more than 60 rails per year. Through an island-wide interview of local residents, we give here a picture estimating the number of Calayan Rails hunted per year and at what rate it is being caught. The results will also show us where the rails are frequently seen and hunted, and by which demographic group. This has an implication to the conservation of the species, as it will tell us the impact of hunting to the rail, and in one hand, where conservation work will be most needed to thwart any further decrease in the species' number.

P1.22 Layusa, CAA*; Oliveros, CH; Garcia, HJD; Follosco, NMG; Reynon, JB; Isla Biodiversity Conservation ; *cynthia.layusa@gmail.com*

Measuring the Impact of Information Education Campaigns on the Calayan Rail Gallirallus calayanensis

After the discovery of the Calayan Rail Gallirallus calayanensis in 2004, a conservation project involving awareness on the species and the environment was undertaken in the remote island of Calayan, northern Philippines. From 2005, the team conducted information education campaigns (IEC) throughout the Island as part of our strategy to convey the uniqueness of and threats to this species. But how much of our effort has been well-targeted and how do we measure the success of our IEC work? We solicited the help of barangay (village) health workers in doing an objective, third-party survey through questionnaires to monitor and evaluate the impacts of IEC activities conducted between the years 2005 - 2008. 350 (3% of total population) took part in the survey. Questions were designed to know the respondents' knowledge on the rail's physical characteristics and habitat and the where these information were gathered from. We also included questions on resource use, perceptions on the environment and environmental responsibilities and policies. This will help us quantify the awareness our project has generated for the Calayan Rail. It will also help us identify gaps and strengths in our IEC campaigns so we could focus our strategies more effectively in our work ahead.

P1.99 Le Tortorec, E*; Helle, S; Huhta, E; SirkiÃ¤, P; Suorsa, P; Hakkarainen, H; University of Turku, Finnish Forest Research Institution; *erleto@utu.fi*

Ptilochronology and Fluctuating Asymmetry as Phenotypic Biomarkers of Forest Fragmentation in the Eurasian Treecreeper (Certhia familiaris)

The aim of this study was to determine whether ptilochronology (an estimate of growth) and fluctuating asymmetry (reflecting developmental instability) of feathers can be used as phenotypic biomarkers of habitat fragmentation, measured as habitat loss and changes in configuration, in a forest-dwelling bird. We sampled feathers from Eurasian treecreepers (Certhia familiaris) between 2000 and 2002 in central Finland where forests are subject to intensive commercial forestry. Ptilochronology was determined by measuring the average width of growth bars from naturally grown and induced tail feathers of adults. The fluctuating asymmetry of wing and tail feathers of both adult and nestling birds was estimated by contrasting the lengths of matching feathers on the right and left sides of individuals. Ptilochronology and fluctuating asymmetry were associated to habitat fragmentation by calculating landscape indices from a 500m radius around each nest box from classified Landsat images. We did not find any relationship between feather growth rates and habitat amount or configuration, but we did find an indication of increased numbers of deformed growth bars in fragmented habitats. The analysis of fluctuating asymmetry showed that habitat amount had a stronger influence than composition. In conclusion, our results show that biomarkers related to growth deformities and asymmetry may respond more to habitat fragmentation than those relating to growth rates in the Eurasian treecreeper.

20.2 Le Viol, I*; Jiguet, F; Julliard, R; Devictor, V; MNHN-UPMC-CNRS, CNRS-UniversitÃ© de Montpellier; *ileviol@mnhn.fr*

Measuring the fate of biodiversity under global changes: the mean species trait approach

Although biases and pitfalls of biodiversity indicators are recurrently debated, their ecological meaning and their relationships with well-known human induced pressure on biodiversity are often not clearly established. In this context, a new type of biodiversity indicators, reflecting variations in explicit species-specific traits in species assemblages has been proposed (Mean Species Traits, MST). Here, we highlight the strengths and weaknesses of MST indicators both from practical and ecological perspectives. Using the European trend in a community specialisation index as a case-study. We show that this metric is sensitive to human pressures at various spatial scales and can be easily adapted on several taxonomic groups, either with presence/absence or abundance data. We further i) compare this metric with more classical indices (richness, diversity) ii) test its sensitivity to human pressures (fragmentation, urbanisation, agricultural intensification). iii) We also compare results for different taxonomic groups using atlases of distribution in Europe. We also repeat this analysis at European scale and for countries within Europe. Finally, iv) we examine the possibility to calculate CSI trends using GBIF data. Our results show the relevance of such mean species trait indicator. We found a consistent strong relationship between CSI and the increase of human pressures both spatially and temporally across countries in Europe. Overall, our results highlight the ongoing functional biotic homogenization process.

SY57 Le XT*; Phan NH; Mai ST; Phan TAD; Mangrove Ecosystem Research Centre (MERC), Hanoi National University of Education, Vietnam (HNUE), Vietnam Institute of Meteorology, Hydrology and Environment; *jmolnar@tnc.org*

Contribution of Mangrove Reforestation in Response to Climate Change and Sea Level Rise in Coastal Zone of Northern Vietnam

The coastal zone of Viet Nam is under various adverse impacts of natural disasters such as storms, floods, high tide, and northeast monsoon. According to assessment of scientists (IPCC, 2007; Thuc at al., 2009), those impacts would be increased due to climate change and sea level rise. Local people in the Northern region of Vietnam have, for generations, known how to plant mangroves to protect dykes, rice fields, properties and people life. Ong and Tan (2008) asserted that mangroves have survived sea-level changes through geological time. Recognizing the role of mangrove, remarkable efforts of society, government and NGOs have been mobilized to reforest the mangroves along the coast of Vietnam. Our study indicated that mangrove forests (Kandelia obovata aged 5-6 years and Sonneratia caseolaris 9 years) can reduce 80-87% of wave height and over 90% of wave energy; and the carbon accumulation, e.g., of 9 year old forests is 15.090 ton/ha/year. The increased trend of mangrove reforestation in the last ten years would make a favourable base to develop and conserve mangroves in northern Vietnam. Some recommendations for utilizing mangrove as soft measure to respond to climate change and sea level rise in northern Vietnam will be discussed, to help the managers, policy-makers and local communities in their consideration to restore mangroves and related decision making process.

SY68 Lee, PG; Global Forest Watch Canada; *Peter@globalforestwatch.ca*

Canada\'s Boreal Intactness: Opportunities and Threats

The Canadian Boreal Forest's level of ecological intactness represents an unprecedented global conservation opportunity, although there are imminent anthropogenic threats. Canada contains the majority of Earth's ecologically intact boreal forest (54%) and about one quarter of the entire world's remaining ecologically intact forest cover. It features large mountain ranges and expansive plains with bogs, peatlands, and permafrost; provides habitat for more than half of North America's birds; contains some of the largest caribou-wolf ecosystems in the world; contains more than 20 percent of Earth's freshwater rivers, lakes, and wetlands, and; is home to over 600 Aboriginal communities. However there has been a rapid, unprecedented and accelerating increase of incursions into the forest to exploit its natural riches; primarily timber, hydrocarbon, hydroelectric and mineral extraction operations. Their cumulative impacts remain largely unstudied although they are evolving rapidly. Global warming is of particular significance in the boreal forest. Over the next century, average temperatures in northern regions will rise substantially more than the global average. Early conservation decisions are necessary to capitalize on the opportunities and ameliorate the threats.

P2.15 Lee, S-I*; Spence, JR; Langor, DW; Department of Renewable Resources, University of Alberta, Canadian Forest Service, Natural Resources Canada; *seungil.lee@ualberta.ca*

Saproxylic beetle diversity according to different stages of spruce deadwood decomposition

Deadwood is obviously important ecological resources of forests providing unique structural characteristics that can be useful habitats for various organisms. Nevertheless, there is a small number of specific information on saproxylic organisms (i.e. organisms that depend on dead or dying wood during some part of their life cycle), especially beetles, according to different stages of deadwood decomposition. We investigated saproxylic beetles in twenty four white spruce logs of 6 different classes on July, 2009 at the EMEND (Ecosystem Management Emulating Natural Disturbance) research site in NW Alberta, Canada. Bolts c. 60 cm in length were cut and moved to rearing cages near the research camp and saproxylic beetles were sampled twice until September. The abundance was the highest in the early decay class. The trophic guild structure was different according to the chage of deadwood decomposition, for example, wood-borer was the most divese in the early decay class, and predator and fungivore were abundant in the late decay class.

P1.30 Lee, TS; Fisheries and Oceans Canada, Species at Risk Program; *tatiana.lee@dfo-mpo.gc.ca*

Fostering community-based conservation of Northern Abalone in B.C.: long-term collaboration between government and First Nations

In 1990, commercial, recreational and First Nations harvests of abalone in B.C. were closed due to significant conservation concerns. Following the fisheries closures, Fisheries and Oceans Canada (DFO) held a recovery and rebuilding workshop in 1999. This workshop identified recovery measures for abalone, and facilitated opportunities to develop community-based action plans and programs to support abalone recovery. In the years that have followed, recovery implementation has showcased some of the most extensive collaborative efforts between government and First Nations on marine species at risk recovery. Eleven areas were identified as â Abalone CoastWatch' regions within B.C. Within each region, programs were developed by First Nation communities to solicit volunteer patrols to discourage abalone poaching and develop education and cultural outreach programs. Integrating approaches across regions has resulted in shared goals, collaboration and comprehensive coverage in remote areas. Collaborative research and monitoring programs have developed consistent methodology between DFO, Parks Canada and coastal First Nations and have often included traditional ecological knowledge in index site selection.

P2.128 Leggo, SN; Jalkotzy, MJ; De La Mare, CJ*; Golder Associates Ltd.; *shanon_leggo@golder.com*

Applications of Remote Cameras in Northeast Alberta, Canada

Remote cameras can be used to gather data for a variety of objectives including detecting key furbearers and wide-ranging carnivores, wildlife habitat use, seasonal movements of wildlife and wildlife interactions with industrial infrastructure. The use of remote camera technology for collecting data on wildlife species offers several advantages over traditional methods of data collection. They allow for collection of data during any season or time of day and in remote locations. As well, remote cameras are simple and reliable systems that can be easily moved among survey sites. In northeast Alberta, within the Oil Sands Region, remote cameras have been used effectively for conducting baseline inventories using baited and non-baited camera stations, monitoring wildlife species in reclaimed areas, assessing wildlife use of potential movement corridors, monitoring wildlife habitat use in relation to disturbances, monitoring for species of concern and monitoring the efficacy of mitigation measures. A minimum of fifteen camera programs have been conducted since 2005 in northeast Alberta. This presentation will outline the methods used for the various objectives and how the results from remote camera surveys can be integrated with other survey types to predict environmental impact assessments, focus long term monitoring and assess effectiveness of mitigation measures for wildlife species in the Oil Sands Region.

4.6 Lehmkuhl, JF*; Hessburg, PF; US Forest Service, PNW Research Station; *jlehmkuhl@fs.fed.us*

A Whole-Landscape Strategy to Restore Inland Northwest Dry Forests and Recover the Northern Spotted Owl

Conservation of the threatened northern spotted owl in the Pacific Northwest, USA, has been based on a reserve network since 1994. From the start, the persistence of reserves in the dry mixed-conifer forests of the eastern Cascade Range has been at issue. There, the loss of fire-tolerant vegetation and increasing wildfire severity and extent are key consequences of 20th century management. Loss of old forests from stand-replacement fires has increased 100 fold from 1972 through 2002. Current reserves occupy 77% of the landscape yet contain only half of the habitat-capable lands, and owl populations have declined by 4% annually since 1994, despite zero habitat loss due to harvest. Wildfire severity and extent are predicted to increase even under moderate climate change forecasts. The last 20 years of research and management in dry forest landscapes provides the scientific basis for a new whole-landscape conservation strategy that integrates forest restoration and owl conservation. This strategy was envisioned and adopted under the recently developed Northern Spotted Owl Recovery Plan. Under the strategy, the entire federal landscape east of the Cascade crest would be managed for ecological objectives, with emphasis on retaining current owl habitat and recruiting future habitat. Model tests of this strategy vs. the reserve strategy are under way. Field implementation and novel restoration treatments will be evaluated under adaptive management.

P2.194 Leidner, AK*; Neel, MC; Dept of Plant Science & Landscape Architecture, University of Maryland College Park, Dept of Plant Science & Landscape Architecture and Dept of Entomology, University of Maryland College Park; *Leidner@umd.edu*

Patterns of decline for threatened and endangered species in the United States

Species are listed as threatened or endangered because they have experienced dramatic declines that place them at high risk for extinction. The ways in which species experience declines, however, may vary among taxa. Although precise estimates of the numbers of individuals, populations, and range sizes are often unknown for imperiled species, the qualitative nature of declines can be ascertained. For all listed species, subspecies, and distinct population segments in the United States with approved recovery plans, we recorded whether each one experienced a change in abundance, the number of populations, and/or range size compared to historic levels. Nearly all species experienced a decline in abundance and many experienced population losses or range contractions. However, taxonomy was associated with the pattern of decline. Invertebrates were just as likely to lose populations as they were to undergo range contractions. Vertebrates were more likely to experience range contractions than to lose populations, whereas plants were more likely to lose populations. These patterns may result from different threats. Narrowly distributed plants and invertebrates may be experiencing acute threats that extirpate populations, while vertebrates may suffer more from diffuse threats that reduce the extent and size of populations. A better understanding of the patterns of decline can help guide recovery objectives and help determine strategies to increase the likelihood of species recovery.

P2.215 Leimgruber, Peter*; Mueller, Thomas; Olson, Kirk; Fernando, Prithiviraj; Pastorini, Jennifer; Nicolson, Craig; Fuller, Todd; Fagan, William; Smithsonian Conservation Biology Institute, Ddept. of Biology, University of Maryland, Dept. of Natural Resource Conservation, University of Masschusetts, Centre for Conservation Research, Sri Lanka, Dept. of Natural Resource Conservation, University of Masschusetts; *leimgruberp@si.edu*

Conserving Moving Targets-How to Deal with Dynamic Specie and Landscape?

Traditional conservation strategies rely heavily on protected area approaches that attempt to conserve species and their habitat within a network of protected spaces. Such strategies are necessarily static in space and time and may have severe limitations if the target species have large area requirements or are extremely mobile. Similarly, protected areas may not capture well the spatio-temporal variation in target ecosystems unless they are very large. Attempts to address these short-comings of protected areas generally focus on increasing connectivity, usually via corridors. However, often our understanding of species mobility (e.g. factors controlling mobility, temporal-spatial patterns) are limited. Using Asian elephants (Elephas maximus) and Mongolian gazelle (Procapra gutturosa) as examples, we describe the special conservation challenges posed by dynamic species and habitats and why landscape-level conservation is required well beyond the borders of protected areas. Based on data from these two species, we describe a framework for the study and conservation of highly dynamic species and landscapes.

8.2 Lemelin, R.H.*; Dowsley, M; Lakehead University; *harvey.lemelin@lakeheadu.ca*
Wabusk and the Cree: Engaging Cree First Nations in Polar Bear Management Strategies in the Province of Ontario
Management approaches to commonly held resources in the Canadian North such as polar bears, have tended to be organized under traditional disciplinary lines emphasizing either utilitarian or preservationist approaches. The effectiveness and appropriateness of such management approaches are being challenged on two fronts. First, climate change is affecting wildlife population parameters and environmental conditions so rapidly that traditional scientific research and monitoring may not be able to keep pace, and second, the co-management systems that are aimed at incorporating aboriginal perspectives, have not lived up to expectations. This presentation explores how the engagement of Cree communities would improve current governance structure, and promote co-management approaches of polar bears in the province of Ontario.

15.5 Lemieux, CJ*; Beechey, TJ; Scott, DJ; Gray, PA; University of Waterloo, Canadian Council on Ecological Areas, Ontario Ministry of Natural Resources; *cjlemieu@mailservices.uwaterloo.ca*
Protected Areas and Climate Change in Canada: Challenges and Opportunities for Adaptation
Canada has a vast network of protected areas comprising more than 1 million square kilometers - an area approximately as large as the combined size of France and Germany. This extensive conservation estate houses a diverse array of terrestrial, freshwater, and marine ecosystems and species of high environmental, social, and economic value, making it an important heritage asset that contributes significantly to global efforts on biodiversity conservation and ecological sustainability. The World Commission on Protected Areas has concluded, however, that conservation actions are likely to fail unless they are adapted to take account of climate change anticipated in the 21st century, emphasizing the need for protected areas agencies to begin to mainstream climate change adaptation into policy, planning, and management. This presentation, sponsored by the Canadian Council on Ecological Areas (CCEA) in collaboration with the University of Waterloo, reports on the results of the first national synthesis on the state of climate change adaptation in Canada's expansive protected areas sector. The presentation covers five aspects: 1) provides an overview of global and Canadian climate change issues and impacts and their implications for protected areas in Canada; 2) summarizes the results of a national survey to report issues, needs and constraints facing protected areas agencies and organizations across Canada; 3) reports case work on selected jurisdictional activities and initiatives in Canada, currently underway or planned, that are directly relevant to protected areas; 4) offers provisional thinking on issues, mitigation and adaptation strategies regarding critical aspects of policy, planning and management for protected areas; and, 5) provokes a call to action for protected areas agencies in Canada to develop a coordinated approach to climate change adaptation. A full report of the review and findings of this collaborative project is available through the CCEA (www.ccea.org).

SY76 Lencinas, MV*; MartÃ–nez Pastur, GJ; CADIC-CONICET; *vlencinas@cadic.gov.ar*
Variable retention as strategy to protect insect diversity in managed South Patagonian forests
Traditional silviculture affects original diversity of old-growth forests, and insect conservation was usually not included in ecosystem management planning. However, in last decade, variable retention was proposed as a strategy to mitigate species losses. The aim was to compare insect diversity in Nothofagus pumilio forests managed with variable retention and traditional forestry during the first fourth years after harvesting. Adult insects were sampled through a wide spectrum trap set (pit-fall, alcohol, lights and color trays) in managed (aggregated-AR, variable-VR and dispersed retention-DR) and control unmanaged stands-C. Richness and relative abundance were analyzed with multivariate tests (classification, NMS, PERMANOVA and PERMDISP). 282 morphospecies were identified, where Diptera, Coleoptera, Lepidoptera and Hymenoptera were the main orders. Studied variables trend to decrease in harvested forests compared to C, depending to habitat damage level and years after harvesting. Multivariate analyses showed similarities between C and aggregated retention areas, however, great dissimilarities were observed with time. Also, introduced species from other environments were higher in harvested than in retained areas. VR improved insect diversity conservation compared to AR or traditional forestry (DR or clear-cuts), maintaining old-growth forest diversity inside the aggregates and decreasing the impact of forestry in harvested areas.

SP6.1 Lentini, PE*; Fischer, J; Gibbons, P; Martin, TG; Australian National University, CSIRO Sustainable Ecosystems; *pia.lentini@anu.edu.au*
Condition and context effects on birds in a large-scale corridor network
The intensively managed agricultural zone of south-eastern Australia is criss-crossed with an extensive network of linear corridors of remnant native vegetation that were originally established for the purpose of droving stock. This network represents a unique natural experiment for regional connectivity. We investigated how species use the network, and how the habitat value of the network interacts with the surrounding farm landscape. To address these objectives, we surveyed birds across a 14,000 km2 area, both in the network and on adjacent farmland. Our design incorporated corridors of varying size and condition, as well as different adjacent land use types (cropping, exotic pastures, native pastures), located at distances of 100m, 200m, or 400m from a given corridor. Bird communities responded to a number of variables, in particular the density of trees within the corridors and the intensity of agriculture in the surrounding landscape. Woodland birds of conservation concern were found almost exclusively in the network of corridors or in native pastures adjacent to the network, as opposed to exotic pastures or crops. Our results demonstrate that networks of corridors for conservation will need to take into account not only the condition of a given corridor, but also its landscape context and adjacent land use.

SY32 Leong, Kirsten*; Emmerson, David; National Park Service, Department of the Interior; *kirsten_leong@nps.gov*

Collaborative Conservation and Adaptive Management in Department of the Interior Agencies

The U.S. Department of the Interior manages one-fifth of the land in the U.S., including the public lands administered by the National Park Service, U.S. Fish and Wildlife Service, and Bureau of Land Management. Federal agencies have included public input in decision-making since the Administrative Procedures Act in 1946, with varying degrees of effectiveness. In the past few decades, approaches to public involvement have broadened to encompass a philosophy of public engagement that includes possibilities for collaborative conservation. This philosophy is reflected in a number of policy and reporting directives, but has not yet diffused widely throughout the agencies in practice. In this paper, we present evidence for this philosophical shift in agency guidance; discuss some of the legal and policy considerations for adopting more dialogue-based collaborative approaches on federal lands; identify common barriers to adoption; and provide examples of cases in which practitioners successfully fulfilled legal procedural requirements while meeting the standards of participatory practice as outlined by organizations such as the International Association for Public Participation. As large scale societal changes continue to affect the way that people experience and value public lands, effectively incorporating collaborative conservation will be increasingly important in public land management.

SY24 LEROUX, SJ*; Schmiegelow, FKA; Cumming, SG; Anderson, Le; Department of Biology, McGill University, Montreal, Quebec, H3A 1B1, Canada, Department of Renewable Resources, University of Alberta, Edmonton, Alberta, T6G 2H1, Canada, DÃ©partement des sciences du bois et de la forÃªt, UniversitÃ© Laval, QuÃ©bec, QuÃ©bec, G1V 0A6, Canada, University of Alberta; *shawn.leroux@mail.mcgill.ca*

Incorporating natural disturbance in the design of protected areas for the boreal region of Canada

The boreal region of Canada is a dynamic ecosystem shaped by large-scale natural disturbances like forest fire. The boreal is unique as it is one of the only remaining regions in the world where we can proactively design protected areas that are big enough to maintain large-scale ecological processes. We present criteria based on characteristics of wildfires to determine the size, location, and efficacy of protected areas that have a high probability of maintaining internal recolonization sources and apply these criteria in 5 study areas in the Northwest boreal region of Canada. We use the estimated maximum extent of the largest fire and the extent and distribution of vegetation communities that are differentially affected by fire to estimate the size and location of candidate protected areas. Then, we use CONSERV, a spatially explicit dynamic simulation model, to determine the ability of candidate protected areas to maintain internal recolonization sources through time (i.e. efficacy). In 4 of 5 study areas, protected areas that were ~2.7-2.8 times the estimated maximum extent of the largest fire effectively maintained recolonization sources through time. Study areas with rare or patchily distributed vegetation communities required larger protected areas in order to maintain recolonization sources. We offer a quantitative method for incorporating large natural disturbance into protected areas design.

SY63 Lepitzki, DAW*; Pacas, C; Wildlife Systems Research, Banff; COSEWIC Member, Parks Canada Agency, Banff National Park; *lepitzki@telusplanet.net*

When the Geographic Range is the Same as Critical Habitat: the Case of the Banff Springs Snail

Sometimes it's easier to delineate Critical Habitat (CH) than to protect it. The diminutive and endemic Banff Springs Snail (Physella johnsoni) is the only species in Canada to have full protection under provisions of the Species-at-Risk Act (SARA). It was reassessed as endangered by COSEWIC in 2008 and continues to be listed as such under SARA. Both a Recovery Strategy and an Action Plan have been approved (2007) and CH has been delineated and gazetted (2008). Systematic population surveys once every three (Jan 1996-July 2000) or four weeks (thereafter) identified an occupied thermal spring habitat (595 sq. m.) slightly small than the penalty box area on a soccer field. Having this small area all within Banff National Park facilitated its delineation as CH. However, challenges continue between implementing policies for protection and for providing memorable visitor experiences as four of the seven snail subpopulations are in a high-visitor use area and birthplace of Canada's national park system - the Cave and Basin National Historic Site (C&BNHS). These challenges may increase as annual visitation at the C&BNHS is targeted to increase from 100,000 to 300,000 visitors per year following the 2010-2012 redevelopment.

SY35 Leslie, EF; National Park Service; *Elaine_Leslie@nps.gov*

Restoration from the Perspective of the US National Park Service

The bison is the icon of the Department of the Interior (DOI) and the National Park Service. Following the near extinction of bison during the 19th century, substantial numbers of bison currently exist as a result of the combined management efforts of State, tribal and Federal governments, conservation groups, and private ranchers and landowners. One of the iconic symbols of American frontier expansion is the image of vast herds of North American bison grazing on the western plains. While the days of millions of free-roaming bison are gone, it may be possible to develop partnership arrangements that will permit bison herds to recreate their natural role in areas where biologically suitable and socially acceptable. In appropriate areas, the presence of bison in adequate numbers may help support the restoration or maintenance of other native species and habitats. This in turn would provide inspiration or enjoyment to diverse elements of our society. As demonstrated convincingly at Yellowstone National Park, observing bison ranging freely over the landscape holds a major attraction for the American public. In 2008, the DOI announced an initiative for managing bison by bureaus and articulates a framework for improved management of the species while providing a foundation to strengthen existing and build new partnerships. This presentation will present a status update on the framework which establishes steps to address the health and genetic composition of DOI bison herds, and acknowledges the ecological and cultural role of bison on the American landscape.

4.1 Li, X*; Tian, Hui; Institute of Zoology, Chinese Academy of Sciences; *lixh@ioz.ac.cn*
Climate change induced range shifts of Galliformes in China
Climate change would cause range shifts of many species in the future. Galliformes may be particularly vulnerable to climate change, as they have low dispersal ability. Little is known about their possible responses to the future climate. We used three predictive habitat distribution models (i.e. generalized linear model, generalized additive model, and MaxEnt) to predict the current and future ranges of all 63 Galliformes in China, based on a comprehensive species occurrence database and a combination of climate variables. Other environmental variables, i.e. elevation and human footprint index were also included in the models. Principal component analysis was conducted to illustrate the association of environmental variables and each species. Using the SRES A2 and B2 climate change scenarios for 2071-2100, we projected that 26 species would have range shifts over 50%, including 10 endemic species. Galliformes at higher elevation face greater range shifts. Northward shifts are more than other directions. Some local range shift patterns are obvious, e.g. nine species in Yungui Plateau (at Southwest China) would have parallel eastwards moving. As to model selection, MaxEnt has the best performance. Incorporating more environmental variables did not significantly improve the model performance, because the variables are correlated. We suggest conservationists pay special concerns to the 26 Galliformes that face extensive range shifts, especially the 10 endemic species.

11.1 Liccioli S*; Smith, A; Ruckstuhl, KE; Massolo, A; University of Calgary; *slicciol@ucalgary.ca*
Gastro-intestinal parasites in urban coyotes: prevalence, spatial distribution and transmission risk in relation to landscape structure and city park use by dogs
Despite the relevance of urban wildlife in parasite maintenance and transmission, and the abundance of coyotes Canis latrans in urban settings in North America, pathogen dynamics in relation to urban landscape strucure and to the use of green areas by dog are still largely unknown. Hereafter, we present the preliminary results of a study that is being carried out in Calgary (AB, Canada). The study focuses on gastrointestinal parasites (GI; e.g. Giardia, Taeniae and Echinococcus spp.) in urban coyotes and dogs to assess the role of the distribution, shape, and connectivity of urban parks and of their use by dogs in affecting the distribution, abundance and transmission of GI between coyotes and dogs. In 8 city parks, coyote and dog fecal sample are being collected during summer and winter, and then submitted to parasitological analysis. We developed a protocol to genotype each coyote fecal sample so to estimate the movements of coyotes between adjacent areas and the actual prevalence of GI in the urban coyote population. The parasitic profiles and dogs are compared and related to landscape structure, distance to rural areas, dog abundance and management (off vs on leash areas). This study will improve our understanding of factors affecting prevalence, distribution and trasmission of GI parasites in coyotes and dogs living in urban settings.

P2.98 Lin Xia*; Qisen Yang; Qian Zhang; Institute of Zoology,CAS; *Xial@ioz.ac.cn*
Behavioural Adaptation of Tibetan Antolopes to the traffic disturbance of Qinghai-tibet railway and highway in Hoh-xil National Nature Reserve
The Tibetan antelope also known as chiru is one of the world endangered animals. Seasonal migration of chiru play an important role in maintaining the gene flow between current isolated geographic populations and also might be a life-history adaptation to increase calf survival. The newly built Qinghai-tibet railway and an accompanied highway bisect the migration corridor of chiru in Hoh-xil Nature Reserve. To offset the barrier effect produced on local fauna, thirty-three special wildlife passages have been built beneath the railway. We monitored the movements of chiru along the Qinghai-Tibet highway and railway, recorded their passes and behavior through crossing structures from the construction period in 2004 on to the present. Monitoring results show that the disturbance to chiru migration included transportation infrastructure, human activities, road traffic, construction of the railway and so on. During the main construction period the Tibetan antelopes were much disturbed but they soon adjusted their migrating routes to avoid most human activities. The antelopes readily adapted to wildlife corridors and other underpasses along the railway: the efficiency of wildlife passages have greatly improved from 56.06 to100%, more crossing structures were used , grouping size and time used in crossing decreased. The use of wildlife corridors was affected by the structure of the passage, recovery of vegetation following damage during construction, and other factors. Our results also indicated that chiru migration were greatly affected by the busy traffic on highway, the successful chiru passes have a negative correlation with the traffic volume.

SY61 Lindsay, Kathryn*; Gobeil, Jean-Francois; Lawler, Joshua J. ; Schloss, Carrie; Beazley, Karen F. ; Landscapes Conservation and Protected Areas, Canadian Wildlife Service, Environment Canada, 351 St. Joseph Blvd., Gatineau QC, K1A 0H3, CAN, School of Forest Resources, University of Washington, Seattle, WA, USA, School of Forest Resources, University of Washington, Seattle, WA, USA, School for Resource and Environmental Studies, Dalhousie University, Halifax, NS, CAN; *karen.beazley@dal.ca*
Projecting Future Climate-Induced Turnover in Vertebrate Fauna Representation in Canada's Protected Areas Networks
Climate change is recognized as an important threat to biodiversity. We assess the potential representation of vertebrate species in Canada's networks of protected areas now and under various future climate-change scenarios. Our goal is to identify where changes in vertebrate fauna will be the greatest and suggest improvements in protected areas planning over short, medium and long terms. We used a set of bioclimatic models built as part of a previous study to project changes in the potential ranges of birds, mammals, and amphibians under 20 different projected future climates. The future climates were simulated by 10 General Circulation Models run for two CO2 emissions scenarios, a high emissions scenario (A2) and a low emissions (B1) scenario. Projections were made for three 30-year averaged time periods: 2011-2040, 2041-2070, and 2071-2100. We used the projected shifts in species potential ranges to assess the degree to which species are represented within protected areas networks of Environment Canada, Parks Canada, other Federal agencies, and Provincial and territorial governments. Species shifts were also assessed within bird conservation regions and the Northern Appalachian/Acadian Ecoregion, an area of conservation interest spanning Canada and the US. Climate projections based on a relatively low greenhouse-gas emissions scenario result in changes in faunal assemblages across Canada. The largest changes are projected to occur at higher latitudes where many species will likely expand their ranges into previously unoccupied areas.

SY42 Lindsey, PA; African Wildlife Conservation Fund; *palindsey@gmail.com*

Conservation Issues Relating To Safari Hunting In Sub-Saharan Africa

Safari hunting tourism comprises a major industry in parts of Africa, particularly in the SADC region. Approximately 26,750 hunting tourists visit Africa every year, generating annual revenues of at least USD229 million. Due to expanding human and livestock populations there is increasing competition for land and pressure on natural resources. Effective wildlife conservation outside of protected areas is increasingly dependent on wildlife-based land uses competing financially and economically with alternatives. In the remoter and less secure parts of Africa, safari hunting is currently the only practical means of generating significant returns from wildlife. Safari hunting is currently practised over ~1.55 million km2 in sub-Saharan Africa, and provides incentives for both habitat protection and for the prevention of unregulated bushmeat hunting. Safari hunting justifies the retention of large blocks of state-land for wildlife management, is a key component of community-based natural resource management programmes and was the primary stimulus for the development of a massive wildlife-ranching industry on private land in southern Africa. However, there are a number of problems which undermine the conservation value of safari hunting and which threaten the future of the industry. The primary issue is structural and institutional: failure of governments to allocate full ownership or user-rights over wildlife to communities, preventing local people from benefitting adequately from safari hunting (or ecotourism). Other key problems include inappropriate systems for leasing hunting concessions, inadequate monitoring of hunted wildlife populations, and flawed processes for establishing quotas. Animal rights groups are vocally opposed to safari hunting, and some African governments appear uncertain over the acceptability of safari hunting as a conservation tool. Consequently, the long term future of safari hunting in Africa is by no means secure. Resolving problems associated with safari hunting is crucial to ensure that the key incentives for wildlife conservation stemming from the industry are perpetuated and enhanced.

P2.9 Linke, J; Castilla, G; McLane, A; McDermid, G*; University of Calgary; *gcastill@ucalgary.ca*

Effects of the Spatial Offset between Landscape Structure Covariates and Species Distribution Field Data

Landscape pattern indices (LPIs) are sometimes used as covariates in occupancy models to account for the structural context in which each individual observation is embedded. Ideally, the sampling units (a.k.a landscape samples) from which these covariates are extracted should be centered on the location where the response variable is being observed. However, there can be situations (e.g., multi-species surveys with data collected at different places within each site; confidentiality issues on the exact location of the field plots) where this is not possible and the landscape samples are not exactly centered at those locations. In this poster we explore whether or not this mismatch affects the value of the LPIs. We analyzed the behavior of four LPIs in a case study of a 10,000 km2 boreal region close to Edmonton, Alberta, containing 30 non-contiguous 18 km2 landscape samples, which we subjected to systematic displacements. The displacements did create large deviations within each individual site. A 1 km displacement led on average to a 15% deviation with respect to the LPI values obtained from the undisplaced landscape samples. The deviations were relatively similar across all directions, and increased with the magnitude of the displacement for all LPIs. Therefore, when the center of landscape samples are displaced with respect the ecological observations collected therein, the displacement adds noise to the sought relationship and uncertainty to the model output.

SY35 List, R.*; SolÃ–s, V.; Barajas, N.; Tolle, C.; Instituto de Ecologia UNAM, The Naure Conservancy, Tututaca Mountain School; *rlist@prodigy.net.mx*

Bison Recovery In Mexico: From Planning To Action

The interest on the bison in Mexico has grown dramatically in just a couple of years, to the extent that it is now considered a priority species for recovery by the federal government and a recovery team was formed in 2008. With the goal of restoring its ecological role in the grasslands of northern Mexico, a Conservation Action Plan has been drafted, which includes the following objectives: 1) Increase the size and range of the free-ranging Janos-Hidalgo bison herd; 2) Establishment of herds under ecological management, within the historic range of the bison in Mexico; 3) Contribute to grassland restoration through bison management; 4) Develop conservation strategies for the bison and its habitat. The main threat for the Janos-Hidalgo bison herd is the US-Mexico border wall and the potential extension to the east, so a case is being made of the need of a wildlife friendly barrier in this area, and talks with landowners from both sides are taking place to involve them in the conservation efforts. A new herd was formed further south within the Janos Biosphere Reserve, with 23 genetically pure bison from Wind Cave National Park in South Dakota and more imports will take place over the next 4 years. This conservation and breeding herd will be used to produce the bison for recovery in other areas of northern Mexico and the site will serve both as a learning and training center on the management of bison.

SP9.13 Littnan, CL*; Baker, JD; Harting, A; NOAA Fisheries, Hawaiian Monk Seal Research Program, Harting Biological Consulting; *charles.littnan@noaa.gov*

Conservation strategies for the endangered Hawaiian monk seal: new threats, new solutions, new risks

With human encroachment, climate change and other factors threatening the persistence and recovery of many endangered species, conservation programs may need to consider actions that run counter to traditional environmental wisdom. This may require abandoning long-standing conservation projects in favor of alternative more hands-on strategies that may or may not work. The Hawaiian monk seal recovery program (HMSRP) is a good example of this. With a population of approximately 1100 seals and an annual decline of 4%, monk seals are on the brink of extinction. Hawaiian monk seals are the most managed species of marine mammal in the world and the HMSRP has started drawing up a large-scale plan to improve chronic poor juvenile survival and preserve the population's reproductive potential. Interventions are being developed and applied to particular age-classes and include deworming, captive care, predator control, and translocations. One translocation scenario would move weaned pups from remote habitats devoid of human presence but characterized by low survival into an area with high human density and novel natural and anthropogenic threats but, counter-intuitively, higher survival rates. Upon achieving sub-adult status, seals may be returned to their natal populations in order to maintain seals across their range. Here we discuss the future enhancement activities and difficult ecological, cultural, and other factors considered in their application to recover monk seals.

14.1 Livoreil, B.*; Gerbeaud-Maulin, F.; Rivière, V.; SOPTOM, DREAL PACA, ECOMED Consultants; *Barbara.Livoreil@gmail.com*

The green & blue network initiative: planning for sustainable conservation beyond NATURA 2000

Often, project aiming at protecting land come from our governments or Europe (Natura 2000) and thus face resistance at the local level, because seen as a top-bottom non democratic process. The green and blue network is an old concept in French-speaking countries. It has recently been revisited during the Grenelle de l Environnement to match the new challenges of biodiversity conservation within climate change. It provides a new adaptive frame for land use planning, in order to restore or maintain connectivity between ecosystems and populations, from the basis of existing protected and designated areas. We present a case-study based on the conservation of Hermann s tortoises (Testudo hermanni hermanni) in Var, France, to illustrate how a concerted bottom-up approach could lead to increased protection of buffer zones and corridors on a short and long term adaptive process.

SY72 LOCKE,HARVEY; WILD Foundation; *harvey@wild.org*

At Least Half: Core protected areas as a cornerstone of the human endeavour in the 21st century

Global efforts to date have been seriously inadequate to protect the other life forms that share the world with us and to prevent human-caused climate change. The oceans are being depleted of fish, large carnivores are disappearing all over the terrestrial world, climate change is drastically changing habitats, freshwater scarcity is becoming acute on many continents, and humans continue to destroy wild ecosystems even though their value to agriculture is marginal. A galvanizing vision is needed. Humanity should protect at least half of Earth's land and water in interconnected PAs because of their critical importance to biodiversity, ecosystem services, human well-being and climate change adaptation and mitigation. We need to renew our focus on core areas while advancing the critical connectivity agenda to avoid building "bridges to nowhere". PAs are the best way to ensure that carbon stays in place and out of the atmosphere. PAs established could take a variety of forms and land tenures that include national parks and wilderness areas, aboriginal conservation areas, private land conservation (whether held by individuals, corporations, community held lands or NGOs), municipal watershed protection areas, and regional land use zone designations provided they meet IUCN's 2008 standards for PAs.

P2.59 Lockhart, Kathy*; de Fontaubert, Charlotte; DECR, Turks and Caicos Government, IUCN US; *kglockhart@hotmail.com*

Overcoming Data Paucity in Two Tropical Fisheries: Queen Conch and Spiny Lobster in the Turks and Caicos Islands

The Turks and Caicos Islands (TCI) are home to two fisheries of critical importance for the local economy: the queen conch (Strombus gigas) fishery, which comparatively is relatively healthy, and the spiny lobster (Panulirus argus) fishery, which gives rise to rather more concern, though the exact status of the stock is difficult to assess. These two fisheries are managed completely differently, with a closed season, and national size and gear restrictions for the spiny lobster, but through a CITES quota for queen conch, along with national gear and size restrictions. In both instances, however, the same level of data collection has taken place, and some of the data collection started as early as the 1800's. Stock assessments have been carried out for both fisheries, some visual surveys were carried out in 2001, marine protected areas were established to protect the stocks and local consumption has been monitored. This paper first evaluates the level of certainty that can be derived from this fragmentary approach, and then suggests alternative methods to best fill the gaps in knowledge and to improve the management of these two key fisheries in the absence of greater certainty.

SY41 Longcore, T*; Rich, C; The Urban Wildlands Group; *longcore@urbanwildlands.org*

Considerations in designing wildlife-friendly night lighting

Conservation lands with public access, including wildland parks, are places to be able to see and enjoy the solitude of unspoiled nature, where the natural rhythms of life are allowed to flourish with minimal disturbance from human interference. Managers of such lands therefore must balance the need to provide visitor infrastructure with its adverse effects on the environment. Although night lighting is considered an essential element for visitors in many circumstances, night lighting has a range of adverse ecological consequences for ecosystems and wildlife. With some planning, however, the effects of lighting on species and ecosystems can be reduced and in some instances avoided altogether. We provide an overview of the effects of artificial night lighting on wildlife and considerations for designing or retrofitting lighting that minimize impacts to wildlife and the nocturnal environment. These considerations are organized by habitat type: dunes, beaches, and shorelines; deserts and scrublands; wetlands; islands, oceans, and reefs; grasslands; deciduous and evergreen forests; alpine and tundra; and urban environments. Within the unique context of each of these environments, managers should consider five questions about lighting systems that address need, duration, intensity, direction, and spectrum as they relate to potential adverse effects.

P2.174 Lopez-Alfaro, C*; Estades, CM; Saucedo, C; Gill, R; Dennis, A; University of Alberta, University of Chile, Conservacion Patagonica, Centre for Human and Ecological, Forest Research UK, CONAF de Aysen, Chile; *clau.mago@gmail.com*

Improving land management plans for the conservation of an endangered Huemul deer (Hippocamelus bisulcus) in Southern Chile

Despite the understanding that wildlife conservation requires maintenance of population connectivity, there is lack of management tools that allows the incorporation of this concept to land use planning. The Aysen region has a large amount of protected lands but its abrupt geography and increasing human activities might reduce the connectivity of the remaining huemul populations. The later is significant due to previous research showing the existence of a threshold on population size and aggregation for population viability. We use spatially explicit population models based on individuals to assess the connectivity between huemul populations and potential corridors. We increase the size of urban areas to evaluate their impacts on connectivity and we explore population spatial configurations that minimize local extinctions. One-hundred individuals were located on each population. The number of individuals and their arriving time with respect to other populations was recorded. Colonization areas and use frequency was used to determine corridors. Results showed a deficient connectivity between the northern populations and the rest of the system and also the existence of isolated populations. Human activities enhance this naturally low connectivity. This methodological approach allows us to create practical tools (e.g. maps) to improve the actual land management plans and enhance the huemul conservation.

P2.153 Lorestani, B*; Khorasani, N; Cheraghi, M; Islamic Azad University- Hamedan Branch, Hamedan, Iran, Department of Environmental Science, College of Natural Resources, University of Tehran, Tehran, Iran; *saba12ir@yahoo.com*

An assessment of native plant species in removal of heavy metals from contaminated soil of a protected area in Iran

Heavy metals concentrations in mine waste are higher than of uncontaminated soil. These mine wastes are harmful to humans and other organisms and tend to bio-accumulate in the food chain. Hyperaccumulator plants can be potentially used to remediate metal-contaminated soil and this process is called phytoremediation. We assessed the extent of metal accumulation by plants found in a mining area located in Lashgardar protected area in Iran. The ultimate goals of this study were to find suitable plants for phytoextraction and phytostabilization (two strategies of phytoremediation). Plants with a high bioconcentration factor (BCF) and low translocation factor (TF) have the potential for phytostabilization and plants with both BCFs and TFs greater than one have the potential to be used for phytoextraction. We collected 36 plants each from 12 species and extracted shoots and roots together with associated soil from the study area. All plant and soil samples were analyzed for total concentration of Pb, Zn, Mn and Fe using atomic absorption spectrophotometer and BCF and TF parameters were calculated for each element. Our results showed that Scrophularia scoparia is effective in phytostabilization of Pb and Centaurea virgata, Echinophora platyloba and Scariola orientalis had a potentioal for phytostabilization of Zn. Furthermore Centaurea virgata and Cirsium congestum were effective in phytostabilization of Mn. However none of the plant species we assessed were suitable for phytoextraction of Pb, Zn, Mn and Fe, and phytostabilization of Fe. In summary, our finding suggest that native plant species growing on mine wastes can be used for restoration of mine waste contaminated sites due to potential for phytoremediation.

P1.154 Lorrilliere, R*; Couvet, D; Robert, A; MNHN CNRS UMR 7204 ; *lorrilliere@mnhn.fr*

Biodiversity facing direct and indirect human induced disturbances.

Human activities are expected to results in a diversity of directional or stochastic disturbances, affecting species either directly or through an effect on their resources. Yet there is no theoretical framework to predict the complex and various effects of these disturbances on communities. We developed a dynamic model that mimics the use of different types of resources by a community of interacting species. We investigated the effects of different types of environmental perturbations (affecting either the growth of species or the availability of resources) on several biodiversity indicators. Our results indicated that (i) in realistic community models (assuming uneven resource requirements among species) the effects of perturbations are strongly buffered as compared with neutral models; (ii) intermediate levels of disturbance are expected to improve community species richness, confirming previous theoretical findings. However, functional community characteristic may be strongly affected by directional or stochastic disturbances; (iii) an increase of the environmental (e.g., climatic) variance may have contrasting effects on community biomass and species richness. Overall, the model may help the interpretation of biodiversity metrics in communities facing disturbances and seriously questions the used of neutral models in biodiversity assessments.

P1.176 Louis Pitelka*; NEON Project Team; NEON, Inc.; *lpitelka@neoninc.org*

The National Ecological Observatory Network (NEON)

The US National Ecological Observatory Network (NEON) is a large facility project funded by the National Science Foundation. NEON's goal is to contribute to ecological understanding and decision-making at the regional to national-scale through integrated observations and experiments. NEON will create a new national observatory network to collect ecological and climatic observations across the continental U.S., Alaska, Hawaii and Puerto Rico. The observatory will be the first of its kind designed to detect and enable forecasting of ecological change at national scales over multiple decades. NEON has partitioned the U. S. into 20 ecoclimatic domains, representing different regions of vegetation, landforms, climate, and ecosystem performance. Data will be collected from strategically selected sites within each domain and synthesized into information products that can be used to describe changes in the nation's ecosystem through space and time. The data NEON collects will focus on how land use, climate change and invasive species affect biodiversity, disease ecology, and ecosystem services. Obtaining integrated data on these relationships over a long-term period is crucial to improving forecast models and resource management for environmental changes. These data and information products will be freely and openly available to scientists, educators, students, decision makers, and the public to enable them to understand and address ecological questions and issues.

SY42 Lovelock, B; University of Otago; *brent.lovelock@otago.ac.nz*

Perspectives from New Zealand: Hunting as Tourism and its Role in Conservation

This paper addresses the challenges facing the sustainability of touristic hunting, and its use as a game management tool. A niche tourism product, hunting-tourism fits into the broader category of wildlife tourism, which includes â non-consumptive' â ecotourism' activities, e.g. wildlife viewing, photography, as well as â consumptive' (hunting/fishing) activities. Hunting-tourists and eco-tourists hold different social and environmental values, a source of conflict, impacting visitor patterns, behaviour and satisfaction for both groups. Ironically, in destinations such as New Zealand, where all game species are introduced â pests', causing unacceptable modification to natural ecosystems, hunting could quite validly be considered to be ecotourism. However the grounds of this argument will always be contentious. One problem facing destination managers who wish to market hunting tourism, is how to do this in a sensitive manner that will not alienate large and lucrative segments of their tourist market. While some destinations have overtly promoted hunting tourism opportunities historically, this may no longer be an acceptable practice given the contemporary realities of the animal-rights/welfare movement and the power of the tourist eco-dollar. For hunting tourism to continue, will increasingly rely upon its proponents clearly defining the benefits of the activity and developing collaborative relationships with the broader tourism industry.

P1.156 Lowney, A.*; Nevin, O.; University of Cumbria; *anf@lowneyplanet.com*

Impacts of mountain bike trails on red squirrel populations (Sciurus vulgaris) in Northern England

The increase in tourism and recreational activities potentially add to the already increasing pressure on endangered and vulnerable wildlife. Impacts on wildlife caused by these increasing popular pursuits are however poorly understood. However it is thought to have damaging effects on species that can lead to a decline in local population numbers and even species richness. I tested the effect of two recently opened mountain bike trails on the abundance of the red squirrel (Sciurus vulgaris), whose numbers have rapidly declined throughout Britain. Surveys were undertaken using distance sampling methods. These followed transects carried out during 2007 prior to the construction of the mountain bike trails. Data gathered was used to compare squirrel abundance with trail usage, habitat typology and population abundances from previous years. Habitat typology was the principle determinant of red squirrel abundance. The presence of mountain bike trails had a strong negative impact on the abundance of red squirrels. The negative impacts created by mountain bike trails could be alleviated by careful selection of trail sites due to habitat types. Leaving areas that provide refugees for red squirrels such as Larch (Larix deciduas) and Sitka spruce (Picea sitchensis).

P2.179 Lu Zhang*; Jiazi Liu; Dajun Wang; Zhi Lu; George Schaller; Yonglin Wu; Li Zhang; Xin He; Peking University, Wildlife Conservation Society, Qinghai Lake National Nature Reserve, Qinghai Forestry Bureau, Shanshui Conservation Center; *zhanglu726@gmail.com*

Impact of Fencing and Livestock on the Survival of Przewalski's Gazelle

The highly-endangered Przewalski's gazelle (Procapra przewalskii) endured severe habitat loss and population decline over the last century. Since 2002, illegal hunting of gazelles has been largely stopped, making fencing of pastures and competition with livestock now the main threats (hunting was banned well before 2002 but not enforced much). We quantified fencing and livestock on gazelle's habitat using parallel transects and analysed spatial correlation among fence-density, livestock-density, and gazelle activity. We also compared reproduction performance of small gazelle populations on distribution areas with different fence densities. Our study indicated that highly-fenced areas in the gazelle's habitat were associated with less gazelle activity, but a higher Enhanced Vegetation Index (EVI) and more livestock. Higher fence density did not correlate with young gazelle mortality, but did correlate with fawning rate. Ten-year EVI trends showed that fencing did not help to improve the condition of grassland, especially in high livestock-density areas. We observed no significant spatial correlation between livestock and gazelle activity, but more work is needed to evaluate the impact of livestock, especially the potential for food competition.

SY28 Luigi Boitani*; Urs Breitenmoser; Christine Breitenmoser-Wursten; Jon Swenson; Department of Animal and Human Biology, UniversitÃ di Roma La Sapienza, Viale dell'UniversitÃ 32, 00185 Roma, Italy , Institute of Veterinary Virology, University of Bern, CH-3012 Switzerland , KORA, Thunstrasse 31, CH-3074 Muri, Switzerland , Department of Ecology and Natural Resources Management, Norwegian University of Life Sciences, NO-1432 Çºs, Norway; *luigi.boitani@uniroma1.it*

Large carnivores, their prey and humans in Europe - the ambitious task of making everyone happy

In spite of high human densities and virtual absence of wilderness areas, 29 out of 33 continental European countries host large carnivore (bears, lynx, wolves and wolverines) populations, most increasing in number and distribution areas, even in agricultural and peri-urban areas. However, predation on livestock affects farmers' economies, predation on wild prey affects hunters' activities, and fears of attacks on humans frighten part of the general public. To reconcile the needs to conserve viable populations of large carnivores with those of humans is a formidable task in the European human dominated landscapes. European protected areas are too small to host viable populations, and hence large carnivores need to co-exist with humans in multi-use landscapes to survive. In spite of their general legal protection, coexistence requires the implementation of locally adapted conservation rules and effective means to prevent and mitigate the conflicts, including culling and hunting within compensatory mortality. The goal of the Large Carnivore Initiative for Europe (LCIE) is to have (more) large carnivores in wider ranges - maximizing distribution rather than density. Populations should be self-sustaining on wild prey but coexistence with human activities implies acceptance that the large carnivores may not be allowed to grow to the ecological carrying capacity as human intervention may be necessary to control the natural patterns toward socially and economically acceptable compromises.

19.2 Lundquist, C.*; Cummings, V.; May, K.; Matheson, F.; Reed, J.; National Institute of Water and Atmospheric Resea, Northland Regional Council; *c.lundquist@niwa.co.nz*

Restoration in New Zealand Estuaries

Abstract: Estuaries in New Zealand are subject to a range of disturbances, including land-based sediment loading that increases turbidity and deposition of fine sediments, favoring mangrove expansion, and decreasing health of shellfish beds and seagrass meadows. Here we discuss three projects led by scientists, community groups, and management agencies that have resulted in successful restoration efforts, and the development of guidelines for restoration activities in New Zealand estuaries. In the first, we developed guidelines for translocating shellfish (cockles). Field experiments tested which methods maximized retention and later recruitment of shellfish (cages; density of shellfish; size of plots). A community group assisted with field work, increasing local knowledge of shellfish biology and restoration methods, and resulting in support for additional shellfish restoration projects. A second project successfully translocated seagrass. Long-term monitoring of translocated seagrass demonstrates that the meadows are increasing in extent. A final project is developing guidelines to maintain a balance of areas of mangrove forest and open sand-flat in the face of increased sediment loads that favour mangrove expansion. Here, the challenge is in identifying techniques to reduce mangrove expansion that minimize impacts on neighboring habitats, while managing community expectations and educating communities on mangrove contributions to estuarine health.

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The Allee effects in invasive ant species

The Allee Effects (AE) gather phenomena in which specie's population growth shows a positive relationship between a component of individual fitness and population size, as a direct consequence of individual aggregation and cooperation. Recently its importance in conservation has been shown for its potential role in extinctions of endangered species as well as in the dynamics of invasive species. Eusocial insects are strong candidates for many AE mechanisms, due to the nature of their social structure. We aim at determining the presence and the mechanisms that may cause AE in ants, including native and invasive species, through the study of the success of colony survivorship in relation to the number of queens and workers that cooperate to found a new colony. We set up lab colonies of Linepitema humile (Argentine ant), one of the most devastating of the invasive species worldwide and Tapinoma nigerrimum, a non-invasive species with similar colony structure. We studied the relationship between reproductive colony fitness and the initial size of the colonies (number of queens). We measured colony survivorship (as a direct measure of reproductive fitness) and other components of fitness (such as reproductive output). Significant differences in the effect of colony size and some measures of fitness between the two species are useful to determine the existence of a critical population size for the colony of invasive species to survive, which is crucial for the management and control of invasive species.

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Pollution Impact on Environment, and How to Conserve it.

Introduction: Every person on Earth contributes to the state of our planet, because we all use natural resources and produce waste materials. The more people there are, the more damage they do through pollution. methods: Laws can stop factories from dumping poisonous chemicals in lakes, rivers, and the ocean. Engineers can build cars that burn less gasoline. Scientists are looking for fuels to replace coal and oil. They are looking for ways to use the power in wind and in rays from the Sun. We can help cut down on the amount of garbage we make. We can recycle paper, plastic, glass bottles, and metal cans. Recycled material gets used over again. Recycling helps cut down on pollution. results: Pollution can kill or sicken plants, animals, and people. Pollution can change the environment. Pollution can get into the air. Pollution can also get into soil and water. From there, pollutants can get into the food chain. Conclusion: Humans are very inventive and intelligent, as well as very destructive and careless. If we understand that our environment is fragile, then we can all help to save it, and the precious and life-giving resources that it provides.

SY15 MacDonald, KI; University of Toronto; *ken.macdonald@utoronto.ca*

'New Partners': Institutional Dynamics, Ideological Shifts and Market Logics in the Organization of Biodiversity Conservation

From its outset, the field of biodiversity conservation has undergone a number of â field-configuring' innovations. One of the most recent is the incorporation of â market-based mechanisms', a broadly defined set of practices that conceive of biodiversity in terms of the potential for capital accumulation and subject it to the vagaries of market fluctuations and financial products and services. Whether such innovations represent peril or promise, to a remarkable degree, the ramifications of such substantive changes are assumed rather than measured. Few organizations have internal metrics in place to quantify, measure, or assess the biodiversity outcomes of such relationships and practices. Rather, the rhetoric of market efficiency is relied upon to represent the utility of such mechanisms for biodiversity conservation. Given the striking absence of evidence demonstrating the efficacy of such practices, serious questions exist regarding the speed with which this innovation has been adopted across a wide spectrum of conservation organizations. This paper begins to address these questions by adopting an organizational perspective which recognizes that the capacity to subject biodiversity to market logics has emerged, not from a demonstrated capacity of â the market' or the private sector to effectively address problems of ecological degradation, but from organizational needs to respond to a dynamic institutional environment and the fiscal constraints associated with neoliberal policies of major donors and multilateral financial institutions. But subjecting biodiversity conservation practice to market logics requires substantive effort be put into altering organizational practice and mobilizing ideological shifts within organizations. Research on organizational actors reveals that within this set of constraints, intensification has revolved around the formation of social ties among between a small number of actors and that, while initially weak, the intensification of market-based mechanisms relies upon processes of institutionalization, across scales, that convert weak and fast-decaying social ties into durable forms of association. This paper examines the history of such institutionalization, the mechanisms involved, and their implications for ways of thinking about biodiversity and engaging in biodiversity conservation.

21.1 Macdonald, S. Ellen*; Work, Tim; Bergeron, Yves; Chen, Han; Quideau, Sylvie; Spence, John; Department of Renewable Resources, University of Alberta , Department of Biological Sciences, UniversitÃ© du QuÃ©bec Ã MontrÃ©al, Department of Applied Science, UniversitÃ© du QuÃ©bec en Abitibi-TÃ©miscamingue, Faculty of Forestry and the Forest Environment, Lakehead University; *ellen.macdonald@ualberta.ca*

Influence of boreal mixedwood forest composition on diversity and composition of biotic communities

The highly productive southern boreal forest in Canada and Eurasia is dominated by mixedwood forests in which the canopy is dominated by varying mixtures of broadleaf (e.g., aspen, poplar, birch) and coniferous (e.g., spruce, fir, pine, cedar) trees. â Mixed' forest stands, in which two or more tree species are prominent in the canopy, can have higher productivity and may also host higher levels of biodiversity than â pure' stands, because they provide a greater variety of habitats. We analyzed data available in the literature on vascular and non-vascular plants, soil microorganisms, arthropods, and songbirds for the Canadian boreal mixedwood forest to determine the relationships of species diversity and community composition to forest (canopy) composition (conifer-dominated vs mixed vs broadleaf-dominated). Four different relationships were observed, each support by different biotic groups. Many different studies of ground beetles demonstrated that all three forest types had similar richness and community composition with minor differences in relative abundance. This was also the case for spiders and moths in mixedwood forests of northwestern Alberta. For understory vascular plants , soil microbial communities, saproxylic beetles, and songbirds mixed forests had higher species richness than either broadleaf- or conifer-dominated forests because they hosted communities comprised of a combination of species found in those two extremes. For nonvascular plants and in a study of litter-dwelling and saproxylic beetles from mixedwood forest types in Quebec richness increased with an increasing conifer component. For rove beetles and understory vascular plant communities in heavily conifer-dominated forests of eastern Canada, richness declined with increasing conifer component. The different relationships between forest composition and richness and community composition for the different groups can be explained by differences in habitat requirements. We conclude that maintaining a diversity of mixedwood forest types at different scales will be important for conserving biodiversity in managed boreal mixedwood landscapes.

SP4.6 MACFARLANE, W.W.*; Logan, J.A.; Kern, W.R.; Geo-Graphics, Inc., USDA Forest Service (retired); *wally@geograph.com*

Recent Assessment of Whitebark Pine Overstory Mortality in the Greater Yellowstone Ecosystem, and Associated Ecological and Management Implications

Historically, the range of mountain pine beetle (MPB) (Dendroctonus ponderosae) was mainly limited to lower elevation forests because of the unfavorable climatic conditions found at higher elevations. For this reason, whitebark pine (WBP) (Pinus albicaulis) which is located above 2500 meters in the Greater Yellowstone Ecosystem (GYE), has largely avoided past MPB outbreaks. However, since 2000 and the onset of significant anthropogenic global warming these previously inhospitable and vulnerable WBP forests are experiencing an alarming level of MPB-related mortality. In the summer of 2009 we conducted a comprehensive sub-watershed level aerial survey using GIS and GPS technologies to assess the spatial extent and intensity of this overstory mortality. Results indicate mortality levels that are distinctly related to geographic location and associated landscape attributes. We found measurable MPB activity in 94% of the WBP sub-watersheds sampled. Approximately 50% of the sub-watersheds sampled showed high-level mortality where the outbreaks have removed at least approximately 70% of the WBP overstory. This information will help forest managers implement restoration strategies in areas showing decline and preservation strategies in less impacted areas. We argue that the documented high mortality likely threatens the ability of these foundation and keystone forests to provide critical ecological services.

4.3 Mack, GG*; Slattery, SM; Armstrong, L; Howerter, DH; Robin, M; Ducks Unlimited Canada; *g_mack@ducks.ca*

Effects of anthropogenic landscape change on duck abundance and distribution in the boreal plains of Canada

The boreal plains ecozone in Canada contains breeding habitat for about 60% of the western boreal forest duck population. Habitat is being lost and fragmented in this ecozone due to industrial development (e.g., forestry, oil and gas extraction). While many studies have investigated the effects of anthropogenic disturbance on terrestrial birds, few have examined the effects on ducks, which also rely on upland habitat for nesting and whose food resources might be altered if hydrologic change results from upland alteration and direct impact on wetlands. Therefore, our objective was to identify types and intensities of habitat disturbances, if any, which negatively affected duck populations across a broad spatial scale. Data sets we used included 50 years of waterfowl surveys collected by the United States Fish and Wildlife Service, habitat variables derived from Land Cover of Canada, Water Fraction of Canada and other wetland spatial datasets, and anthropogenic disturbances (e.g., forest conversion, road density, oil and gas well sites) obtained from Global Forest Watch's spatial datasets. We anticipate our results will help identify which landscape changes have the potential to limit duck populations in the western boreal forest. Consequently, conservation actions could start to target these limitations to help improve waterfowl and wetland conservation efforts in the boreal plains.

1.3 MacKay, JWB*; Murphy, EC; Hauber, ME; Russell, JC; Clout, MN; University of Auckland, Department of Conservation, Hunter College, CUNY, University of California - Berkeley; *j.mackay@auckland.ac.nz*

Experimental invasions to determine biosecurity best practice

Islands that are free of invasive rodents are important sites for conservation and it is therefore essential that incursions of such species can be rapidly detected so they can be removed before they can establish. The house mouse (Mus musculus) is often transported to islands and has proven to be the most difficult rodent species to eradicate from islands, requiring specialised early detection methods to be developed. During 2008 we recorded densities and ranging behaviour of mice on a 6ha island in New Zealand culminating in a successful eradication of mice. In 2009 we sequentially released pairs of radio-collared male and female mice at opposite ends of the mouse free island and monitored their movements with radio-tracking and tracking tunnels. All animals were detected with tracking tunnels and eliminated by trapping within 2 weeks of release suggesting that detecting and removing newly arrived mice is possible. Initial mouse home ranges averaged 0.26ha whereas the ranges of released animals averaged 3.6ha. Released animals were recorded ranging near to each other after being released approximately 400m apart. The observed increase in ranging behaviour may compensate for Allee effects in the colonizing population. As well as contributing to a better understanding of population processes in low density invasion ecology, results also have important implications for biosecurity and will assist managers in detecting and eliminating mice at low densities.

P2.158 Madosky, J*; Howard, J; Rubenstein, D; Stuska, S; University of New Orleans, Princeton University, National Park Service; *jmadosky@uno.edu*
Effects of population management by immunocontraception on harem stability in feral horses (Equus caballus) on Shackleford Banks Island, NC
Feral horses on Shackleford Banks Island, NC are managed by The National Park Service in order to reduce their impact on the fragile barrier island ecosystem. Management techniques include immunocontraception of most females. The immunocontraceptive reduces the number of horses that need to be physically removed, but there is concern that the immunocontraceptive is influencing the social behavior of the mares and reducing harem stability. I investigated the effect of immunocontraception on harem stability by tracking the number of harem changes of each adult mare through the breeding season for two seasons. In both seasons the mares that had been treated with the immunocontraceptive changed harems significantly more than mares never treated (one-tailed: 2007, p = .042 and 2008, p=.021). The number of years treated did not have a significant effect on the number of harem changes (2007 p=.199, 2008 p = .871), nor did the number of years a mare had been off contraceptive once the contraceptive is discontinued (2007 p =.310, 2008 p=.823). Additionally, there was no significant difference in harem changes between mares that were actively contracepted and mares that had been contracepted in the past but were not actively contracepted (2007 p=.196, 2008 p=.751). These results indicate that the immunocontraceptive has a significant effect on harem stability and that once a mare has been contracepted the behavioral effect of the contraceptive treatment may not be readily reversed.

SY14 Magnusson, W. E.*; Hero, J.-M.; Costa, F. R. C.; Lawson, B. ; Castley, G.; Koblitz, R.; Franklin, E.; Lima, A. P.; Instituto Nacional de Pesquisas da AmazÃ´nia, Griffith University, Department of Environment and Resource Management, Queensland, Instituto Brasileiro do Meio Ambiente e dos Recursos Naturais RenovÃ¡veis; *bill@inpa.gov.br*
RAPELD and the hunt for the black swan: Adaptive co-management for monitoring biodiversity on a global scale.
There is widespread misunderstanding of the difference between designing a monitoring study and designing a monitoring system. Designing a monitoring study can benefit from focusing on a limited range of management goals, if all of the stakeholders are convinced of the relevance of those goals, and it is reasonable to assume that other stakeholders or goals will not be forced onto the system. The latter assumptions are likely to apply only to geographically and temporally limited studies. A major limitation of most monitoring studies, even when conducted as part of adaptive management, is that they are not designed to deal with extremely important, but essentially unpredictable, phenomena (black swans). The cost of implementing an optimal design for every known environmental threat is beyond any reasonable expectation for financing within the foreseeable future, and even if they were undertaken, those studies would not self organize into a system that would optimize our chances of detecting and dealing with black swans. In this paper, we present some preliminary results from the RAPELD system, which was designed to maximize the chances of detecting black swans, by implementing infrastructure that is useful to a wide range of stakeholders with different objectives and scales of interest, while maintaining the flexibility to expand or contract to deal with specific threats.

7.7 MAGUIRE, LA*; Cochrane, JF; Thompson,GT; Regan, TJ; Duke University, Patuxent Wildlife Research Center, NOAA Fisheries, University of Melbourne; *lmaguire@duke.edu*
Are Scientists Able to Make Consistent Judgments About Relative Endangerment of Species Based on Patterns of Extinction Probability?
Determining whether a species warrants listing under the U.S. Endangered Species Act requires judgment about how large its chances of extinction must be, and how imminent, to qualify for listing. Developing clear, perhaps quantitative, listing standards requires information on how scientists decide what patterns of extinction probability indicate more or less endangerment. Using several value elicitation protocols, we presented 21 scientists knowledgeable about endangered species with graphs depicting different patterns of extinction probability and asked them to rate relative endangerment. We found that: (1) judgments of endangerment were often inconsistent within and between subjects; (2) the timeframes for concern about extinction varied among subjects from a hundred to thousands of years; (3) scientists working to develop quantitative listing criteria responded most consistently, although all subjects sometimes misinterpreted graphs of extinction probability over time; (4) judgments were less consistent when graphs of extinction probability rose slowly but steadily over time, or rose rapidly but not until several decades into the future; and (5) some subjects revealed changing perceptions of endangerment as they completed the tasks, suggesting that perhaps they did not have stable prior concepts of degree of endangerment. Better training in the kinds of judgmental tasks we presented will be needed both to develop clear standards for listing and to apply them consistently.

P1.47 Mahaffy, N; Boer, C; McFarlane, K*; Franke, A; The King's University College, Canadian Circumpolar Institute; *keri.mcfarlane@kingsu.ca*
Making a comeback: A study of population genetic health of the Alberta peregrine falcon (F. peregrinus)
Alberta peregrine falcons (Falco peregrinus anatum) are an endangered species recovering from catastrophic population declines during the mid-1900s. However, despite great interest in the conservation of this species, little is known about the genetic relationships within populations or the biological mechanisms that influence their population dynamics. As an initial step, we investigated genetic diversity among the bottlenecked Alberta peregrines and compared it to a wild population from Nunavut. We isolated DNA from 17 blood samples obtained from a captive population in Alberta, which contains progeny from the captive population bred for a reintroduction effort under the Canadian Wildlife Service from 1970-96. To provide a baseline for genetic diversity in wild peregrines, we also examined genetic diversity in a wild population from Nunavut that has not experienced a recent bottleneck. For this comparison, we isolated DNA from 64 F. p. tundrus specimens collected in 2006-09 near Rankin Inlet. For all samples, we determined genotypes at six microsatellite loci. Results show that the captive population exhibits lower genetic diversity than the wild population. Across both populations, allelic diversity ranged from 3-13 alleles/locus, and heterozygosity ranged from 59-89%. We speculate that the captive population is not representative of the wild Alberta population, if the diversity of the Nunavut population is indicative of that typically found among wild peregrines.

23.2 Mahoney, Shane P.; Lewis, Keith P.*; Soulliere, C.E.; Weir, Jackie N.; Department of Environment & Conservation, Government of Newfoundland & Labrador, St. John's, NL A1B 4J6, Canada; *colleensoulliere@gov.nl.ca*

Newfoundland's woodland caribou: Population dynamics through a century of ecological change

Woodland caribou (Rangifer tarandus) have persisted in Newfoundland, Canada since the last glaciation and are the only native ungulate to the island landscape. Population estimates are available from survey and census since the 1950s and have been reconstructed from historic reports and documents to the 1880s. The caribou population peaked in the late 1800s, followed by a rapid decline and a long period of low-density stasis. In the 1960s the population began to increase steadily to a second peak in the late 1990s followed again by a rapid decline which continues today. The influence of ecological change is evaluated including: the disappearance, introduction, and colonization of the island by other mammalian species, introduction of parasites, and the collapse of the cod stocks. In addition, we evaluated the technological advances which changed both the nature of anthropogenic influence and the nature of our understanding of caribou ecology. Despite similarities in the magnitude of the current population decline and that of the late 19th century, factors limiting population recovery have changed dramatically; coupled with prediction of climate change, there is a great deal of uncertainty regarding the future of Newfoundland caribou.

SY31 Mahoney, SP*; Weir, J; Soulliere, C; ; *vors@ualberta.ca*

Caribou in a Collapsing World: Rescuing Space Travelers on a Finite Planet

Caribou represent an iconic life form, not only in the recent history of circumpolar ecosystems and human cultures of the north temperate and arctic systems, but also from a human history perspective. The populations of both Neanderthal and Cro Magnon in Europe were heavily dependant on this species for their survival, as were the evolved cultures of many northern peoples around the globe who, like Rangifer, ranged northward with glacial retreat. Indeed, it may be argued that caribou absence from these northern ecosystems would have significantly altered the course of human development in these regions. Resilient in their significance, caribou remain today of inestimable importance within the ecological fabric of the systems they occupy, and within the subsistence and recreational human enterprises aligned with them. For many reasons these magnificent animals pose incredibly complex challenges to conservation leaders of every region and discipline. Their tendency to express long term population perturbations of great magnitude; their catholic diets and habitat occupancy traditions that have seen them established from frigid arctic islands to temperate rainforests; the great latitudinal and longitudinal metrics of their distribution globally; their unique and heavy reliance on the lethargic lichen pastures of tundra and forest; their tradition of flight over aggression and subsequent vulnerability to an extraordinary host of large and meso-predators; their unique place in the diverse cultures they have supported and fed; and their reluctance to generally adapt to broad scale human intrusions, all make caribou a species for which management solutions are synonyms for constant reevaluation. But more than all other factors, it is the inherent tendency of caribou to utilize space and to inevitably move between extremes of density over annual cycles and/or geographic planes that makes them so hard to evaluate and difficult to protect. They are bound to meet humanity along an almost amorphous front, and outside of leaving the land for them, a half century of science still struggles to define more realistic options. The patchwork quilt that is the reality of Rangifer ecotype expression means that the generalities science pursues may never be possible and the specifics for their local conservation too many to invoke. Caribou may well be, like the bison before and perhaps the wildebeest to come, a species for whom only a shadow awaits. What is unquestionably true is that we will have no greater conservation challenge than to keep them with us over the vast areas that even today they roam. Losing them will be a tragedy beyond measure. Once more caribou are bleeding northward, but this time it is not the ice fields that are luring them on, but the front of humanity that is pushing them beyond.

P1.87 Maili Alicia GonzÃ¡lez Machorro*; Marcel Ciobanu; Mario Arturo GonzÃ¡lez Machorro; Antonio GonzÃ¡lez Fuente; Maria Alicia Machorro RodrÃ–guez; Universidad Veracruzana, RegiÃ³n Orizaba-CÃ³rdoba, Veracruz, MÃ©xico; Universidad Internacional de AndalucÃ–a, Palos de la Frontera, Huelva, EspaÃ±a;, Institute of Biological Research, Cluj-Napoca, Romania, Universidad PedagÃ³gica Veracruzana, Cd. Mendoza, Veracruz, MÃ©xico, FundaciÃ³n Latinoamericana de Apoyo a la EconomÃ–a y Saber Popular, Tlaxcala, MÃ©xico, SecretarÃ–a de EducaciÃ³n de Veracruz, Orizaba, Veracruz, MÃ©xico; *mailigonz@yahoo.com.mx*

Participatory management of sustainable tourism development as a strategy to support economic and environmental conservation

Necoxtla and La Cuesta are two communities located in the region of High Mountains of the municipality of Camerino Z. Mendoza (Veracruz, Mexico) that still preserve customs of the NÃ¡huatl ethnic group. The area has high biodiversity, scenic beauty and interesting underground systems, attracting visitors who require tourist services. The inhabitants subsist on forest exploitation and seasonally planting on impoverished lands affected by monoculture and deforestation. The current conditions of socio-ecological context, the lack of income sources, unemployment and low educational levels contribute to adverse lifestyles and create problems of migration. In this framework, the results of participatory diagnosis identified niches and opportunities that sustained the proposed approach to promote sustainable tourism development and generate, from the cosmovision of indigenous peoples, a participatory strategy to activate the local economy. The vision considers virtuous circles, with the committed participation of the population, as actors and authors of desirable scenarios of sustainability, with values of environmental ethics and a dignified and sustainable endogenous development, for conserving the natural and cultural heritage of the region.

SY13 Maiorano, L*; Falcucci, A; Guisan, A; Rondinini, C; Boitani, L; Department of Ecology and Evolution, University of Lausanne, Switzerland AND Department of Animal and Human Biology, Sapienza University of Rome, Italy, Department of Animal and Human Biology, Sapienza University of Rome, Italy, Department of Ecology and Evolution, University of Lausanne, Switzerland; *luig.maiorano@unil.ch*

Future battlegrounds for the conservation of terrestrial mammals in the Mediterranean basin

The largest of the world\'s five Mediterranean-climate regions, the Mediterranean basin goes from Portugal to Jordan (west to east) and from Italy to Morocco (north to south). The basin is an outstanding hotspot of biological diversity with a long history of integration between natural ecosystems and human activities. However, only 5% of the hotspot contains relatively intact vegetation, making the Mediterranean basin one of the four most significantly altered biodiversity hotspots on Earth. The hotspot hosts more than 220 terrestrial mammal species with at least 25 endemic species. Many of these species are endangered to some level, mainly because of the 300 million people living in the basin. Using the data available from the IUCN Global Mammal Assessment, we modeled in an ensemble forecasting approach the climatic niche of all species. We projected the climatic niches in the future accounting for climate change and desertification potential and we investigated the possible conservation options that should be considered in order to counteract potential declines. In our analyses we considered the already existing conservation areas (Natura 2000 and protected areas for the European part of the basin, existing protected areas for the rest) as well as the main pressures that the entire basin will face in the future (e.g. development for tourism). We also provided indication of the areas where the most important threats will occur with suggestion for conservation and management.

P2.30 Malcolm, CD*; Bruederlin, B; Sallows, T; Deparment of Geography, Brandon University, Brandon, Manitoba, Canada, Manitoba Water Stewardship, Fisheries Branch, Brandon, Manitoba, Canada, Riding Mountain National Park, Parks Canada, Wasagaming, Manitoba, Canada; *malcolmc@brandonu.ca*

Movement of northern pike in a human-altered river system in Manitoba, Canada

Between the late 1800's and 1960 the Little Saskatchewan River, in southwestern Manitoba, was divided into five disjunct stretches, for upstream movement of fish, through construction of dams and a spillway; four reservoirs were created. Beginning in 1992, fish passways were constructed around three of the barriers. In April, 2007 and 2008, we tagged a total of 88 northern pike with external VHF transmitters at each of the four reservoirs, to examine movements and assess connectivity at the dams. During each year pike were tracked by foot, boat, and airplane throughout the summer, fall, winter, and following spring, until tags no longer functioned; maximum tag operation was 400 days. We used data from 66 of the tagged fish: 51.5% of the pike moved greater than 500 metres beyond their first data point following tagging, 21.2% moved downstream over a dam, 10.6% moved back and forth around a dam more than once within one year, and 19.7% over-wintered in a river portion of the system. Two pike moved approximately 120 km upriver, river channel distance, from point of tagging. The results support successful function of the fish passways (for northern pike), and indicate greater movement, particularly in a downstream direction and during the winter, as well as connectivity, than was expected. River over-wintering dictates that water levels must be maintained at current levels or higher, to restrict winterkill.

SY79 Mamer, Melinda ; Suncor Energy ; *mmamer@suncor.com*

Oil Sands Tailings Technology: Understanding the Impacts to Reclamation

Managing tailings is a critical component in the development of oil sands mines; the choice of tailings technology impacts reclamation schedules and outcomes. When tailings are released to a pond, a layer forms called Mature Fine Tailings (MFT) which is made up of fine clay particles suspended in water. The challenge is that MFT does not settle within a reasonable timeframe. As a result, Suncor has needed more and larger oil sands tailings ponds over the years. In the 1990s, Suncor pioneered consolidated tailings technology to help speed up the consolidation of MFT. Tailings Reduction Operations is a new approach to tailings management. TRO is the process of mixing MFT with a polymer flocculent, then depositing it in thin layers and allowing it to dry. This new process has significant benefits such as: accelerating reclamation, reducing the need for more tailings ponds and reducing the existing inventory of MFT. Suncor began reclamation of tailings in 1971 with varied success. The development of Consolidated Tailings technology required new reclamation techniques which has resulted in significant research. Examples of existing tailings reclamation will be discussed. The impact of TRO on reclamation schedules and outcomes will also be discussed.

P2.101 Manchi, S S*; Sankaran R; Salim Ali Center for Ornithology and Natural History, Coimbatore, India; *ediblenest@gmail.com*

Participatory Conservation Of The Edible-Nest Swiftlets In Andaman And Nicobar Islands

International trafficking affected wild population of the Edible-nest Swiftlet Aerodramus fuciphagus allover its distribution including Andaman and Nicobar Islands. After loss of around 80.00% of breeding population in a decade, conservation of the species was commenced by involving the motivated nest collectors/poachers. To assess the efficacy of the protection system, data were collected from 29 protected and 168 unprotected caves using nest count method. Annual breeding populations in 28 protected caves at Chalis-ek and one cave at Interview Island were estimated between 2001 and 2008. Unprotected populations in 152 caves at Baratang Island and 16 caves at Interview Island were estimated between February and April 2008. Protected population showed significant growth of 38.98% with an average annual growth rate of 4.75Â±6.21%. Unprotected population showed significant decline of 73.68% with dissertation of 60.50% of caves between 1997 and 2008. These results demand urgency to expand existing protection system to the undefended caves throughout the island arc. Recent exclusion of the species from the Scheduled-I of Wildlife protection Act will help to develop and expand the protection system to assure survival of the species in wild and sustainable use of this natural resource towards economic development of local people.

SY73 Mandrak, NE; Fisheries and Oceans Canada; *mandrakn@dfo-mpo.gc.ca*

Current status, trends, threats and future of the Great Lakes ecozone

The Great Lakes have a combined surface area of about 244,000 km2 and is the largest freshwater ecosystem on Earth. The Great Lakes have been an agricultural and industrial hub of northeastern North America for several hundred years. As a result, the ecosystem has undergone substantial changes. Although historically oligotrophic, large portions of the lower Great Lakes became increasingly eutrophied due to increasing nutrient inputs from urban and rural sources culminating in large dead zones by the 1950s. The large population of the basin (currently >35 million) has led to significant habitat modification and losses, most notably the loss of 35% of the coastal wetlands. Overfishing led to substantial declines in fisheries by the early 20th century, and remaining fishes contained increasing levels of toxic contaminants. There has also been a long history of invasive species introductions, deliberate and accidental, leading to significant changes in the ecosystem. Recently, nutrient and contaminant levels have declined, and remaining fisheries and habitat have been managed more effectively. Invasive species remain a major threat, and climate change is an emerging threat. Future management actions should focus on further monitoring and control of nutrients, contaminants and invasive species, and conservation and protection of native species and habitat.

SP7.5 Manez, M*; Touza, J; Chas Amil, M; Dehnen-Schmutz, K.; University of Vigo, University of Santiago, University of Warwick; *mmanez@uvigo.es*

Stakeholders' perceptions of invasive alien plants: a case study from Galicia, Spain.

Social perceptions of the risks posed by deliberately introduced plants influence the development of effective public policies to manage and control invasive alien species (IAS). An understanding of the determinants of these public perceptions can improve the capacity to anticipate policy responses for two main reasons: ï § A high percentage of IAS were introduced deliberately for economic reasons such as horticultural and forestry species (Groves, 1998; Mack and Erneberg, 2002; Pysek et al., 2002). ï § IAS generate economic benefits to their users that may offset the impacts. This paper investigates social perceptions, awareness and attitudes of the local population towards invasive plants (IAS) to evaluate the potential success and possible implications of different IAS policies. The analysis is being undertaken in Galicia (northwest of Spain). Particular emphasis is given to species introduced by ornamental or forestry uses and that are currently under more control in Galicia and Spain or represent a serious threat. We speculate that the results will highlight the current low level of risk awareness by stakeholders, local population and decision makers. This low level of awareness has resulted in a lack of regulation of market distribution of non-native plants in Spain

SY14 Manley, P.; US Forest Service; *pmanley@fs.fed.us*

The art, science, and religion of biodiversity monitoring

Native ecosystems are subject to a growing array and magnitude of anthropogenic stressors as human populations and associated resource demands increase over time. Declines in biological diversity are a predictable consequence of loss, fragmentation, and degradation of native ecosystems. In turn, biodiversity is a key factor in maintaining the resilience of native ecosystems in the face of changing environmental conditions, including those associated with climate change. The host of anthropogenic stressors acting in concert on native ecosystems today has uncertain and potentially unpredictable consequences for native species populations and communities and the ecosystem services that they provide. Large-scale status and change monitoring is an essential tool in the race to gain knowledge about vulnerabilities and thresholds of stability in population persistence, community cohesion, and ultimately ecosystem resilience. High levels of uncertainty about where, when, and what changes in biodiversity may occur in response to uncertain future environmental conditions dictate strategic sampling designs that provide a balance of focused and broad-scale data collection, short- and longer-term response information, and retrospective and prospective analyses. These uncertainties also limit the utility of coarse filter approaches to monitoring biodiversity, although wide-spread reluctance to commit resources to direct measures of biodiversity persists. The Multiple Species Inventory and Monitoring protocol developed by the US Forest Service is an approach that offers many of these features; its strengths and weaknesses are explored as a case study.

P2.45 Manopawitr, Petch*; Dearden, Philip; Department of Geography, University of Victoria; *petch@uvic.ca*

Building social-ecological resilience: how climate change can help improve conservation management of Marine Protected Areas in Thailand

Marine Protected Areas (MPAs) in Thailand are well established but their success and effectiveness are largely unknown. Disparate government agencies and outdated legislation are inadequate to address the management challenges posed by cumulative local pressures such as pollution and over-fishing. Climate change will pose new challenges due to sea level rise, increasing sea surface temperature, ocean acidification and extreme climate events. Addressing climate change challenges will require a holistic approach that incorporates site-specific environmental vulnerability and social adaptive capacity into conservation planning. In post-tsunami efforts, a number of integrated ecosystem-based management programs have been developed to restore coastal ecosystems through community-focused and sustainable livelihood approaches. A newly proposed Andaman Protected Area Network comprised of 18 MPAs and recommended buffer zones and community management areas, over 3.5 million ha in total, will be country's largest marine spatial planning initiative in which a new form of governance is expected. This paper describes and analyses these initiatives and their efficacy in reducing immediate threats to coral reef and associated coastal systems and enhancing ecological and social resiliency in the face of climate change. Developing a resilient MPA network is identified as an important next step and the paper concludes with some suggestions on how to achieve this objective.

8.6 Manseau, M*; Attagutsiak, K; Mouland, G; Parks Canada and University of Manitoba, Parks Canada; *micheline.manseau@pc.gc.ca*

Contribution of Inuit knowledge and perspectives to the monitoring of Arctic landscapes - Nunavut National Parks

Monitoring and reporting for environmental changes in northern latitudes presents a number of unique challenges related to the remoteness of the areas, the vast tracts of space, and in many cases, the lack of available basic information. To overcome these obstacles, we have pursued a number of innovative approaches that build on strong partnerships with local communities around Sirmilik, Auyuittuq and Ukkusiksalik National Park, Nunavut, Canada. Through a combination of interviewing and mapping techniques, regular experts meetings and on-the-land activities in key park areas, we identified indicators of sea ice and environmental changes, gained expert advice from Elders and hunters on places of ecological importance and associated ecological processes, approaches to conservation, safety practices, and ecosystem management. The life-long experiences of Elders and hunters from their extensive travels across the Arctic, their dependence on the availability of animal species for survival and their ability to access these remote areas provided comprehensive and detailed information that will enhance the design of long-term monitoring programs. Although the knowledge provided was unparalleled, the most significant outcome of the work was in the development of solid relationships with the Inuit communities and knowledge holders - creating a place where meaningful discussions can happen about resource conservation and safety issues, environmental change and strategies for adaptation.

P2.109 Manuel Guayara*; Victor Luna; Oscar Gallego; Unassigned; *jaimar74@gmail.com*
Education and sustainable development alternatives: tools for regional conservation model in Colombia
The Colombian Andes has the highest diversity of amphibian species reported for the country and the largest number of endemic species in other groups like mammals and butterflies. However, 80% of these ecosystems have been heavily tapped due to the indiscriminate expansion of agricultural and livestock frontiers, product of unmet needs and ignorance of the farmers in the Colombian Andes. For this reason, Falan is a pioneer municipality in research and environmental education, which through workshops, lectures, eco-hikes and videos made by young school students about environmental issues in the municipality, awareness has been generated largely from the farmers population. Also, to strengthen the research process, meetings have been held annually for young researchers from universities and regional research centers whose purpose is to seek sustainable development alternatives that allow positioning the municipality as a center for research and conservation in Colombia. Moreover, strategic alliances with government institutions, have resulted in encounters regional eco-tourism each year since 2004, representing an affordable alternative that encourage farmers to take care the environment and sustainable thinking in a harvesting natural resources.

SP6.2 Manzano Fischer, P*; Barajas, N; Berlanga, H; Villegas, R; Cruz de la, E; March, I; Cruz, L; Cruz, I; Agrupacion Dodo, The Nature Conservancy, North American Bird Conservation Initiative, Instituto de EcologÃ–a A. C., Instituto Nacional de EcologÃ–a, ComisiÃ³n Nacional de Ã reas Naturales Protegidas; *pmanzano22@hotmail.com*
Evaluation of conflicts between birds an powerlines in Mexico: Problems and solutions
Collision with wind turbines, transmission lines and electrocution on power lines are increasing with the growing energy needs. The extent of the problem in Mexico is unknown. To continue previous efforts, NGOs, government agencies and the Federal Utility Company (CFE) participated in a workshop to search for viable solutions and follow up mechanisms. The participants worked on: 1) a list of technical suggestions for environmental impact reports; 2) agreements, suggestions and mechanisms to supervise and follow up prevention and mitigation measures; 3) a diagnosis of current laws, how these are applied and suggestions on how to improve its efficiency. As a result of the workshop, some important initiatives were presented. 1) Power lines in golden eagle nesting areas will be retrofitted as part of the celebration for the Bicentenary of Mexican Independence. 2) Adoption of power lines by different industries to retrofit them and prevent electrocution risk. 3) Surveys to identify critical areas and studies to evaluate different impacts of energy generation, transmission and distribution on ecosystems. 4) Update information on wind power regulations, on bats as collision victims in wind farms, and the removal of anemometric towers once wind farms are operating. 5) Suggestions on how to improve inter-institutional planning, coordination of information and guidelines and exchange of good practices relating the planning of environmental projects.

15.2 Mapfumo, Emmanuel*; Nolan, Sheilah; Baron, Vern; Basarab, John; EBA Engineering Consultants, Alberta Agriculture and Rural Development, Agriculture and Agri-Food Canada; *emapfumo@eba.ca*
Greenhouse Gas Emissions and Mitigation Options Associated With Grazing system Management in Alberta
A first approximation framework to assess net emissions/reductions of carbon dioxide (CO2), nitrous oxide (N2O) and methane (CH4) within beef cattle-grazing systems in Alberta was outlined in the form of a case study of typical "business as usual" or baseline management scenario as compared with improved pasture scenarios for the dry and moist agro-climatic zones of Alberta. Using the modified Intergovernmental Panel for Climate Change (IPCC) modified Tier 2 approach the carbon (C) sequestration rates, N2O emission and enteric plus grazing cattle manure CH4 emission rates were estimated for unimproved (i.e. baseline) and improved cattle-pasture systems in dry and moist zones in Alberta. The results indicated that improved pastures under light grazing represented increases in net greenhouse gas (GHG) sinks in the subregions considered, due to increased rates of C sequestration. In contrast, heavily grazed improved pastures represented net GHG sources due to increased N2O emissions caused by fertilizer application. Also increased CH4 emissions occurred under heavy grazing as a result of higher stocking rates that are beyond what can be counteracted by increased C sequestration. Accurate estimation of baseline emissions in various subregions will be critical for the development of a carbon offset system for beef livestock-pasture systems across Alberta.

SP2.2 Marescot, L*; Cubaynes, S; Pradel, R; Duchamp, C; Marboutin, E; Gimenez, O; Centre d'Ecologie Fonctionnelle et Evolutive, UMR 5175, campus CNRS, Office National de la Chasse et de la Faune Sauvage, CNERA prÃ©dateurs , Centre d'Ecologie Fonctionnelle et Evolutive; *lucile.marescot@cefe.cnrs.fr*
Population growth rate as a robust demographic parameter for the French wolf population management.
Wolf management is one of the most controversial issues in wildlife conservation, because of the Manichean public opinion toward the species. Since the natural wolf recolonization of the French Alps, livestock depredations have constantly increased so does shepherds discontentment. To better handle conflicts between agricultural activities and wolves, reliable estimates of population abundance and rate of increase (Î») are needed. Because wolf is a very elusive species, a non-invasive method based on scats genotyping was used to identify individuals. We first show that there is a strong heterogeneity in the detection process (DH) generated by dominants being more likely to use feces to mark the territory and therefore more detectable than subordinates. We then demonstrate that, if it is ignored, DH leads to a strong underestimation of wolf population size. Finally, we propose a new capture-recapture approach to estimate Î» while explicitly accounting for heterogeneity. Seasonal effects on detection were detected, individuals being less capturable in summer when pups stay in the den. Annual growth rates reached 1.2707 (SE = 0.0835) and 1.2690 (SE = 0.0952) when respectively accounting and ignoring DH. The robustness of our approach to DH was also verified in a simulation study using several scenarios with contrasting degree of DH. These results should encourage managers to focus on the response of Î» to management actions instead of making decision based on abundance thresholds.

P2.50 Marianne G. Camoying*; Coleen Espos; Jean Radelle Romo; University of the Philippines; *mg.camoying@gmail.com*

An appraisal of the community structure of mangrove forest in Bagonbanua Marine Reserve, Guiuan, Eastern Samar, Summer 2005..

A taxonomic survey and zonation analysis of mangrove species was conducted in Bagonbanua Mangrove Forest during the Summer of 2005. The transect line plot method was applied for establishing sampling plots. Physico-chemical parameters such as temperature, salinity, and pH were noted. Five species belonging to three families were identified. The species were Rhizophora mucronata, Rhizophora apiculata, Bruguiera cylindrical, Sonneratia alba and Aegiceras corniculatum. The most dominant species and had the highest regenerative capacity was Rhizophora mucronata. The least in number was Aegiceras corniculatum having the lowest probability to sustain its existence. An evident zonation was observed perpendicular to the shore. The seaward zone which was dominated by Rhizophora sp. was the most expansive.

P2.191 Marsh, AJ*; Wellicome, TI; Bayne, EM; University of Alberta, Canadian Wildlife Service; *amarsh@ualberta.ca*

A new technology to determine Burrowing Owl critical foraging habitat.

The purpose of this project is to identify the precise locations at which Burrowing Owls capture their prey. The Burrowing Owl (Athene cunicularia) was listed as endangered in Canada in 1995. The main reason for the decline of B. Owls is loss of native prairie habitat, with over 75% of their native range converted to non-native habitat. Non-native habitats (i.e., cropland, tame grass, tame hay and roadside ditches) tend to consist of tall, dense vegetation, which may restrict successful foraging by precluding small mammal detection and/or capture. Recovery strategies for the B.Owl have recognized the need to identify the types and configuration of critical feeding habitats required to effectively raise owlets. I use new dataloggers that acquire a location every second, accurate to

SY28 Mark Hebblewhite; Wildlife Biology Program, University of Montana; *mark.hebblewhite@umontana.edu*

A critique of ungulate management in the post-wolf recovery era

Wolf recovery is restoring one of the most important ecological processes shaping ungulate population dynamics after an absence of 70-years. Unfortunately, the modern foundation of ungulate population management is ill-equipped to this new reality for several reasons. First, management objectives for most ungulate populations are based on either the concept of nutritional carrying capacity or the long-term average ungulate population size for a wildlife management unit. For either of these approaches to work after wolf recolonization, wolf predation must be a weak limiting, but not regulating factor. If this is false, then it becomes a logical tautology to define the population objective as the number of elk based only on food in the post-wolf recovery era. A review of predator-prey theory suggests three alternate hypotheses to the food-only model, the predation-food hypothesis, the predator-pit hypothesis, and the predator regulation hypothesis. Focusing here on wolf-elk dynamics because of the importance of elk management in the west, I review the theoretical and empirical support for these three broad alternate hypotheses. Similar to wolf-moose systems, empirical and theoretical evidence supports the predator regulation hypothesis, and rejects the predation-food and predator-pit hypotheses for wolf-elk dynamics. Rejection of the alternate hypotheses emphasizes that wolf control is unlikely to have long-term effects or that high ungulate densities will persist after wolf recovery. However, uncertainty as to the magnitude of the predation effect suggests a critical role for habitat quality to buffer the top-down effects of wolf regulation. Faced with this review of theory and empiricism, I outline several options available to ungulate managers for integrating wolf-ungulate management under different management paradigms including maximum sustained yield of ungulates, ecosystem process management, or national parks management.

SY76 Martin, R.D.*; Oxbrough, A.; Kelly, T.C.; Irwin, S.; O' Halloran, J.; ZEPS Dept. and Environmental Research Institute, University College Cork, Ireland; *r.martin@ucc.ie*

The biodiversity of canopy invertebrates in a range of forest types in Ireland

Since the early 1900's there has been a dramatic increase in Ireland's forest cover from less than 1% to approximately 10%, primarily through the creation of commercial plantations of non-native trees that support a largely unexplored biodiversity. Although once extensively covered in broadleaf forest, less than 1% of Ireland's land mass is now made up of native woodland. Thus, there is great potential for plantation forests to function as refugia for forest specialist species here. Our research aims to assess the hitherto unexplored canopy invertebrate component of Irish native and plantation forests, to identify suitable forest canopy biodiversity indicators and to provide detailed information on the basic ecology and species composition of forest canopy invertebrates in Ireland. Canopy invertebrate diversity was assessed in monoculture Norway spruce plantations, polyculture Norway spruce plantations with native oak as the secondary tree species, and native oak woodlands throughout Ireland using thermal fogging. Invertebrates from the orders Araneae, Opiliones and Coleoptera were identified to species level. Significant differences (p

P2.77 Martinez-Haro, M*; Green, AJ; Acevedo, P; Mateo, R; Instituto de InvestigaciÃ³n en Recursos CinegÃ©ticos (CSIC), EstaciÃ³n BiolÃ³gica de DoÃ±ana (CSIC), Universidad de MÃ¡laga; *monica.martinez@uclm.es*

Use of Grit Supplements by Waterbirds: an Experimental Assessment of Strategies to Reduce Lead Poisoning

The ingestion of spent lead (Pb) shot due to confusion with grit particles causes Pb poisoning in a large number of waterbirds, being one of the main causes of mortality. Lead ammunition for hunting over wetlands is being progressively banned in more countries, while grit supplementation has been proposed as a management measure to avoid the ingestion of deposited Pb shot. However, few studies have been done on grit ingestion in waterfowl. Thus, studies of grit selection with waterfowl in semi-captivity and in the wild were undertaken to evaluate preferences in the colour (red or grey), and geochemical composition (siliceous or calcareous) of grit, whether it was available dry or in water, its position within the wetland (the shore, open water or artificial platforms). Grit ingestion in waterfowl was intimately associated with feeding behaviour; it was consistently higher when food was included in the treatments. In the absence of food, red grit was taken in higher amounts than grey grit in semi-captivity but not in the wild. Siliceous grit was taken in a higher amount than calcareous grit when offered dry, but not in water. No differences in the amount of ingested grit were found between different positions within the wetland. In order to optimize the effectiveness of grit supplementation to reduce the risk of Pb poisoning in waterfowl, calcareous and siliceous grit may be combined and applied in feeding sites or else mixed with bait to attract birds.

SY15 Mascia, MB*; Pailler, S; Burns, D; Mlotha, J; Murray, D; Roschanka, V; WWF, Yale U., Antioch University-New England, University of California-Santa Barbara, University of Maryland; *michael.mascia@wwfus.org*

Silent Crisis or Unspoken Solution? Protected Area Downgrading, Downsizing, and Degazettement

Conservation policy assumes that national parks and protected areas (PAs) are permanent fixtures on the landscape, but scattered evidence points to widespread - yet largely overlooked - PA downgrading, downsizing, and degazettement (PADDD). Though PAs are the cornerstone of global conservation efforts, PADDD has never been systematically studied. To inform conservation policy and practice, we examine the spatial and temporal patterns of PADDD in Africa, Asia, and Latin America and the Caribbean. Results to date reveal more than 300 instances of PADDD in 32 countries. In several countries, PADDD has affected 30-60% of the national PA system. Proximate causes of PADDD range widely, but often center on rights to natural resources. The conservation impacts of PADDD are unclear, though evidence suggests that PADDD may sometimes advance conservation ends. Given that strategies predicated upon permanent networks of PAs are unlikely to succeed if these very PAs are disappearing from the landscape, PADDD presents a fundamental challenge to the prevailing conservation paradigm. PADDD also complicates efforts to reduce emissions from deforestation and forest degradation (REDD), since proposed REDD policies would create incentives to maintain and perhaps even accelerate rates of PADDD. By challenging longstanding conservation assumptions, PADDD highlights the need for renewed focus on the development of more resilient PAs and more robust conservation strategies.

SY4 Mascia, MB*; Fleishman, E.; Rudd, M; Beazley, K.; Blockstein, D.; Carter, A.; Cooke, S.; Hall, J.; World Wildlife Fund, University of California, University of York, Dalhousie University, National Council for Science and the Environment, Memorial University of Newfoundland, Carleton University, U.S. Department of Defense; *michael.mascia@wwfus.org*

Methods for identifying policy-relevant conservation research questions in the United States and Canada

To identify priorities for policy-relevant conservation research in the United States and Canada, we employed a parallel set of participatory methods. To identify U.S. research priorities, we opportunistically engaged diverse senior conservation decision makers (n=8) to determine scientific issues of near-term (up to 10 years) policy relevance. We then invited thought leaders from public, private, and non-profit organizations (including academia) to a workshop to identify "America's Top 40" policy-relevant research questions in conservation science. Workshop organizers (n=7) and participants (n=35) solicited questions within their organizations, from other colleagues, and in public forums (e.g., email listservs). We received questions (n=531) through an online portal (www.40q.org). Prior to the workshop, participants screened questions to eliminate obvious redundancies, value statements, and questions that could not be addressed through scientific inquiry. In the workshop, participants reviewed and refined the remaining research questions to identify 40 of particular importance to U.S. conservation policy and practice. Workshop participants subsequently refined these questions via email dialogue. To explore variation in priorities across sectors and levels of government, we then presented these 40 research questions to staff of federal and state agencies and NGOs and to academics in a survey. We used parallel methods to identify Canadian research priorities.

SY10 Masozera, M*; Stainback, GA; Wildlife Conservation Society, University of Kentunky; *mmasozera@wcs.org*

Payments for Ecosystem Services and Poverty Reduction in Rwanda

Two of the biggest challenges facing Rwanda today are reducing poverty, especially among rural households, and protecting the ecosystems which provide essential services that support activities such as subsistence agriculture, collection of safe drinking water and the harvesting of forest products. Combining these two objectives is not easy and there are numerous pitfalls to effective policy design. This presentation will explore the possibilities of linking the growing interest in payments for ecosystem services (PES) mechanisms with alleviating poverty of smallholder farmers of Rwanda. Specifically the potential of PES programs for carbon offsets, water quality enhancement and biodiversity are analyzed to identify key challenges and opportunities for successful implementation. To have a positive impact on rural farmers, a main recommendation is the integration of PES programs with other rural development initiatives in order to avoid contradictory policies and actions in rural development and land use planning. PES programs also need to be tailored to the specific economic challenges faced by smallholder farmers.

P1.166 Massimino, D*; Orioli, V; Bani, L; University of Milano-Bicocca; *dario.massimino@unimib.it*

Usefulness of coarse grain data on forest management to improve habitat suitability models for interior forest birds

We tested the use of coarse grain data on forest management systems to improve habitat suitability models for five broadleaf forest birds: the long-tailed tit Aegithalos caudatus, marsh tit Poecile palustris, blue tit Cyanistes caeruleus, wood nuthatch Sitta europaea and short-toed tree-creeper Certhia brachydactyla. All species except the long-tailed tit are cavity nesters. Bird data were extracted from a database of 4552 point counts performed between 1992 and 2002 in Lombardy (Italy). We used Generalized Linear Models to assess habitat suitability for each species. Environmental predictors were land-use fractional covers, elevation, slope, aspect, forest isolation, and coarse grain data on forest management systems aggregated for administrative provinces. They were selected by a stepwise procedure using the Bayesian Information Criterion. Variables describing the forest management system at provincial scale resulted important for the cavity-nesting species, while they were discarded from the model of the long-tailed tit. This supports the hypothesis that data on forest management, although coarse grained, are useful to improve habitat models for structure-sensitive species, whose abundance is strongly affected by silvicultural practices. The results should be taken into account by forest managers, considering that Europe is still losing ecologically high-quality forests, although the overall forested area has increased in the last decades.

P1.48 Mastretta, A*; Wegier, A; VÃ¡zquez-Lobo, A; PiÃ±ero, D; Instituto de EcologÃ–a, UNAM; *ticatla@gmail.com*

Conservation consequences of rarity: lessons from Juniperus blancoi phylogeography

The phylogeographic study of a rare species has relevant consequences to our understanding of its habitat evolution and for conservation. Juniperus blancoi MartÃ–nez is an endangered rare conifer with three recognized varieties, which has a wide yet restricted distribution. In this study the trnC-trnD cpDNA region was used to assess population genetics parameters and to perform phylogeographic analyses using the eight known populations of the species. The phylogeographic structure indicates a series of expansion, fragmentation and isolation processes. The Ne = 3.3x106 males and a tmrca= 3.5 MYA suggest that there existed bigger populations that were drastically reduced and fragmented. This resulted in high haplotipic diversity (h = 0.86266), geographic structure (5 SAMOVA groups) and high differentiation values (FST = 0.79469 and FST > 0.25 in most of the pairwise comparisons). We conclude that rarity can be a natural condition characterized by historically large effective population sizes, and as a consequence high genetic diversity and differentiation levels. Fragmented and isolated populations are more inclined to differentiation and speciation processes, thus each one has high evolutionary potential, which makes its conservation more challenging. Also, we state that the geographic distribution of species like this should be more closely related to historical processes, so its presence must be considered as a factor increasing the biological relevance of a region.

SP8.10 Mastretta, A.*; Ortiz- Rosas, F.; Ruiz- Bustos, L.; HernÃ¡ndez, G.; Carabias, J.; Natura y Ecositemas Mexicanos A.C., Universidad AutÃ³noma Metropolitana, Facultad de Ciencias, UNAM; *luciaruizb@gmail.com*

A successful methodology to establish Payment for Environmental Services in a tropical rainforest area: a case study in the Selva Lacandona

Conservation of the rainforest remnants in the southern part of Selva Lacandona region (MarquÃ©s de Comillas), has been furthered by a payment for environmental services (PES) program issued by the government. A proper method was needed for the acceptance of the program by the communities and for it to have good results. More than 30% of the original ecosystem in the study area has been lost due to land use change, with most of it happening between 2000 and 2007. Since 2007, the PES program has helped ejidos to avoid deforestation. This has been achieved by designing and applying a method according to the ecosystem, land tenure and geographic information available. The method consists on: explaining the program in the ejido assembly and registering interested people; finding the geographic information available for the site; field assessment of the area: geopositioning it and evaluating its vegetation and conservation status; integrating the results in a GIS; discussing and verifying the results with the landholders in a participatory process; drafting a technical report that presents the results and includes resource management practices for the area\'s conservation. The use of this method has benefitted 369 families and is protecting 9921 Ha, which is the 27% of these ejidos. This method was essential to the success of the PES program in the region and triggered local management and long-term conservation programs.

P2.134 Matsumoto, MH*; Rodrigues, ST; Oliveira, M; TNC - The Nature Conservancy, WWF - World Wildlife Fund; *mhmatsu@gmail.com*

Forest vegetation remnant in Mato Grosso state in Brazilian Amazonia - measuring the impact of landcover fragmentation

For several years conversion of native vegetation into pasture and cropland was conducted at high rate in the Mato Grosso state in the Brazilian Amazonia. More recently, due to several reasons the deforestation rate has been reduced in that state, however one of most important effects of deforestation remain, which is the landscape fragmentation. Currently, there is 314,504 km2 natural forest vegetation left in the Mato Grosso state, compounding a diverse landscape structure, from a continuous natural forest to mosaic of forest patches surrounded by pasture/cropland. In order to evaluate the effect of land fragmentation, we applied Landcover Fragmentation tool to measure the level of impact due to natural vegetation conversion from 1997 to 2007 in the Mato Grosso state. The result shows that 75,964 km2 of natural forest were converted during 1997 to 2007, while the landscape fragmentation analysis revealed that only 258,265 km2 corresponds to a core area of vegetation remnant, which is about 82% of current natural forest left. Based on this preliminary result, there is evidence that the real impact of landscape fragmentation is greater than the total area of vegetation remnant mapped in the Mato Grosso state.

11.2 Matsumoto, T*; Samuel, MD; Johannes, BA; Coltman, DW; Department of Biological Sciences, University of Alberta, Edmonton, Alberta T6G 2E9, US Geological Survey, Wisconsin Cooperative Wildlife Research Unit, University of Wisconsin, Madison, Wisconsin 53706; *tmatsumo@ualberta.ca*

Association Mapping of Genetic Risk Factors for Chronic Wasting Disease in Wild Deer

Chronic wasting disease (CWD) is a fatal prion disease of North American cervids, affecting elk, deer, and moose. CWD is the only prion disease known to infect free-ranging animals, and its management in the wild presents great challenges. Identification of genetic risk factors would increase our understanding of prion pathobiology and potentially lead to CWD mitigation. Our study aims to assess the feasibility of identifying novel genetic risk factors for CWD using a population genetic approach called association mapping. We used the bovine microsatellite map as a reference and developed a marker panel for three predicted deer linkage groups containing several candidate genes. Amplification rate in Wisconsin white-tailed deer (Odocoileus virginianus) was relatively inefficient (31.62%), and a low level of linkage disequilibrium (< 1-2cM predicted distance) was found in the population sample (N=184), indicating that current marker density is insufficient for chromosome-wide coverage. Currently two matched case-control samples of Wisconsin white-tailed deer and Saskatchewan mule deer (Odocoileus hemionus) are being genotyped for association analysis. Our results illuminate the challenges of using comparative, microsatellite-based association mapping in wild species. At present, it may be more effective to target candidate genes or small genomic regions in association studies of wild populations until more substantial genomic resources become available.

P1.158 MAYOR, S.J.*; Boutin, S.; He, F.; Department of Biological Sciences, University of Alberta, Department of Renewable Resources, University of Alberta; *mayor@ualberta.ca*

Cumulative human impacts on regional scale boreal vascular plant biodiversity and community structure

In northern Alberta, expansion of energy sector, forestry, agricultural, and urban land uses are rapidly altering the boreal ecoregion at an unprecedented scale and intensity. How are ecological communities responding to these landscape changes? We conducted large scale (1 ha) timed field surveys of vascular plant occupancy and abundance throughout Alberta's boreal ecoregion (380 000 km2). Human impacts were investigated at three scales (1 ha, 18 km2, 400 km2) on a continuum of 0 - 100% land alteration. We analyzed species diversity (Î±), turnover (Î²), occupancy-rank relationships, species-abundance distributions, species-area relationships, and community specialization in concert to assess community structure. At intermediate disturbances, diversity was higher than in intact landscapes, but specialists were rarer and the community was dominated by fewer species. At heavy disturbances, communities were more homogeneous, harboured fewer species with more varied abundances, occupied by more common and generalist species while specialists and rare species were rarer. These differences suggest a broad, fundamental shift in community organization with anthropogenic disturbance concealed by richness alone. The scales at which disturbance influenced biodiversity revealed the mechanisms behind community change: extensive regional scale disturbance altered local diversity patterns by increasing isolation, while extensive local disturbance altered diversity by environmental filtering.

P1.172 Maxcy, K.A.; Litke, J.L.*; Fiera Biological Consulting; *kmaxcy@fieraconsulting.ca*

Seismic line recovery: implications for animal movement and weed invasion in the boreal forest in Alberta, Canada.

Seismic lines created during oil and gas exploration are a pervasive feature in northeastern Alberta. Low impact seismic (LIS) line technology is being implemented with increasing frequency in an effort to minimize impacts to biodiversity. However, it is unknown to what extent LIS mitigate negative impacts compared to wider conventional seismic (CS) lines. Therefore, we investigated the effects of seismic line type and line age on the presence of game trails and the occurrence of invasive species. Seismic lines appear to facilitate the movement of large mammals as indicated by the presence of game trails; further, these trails become persistent features in the landbase regardless of line type or age. For invasive species, species richness and abundance was highest on young seismic lines, regardless of line type, but declined with age. In addition, upland forest types (aspen and white spruce) were much more susceptible to invasive species establishment compared to lowland forests types (bogs and fens). Overall, results of this study suggest that LIS, while having a smaller footprint compared to CS, are functioning as movement corridors for both mammals and invasive species. The long term ecological significance of these results is unknown; however, a precautionary approach in which the seismic line footprint is minimized, and management strategies enhancing seismic line recovery are required to minimize impacts to biodiversity in northeastern Alberta.

P1.80 MÃ¡rquez, AL*; Estrada, A; MÃ¡rquez, C; Venezuelan indigenous communities of the municipalities of Atabapo, Maroa and RÃ–o Negro; Real, R; Universidad de MÃ¡laga, Instituto de InvestigaciÃ³n en Recursos CinegÃ©ticos , Universidad de MÃ¡laga, Municipalities of Atabapo, Maroa and RÃ–o Negro, Amazonas State, Venezuela, Universidad de MÃ¡laga; *almarquez@uma.es*

Indigenous Perception of Environmental Impact of Domestic Activities in The Amazonia

The University of MÃ¡laga has been working in concurrence with different Venezuelan indigenous communities in the Amazonas State since 2001 in order to know which their main problems concerning biodiversity conservation are. In June 2009 we started another research line with them, i.e., how they (mainly females) perceive the impacts that different daily activities could have on the environment. We visited six indigenous communities and asked them to work in partnership with us. We obtained a positive answer, so they were questioned about the state of affairs of: i) the energy they use, ii) the waste they produce, iii) their hygiene habits, and iv) the sanitation systems they have. As an example, all the communities obtained electricity through gasoil plants which operate some hours a day. A majority (83.3%) of them thought the gasoil plant does not produce any problem for people or the environment. However, when they were asked to classify the above mentioned activities in relation to the impacts they produce, 50% of the communities identified gasoil spill as the principal problem. The second environmental problem was considered to be the rubbish they generate, followed by faeces deposition, and the soap they use to wash in the river. We will present in detail their perceptions for the different activities. In our next visit, we aim to show them the conclusions reached by the neighbouring communities, as well as some eco-friendly alternatives to the identified problems.

SY60 McCarney, G.R.; Armstrong, G.*; Adamowicz. W.L.; , University of Alberta; *glen.armstrong@ualberta.ca*

Joint Production of Timber, Carbon, and Wildlife Habitat in the Canadian Boreal Plains

This study investigates the relationships and trade-offs between forest carbon management, sustained timber yield, and the production of wildlife habitat in order to provide a more complete picture of the costs and challenges faced by forest managers for a particular case study in Canadaâ s boreal mixedwood region. The work presented is an extension of previous efforts by Armstrong et al. (2003), who model the joint production of timber supply and wildlife habitat using a natural disturbance model approach to ecosystem management. The primary contribution of the present study is the detailed incorporation of a carbon budget model into the framework developed by Armstrong et al. (2003). Using the Carbon Budget Model of the Canadian Forest Sector (CBM-CFS3), dynamics specific to separate biomass and dead organic matter carbon pools are represented for individual forest cover types. Results indicate the potential for cost thresholds in the joint production of timber supply and carbon sequestration. These thresholds are linked to switch points in the decision between multiple use and specialized land management practices. Co-benefits in the production of carbon and wildlife habitat are shown to depend upon ecological parameters, harvest flow regulations and incentives for timber supply provided by the market.

SY51 McClennen; Wildlife Conservation Society; *cmcclennen@wcs.org*

Policy Approaches to Connectivity Requirements in Marine and Coastal Systems

The oceans continue to provide far superior connectivity of protected resources than terrestrial systems, but the lack of roads, other infrastructure and property boundaries require broad policy interventions across large seascapes of even oceans between critical life stages or habitat of marine wildlife. A number of new policy tools are emerging to conserve marine biodiversity and their supporting ecosystems both in the domestic and international context. In developed countries, the increasing privatization of fishery resources through â catch shares' and a significant effort to plan for future ocean development via "Marine Spatial Planning" are providing both obstacles and useful mechanisms for adaptation of both marine wildlife and human use of marine resources. World-wide, large scale efforts to increase networks of Marine Protected Areas (MPAs) and larger "Seascape" scale conservation in open-access systems are challenged by limited scientific understanding, such complex larval transport mechanisms, but are increasingly considering connectivity needs. The experience of the Wildlife Conservation Society's efforts to conserve marine biodiversity in several different eco-regions will be presented to explore policy solutions across both socio-economic and environmental gradients. Vertical connectivity across land and sea in the Fijiian islands, resilient networks of protected coral reefs in Madagascar, consideration of the needs of highly migratory wildlife in large ocean systems of the Southwest Atlantic, and the opportunities of domestic Marine Spatial Planning of the US Mid-Atlantic will all be considered for their various policy approaches to addressing connectivity requirements in the Marine Environment.

P1.144 McCreless, E*; Visconti, P; Carwardine, J; Smith, RJ; University of California, Santa Cruz, James Cook University, CSIRO Sustainable Ecosystems, DICE, University of Kent; *mccreless@biology.ucsc.edu*

Cheap and nasty? Global conservation prioritisation schemes based on cost data must consider governance and human rights

The financial cost of different conservation projects varies widely and it is vital to consider costs when prioritising projects. Recent work has modelled protected area management costs for a large number of countries, and these data have been used to identify where conservation funds would be best spent to maximise the return on investment. However, low management costs in some countries may correlate with other factors that influence conservation effectiveness and broader impacts. We found that membership of conservation NGOs tends to be lower in countries with low management costs, indicating a lack of civil society involvement. Therefore, conservation projects in these countries are likely driven by outside organisations and implemented by state agencies. This can have perverse outcomes in countries with poor governance or human rights records, which we found to be correlated with management cost at the country level. Poor governance and corruption can increase the financial cost and risk of failure for conservation projects, and disenfranchised citizens in some countries are less likely to be involved in conservation and thus less likely to support it. Our results suggest that decision-makers should take these socio-political factors into consideration when choosing where to work. It is important to account for the side effects of conservation policies on human well being, and to estimate the extra costs involved in ensuring that projects have strong local support.

SP11.7 McCue, AJ*; Wiersma, YF; McGrath, MJ; Memorial University of Newfoundland, NL Dept. of Environment and Conservation; *ajmccue@mun.ca*

Seasonal Habitat Associations of Recently Colonized Coyotes in the Maritime Barrens Ecoregion of Newfoundland

Coyotes (Canis latrans) recently colonized the island of Newfoundland. Their range expansion has generated public calls for predator control, since it is believed (not verified) that the concurrent decline of the largest remaining woodland caribou (Rangifer tarandus) population in Canada is due to the new predator. Here, we determine habitat associations of coyotes in a novel environment, the Maritime Barrens Ecoregion (MBE). The MBE is characterized by dwarf-shrub heath, sparsely populated with high density patches of stunted conifers. The region is interspersed with bogs, fens and ponds associated with high precipitation and high fog frequency. The depauperate mammalian fauna of the region results in high variability of available food biomass for coyotes. Migratory woodland caribou represent a seasonally abundant food source throughout the winter. Seventeen (9M, 8F) coyotes were monitored with GPS collars collecting data points every 4 hours for periods ranging from 6 months to 2 years. Location acquisition rates ranged from 70-97%. We delineated seasons for modelling based on abundant (winter) and limited (summer) woodland caribou. We used both statistical modelling and machine learning to develop individual-based models of habitat association to better assess coyote relationships to a range of environment and habitat attributes. The models can be used to assess spatial interactions between caribou and coyotes to better assess the potential impacts of the new predator.

P1.46 McDevitt, AD*; Muhly, TB; Pitt, JA; Paton, D; Boyce, MS; Hebblewhite, M; Mariani, S; Musiani, M; University of Calgary, University of Alberta, University of Alberta, University of Montana, University College Dublin; *amcdevit@ucalgary.ca*

Effects of habitat selection and anthropogenic disturbance on microevolution in elk (Cervus elaphus)

One of the most important issues in conservation biology is human influence on habitat-selection patterns. This affects microevolutionary processes (evolution at fine spatial and temporal scales) and can be associated with the factors that cause extirpation, including habitat degradation and over-harvesting. Our project evaluates human effects on microevolution through changes in habitat selection, using elk (Cervus elaphus) as a model species. Based on previous findings, we predicted that (a) animals born in a certain habitat remain or disperse to similar habitats, supporting natal-habitat based dispersal and that (b) humans influence habitat selection. Therefore, human activity could lead to reproductive isolation of demes. We are implementing a combined genetics and spatial analysis of elk and their habitat use in southwest Alberta, Canada in a region heavily impacted by human use through industry and recreation. We examined relatedness and fine-scale genetic structure using 30 microsatellite loci on 140 GPS-collared elk to test how relatedness and genetic structure are correlated with preference for similar habitats. We combined this with extensive GIS and human-activity data to show how natural and anthropogenic factors drive microevolution.

SY79 McEachern, P; Alberta Environment; *Preston.McEachern@gov.ab.ca*

Water quality and quantity in the oil sands: The goals, regulatory response and the conundrum of remaining flexible

Recent press and public discourse on oil sands mining have been dominated by negative views on water use, water quality, reclamation and ultimately on sustainability. These interdependent issues are indeed challenges in oil sands management but their solutions are comprehensible, approachable and are being effectively tackled. This talk will provide an overview of the key environmental challenges with respect to water and how these are being addressed. In so doing the talk is meant to dispel some of the fictions in an unapologetic attempt to focus attention on the most pressing environmental issues, especially the eventual return of water and its solutes to the Athabasca River system. Key to this debate is assurance that managed problems remain low impact so I will review monitoring in the oil sands region, the current status of water quality and quantity in the Athabasca River and link this to emerging regulatory direction under the Lower Athabasca Regional Plan. Emerging techniques for performance evaluation and reporting, particularly the analysis of contaminants related to oil sands will also be briefly reviewed. The talk will conclude with an assessment of potential regulatory challenges, where flexibility must be considered to reconcile potential conflicting goals (e.g. creation of storage to meet Instream Flow Needs vs. reduction of footprint and rapid tailings reclamation).

P1.145 McElwee, Pam; Arizona State; *pamela.mcelwee@asu.edu*

Use and Abuse of Conservation Concepts in Policy: "Keystone Species" and "Biodiversity Corridors" in Practice in the Greater Mekong Subregion

Conservation science often uses concepts that can be taken to mean something very different in real-world conservation. A good example is the idea of â keystone species', which in many conservation projects is simply taken to mean whatever species the funder is most interested in conserving, regardless of its functional role in the ecosystem. Yet the disjuncture between the scientific context in which a conservation concept is proposed and the way this concept gets translated on the ground has rarely been explored. Based on fieldwork in Vietnam near several important protected areas, as well as policy interviews with key figures in the government and conservation NGO community, I assess the way key â conservation concepts', in particular the notions of keystone species and biodiversity corridors, circulate from journals to funding agencies to organizations down to project sites in forms that have little to do with the original science behind them. Through interviews, I have compiled very different ideas about what these concepts mean from people in government at different levels, local people near protected areas, and the international conservation community. In the end, these concepts have become little more than buzzwords and fads, with little common understanding of what they mean.

P2.1 McEwan, J*; Vamosi, J; University of Calgary; *sdennenm@ucalgary.ca*

FLORAL COLOUR VERSUS PHYLOGENY IN STRUCTURING SUBALPINE MEADOW COMMUNITIES

Floral colour is important for determining plant reproductive success and is potentially a significant component of plant-pollinator networks. We conducted a survey of the interactions between plants and pollinators in subalpine meadow communities of Alberta's Rocky Mountains and tested the hypothesis that floral colour is an important trait in structuring plant communities. To determine the structure of plant-pollinator networks in these communities, we collected insect pollinators on each flowering plant in two representative communities and used dendrograms based on floral colour reflectance spectra to determine if species tended to be more similar or dissimilar in floral colour within communities as compared to randomly assembled communities. We found that species tended to be more dissimilar in floral colour within communities when compared to randomly assembled coflowering communities. Floral colour also had a low phylogentic signal suggesting that it evolves relatively quickly. These results indicate that floral colour is an integral component of the structure of coflowering communities, which is corroborated by many other studies that have found frequent floral colour transitions within plant lineages. The structuring of plant communities based on floral colour therefore has major consequences for the structure of plant-pollinator networks that many insects and birds ultimately depend on.

P2.145 McGregor, AM*; Davis, C; University of Alberta, Alberta Sustainable Resource Development; *amm15@ualberta.ca*

The application of an ecosystem model to the planning and assessment of a fisheries restoration project in a freshwater system.

In the last 100 years Lac La Biche, a 22,000 ha lake located in northeastern Alberta, Canada, has changed from a system with walleye (Sander vitreus) as the top fish-eating predator to one where a bird, the Double-Crested Cormorant (Phalacrocorax auritus), is at the top of the aquatic food chain. In 2005, the fisheries management branch of the provincial government initiated a fisheries restoration program with the goal of restoring walleye as the top predator in the system. A mass-balance modeling system called Ecopath with Ecosim (EwE) was used to examine the influence of foraging by Double-crested Cormorants on the local fish community. This model is being used to examine the different structuring roles of bird versus fish predators in aquatic food webs, and the potential for different management activities (ie. bird control and walleye stocking) to restore piscivore dominance within the system.

P2.16 McIntosh, A.C.S.*; Macdonald, S.E.; University of Alberta; *amcintos@ualberta.ca*

Effects of Simulated Mountain Pine Beetle Attack on Vegetation and Below-Ground Attributes in Western Alberta Lodgepole Pine Forests

The mountain pine beetle (MPB; Dendroctonus ponderosae), a native bark beetle of western North America pine forests, has been described as the "most damaging biotic disturbance agent in mature lodgepole pine in western Canada". With global warming, the MPB is anticipated to significantly expand its' range, and has already expanded into some of western Alberta's lodgepole pine forests. The objectives of this study are to compare twelve mature lodgepole pine stands in western Alberta before and after four simulated MPB treatment levels (control, 50% mortality, 100% mortality, salvage harvest) with respect to: 1) Overstory forest structure; 2) Understory plant community composition (seedlings, vascular plants, non-vascular plants); and 3) Below-ground attributes (microbial activity, nutrient availability). This presentation focuses primarily on the pre-treatment year data and describes relationships between the overstory, understory, and below-ground dynamics of these twelve stands. There were an average of 1186 live tph (mean dbh = 19.6 cm) and 744 dead tph (mean dbh=12.8 cm) prior to treatment, with total basal area averaging 50 m2/ha. Total species richness among the stands included nine bryophyte species, two fern species, 23 forb species, 16 shrub species, and six tree species. The results of our study will help inform forest management and conservation of expanding MPB-impacted landscapes in western Canada.

P2.55 McKillop, M.M.*; Vergara, V.; Barrett-Lennard, L.G. ; Vancouver Aquarium Marine Science Centre, PO Box 3232, Vancouver, B.C., V6B 3X8, Canada, Vancouver Aquarium Marine Science Centre, PO Box 3232, Vancouver, B.C., V6B 3X8, Canada and University of British Columbia, Zoology Dept., 2370-6270 University Blvd, Vancouver, B.C. V6T 1Z4, Canada; *Meghan.McKillop@vanaqua.org*

Potential Impacts of Shipping Noise on Mother-Calf Acoustic Contact in Belugas (Delphinapterus leucas)

In coming decades, decreases in annual ice cover in the Arctic resulting from climate change will likely increase the exposure of marine mammals such as belugas- highly vocal whales that winter in the vicinity of ice and calve near ice-free estuaries in late spring -to noise from fishing, shipping and other vessels. Here we investigated the potential for this noise to acoustically mask calls used by beluga mothers and offspring to maintain or regain contact. We compared the frequency distributions of calls produced by two mother-calf pairs over 10-12 months in a captive setting with sounds from natural and anthropogenic sources. Mothers used characteristic contact calls (Vergara and Barrett-Lennard 2008 Aquatic Mammals 34:123) with typical peak energy frequencies from 6-15 kHz from the time of birth. The peak energies of most contact calls were well above most of the energy of noise produced by shipping, sea ice, wind, and precipitation. In contrast, the vocalizations of newborn calves had lower peak frequencies (2-3.4 kHz) and narrower energy distributions with significant potential for masking by shipping noise and ice. By 4-5 months, a time when calves in the wild would begin to encounter ice, their peak frequencies increased to 5 kHz. We conclude that shipping noise is most likely to affect the ability of mothers to hear calves during the first few months of life, and may increase the risk of mother-calf separation.

SY71 McLellan, B; BC Ministry of Forests and Range Research Branch; *bruce.mclellan@gov.bc.ca*

Status and conservation of grizzly bears in British Columbia

Shortly following the westward movement of European trappers, gold miners, and settlers, grizzly bear abundance and distribution contract; plummeting in the lower 48 states and the prairies Provinces. Perhaps due to a combination of more northern latitudes, much more rugged topography, and often higher precipitation, grizzly bears remain across more than 80% of their historic range in British Columbia (BC). Because grizzly bears are difficult to census in heavily forested areas, we in BC developed the DNA based mark-recapture methods in 1995 and have used it in 22 areas in the province to estimate grizzly bear densities. Across most of BC, grizzly bear populations are healthy and are managed as a big-game animal and hunted mostly in the spring but also the fall in some areas using a lottery system for a limited number of permits for residents and a quota for guides. The number of permits varies to attain the acceptable annual harvest that is averaged over a 5 year allocation period. Females with attendant offspring are protected and where bears are only hunted in the spring, this regulation essentially protects the most productive females from hunting. In some southern areas, however, the populations are small and fragmented. The level of fragmentation has been highlighted in the southeastern corner of the province but populations in the southwestern corner appear even smaller and more fragmented. In the southwest, populations are not only small, but have been isolated for many decades and have the lowest levels of heterozygosity of any grizzly populations except on Kodiak Island. Until recently, grizzly bears in this corner of BC have largely been ignored by scientists and they continue to have a low profile by conservation groups.

SY28 McLellan, BN; BC Ministry of Forests and Range Research Branch; *bruce.mclellan@gov.bc.ca*

Matrix management and large mammal conservation in British Columbia.

The large mammal predator prey system (LMPPS) in British Columbia involves 6 species of predators and 9 ungulates. Although the movements of individual animals reflect the large spatial scales that the system functions across, this is dwarfed by the scale covered by their shifting distribution 's over temporal scales relevant to conservation. Over the past few decades, people have suggested that BC adopt a "core and linkage" conservation model for the LMPPS. This expanded into a broader strategy called the Y2Y that has been expanding in size over time. These conservation strategies, however, are more restrictive than where the LMPPS currently function. The management strategy in BC is to not only maintain the LMPPS across this much larger area but recover it where needed. Given the historic shifts in members of the LMPPS due to climate change in the 1800's and early 1900's, more shifting due to climate change is expected. Limiting conservation efforts to relatively restricted areas is unwise compared to maintaining its current distribution or expanding it. Clearly, managing the "matrix" and the few "fractures" in the distribution for some species will continue to be a significant challenge.

SY61 McLennan, D.S.; Parks Canada Agency; *donald.mclennan@pc.gc.ca*

Managing Arctic Biodiversity in a Changing World - A Model for Proactive Adaptive Management in Canada's Arctic National Parks

This presentation uses work completed under the CiCAT Tundra IPY Project to demonstrate the development, key components (inventory, monitoring, research, and management modelling), and applications of a management knowledge system aimed at providing park managers with critical information on park ecological change, intended to facilitate adaptation to ongoing and future ecological change. It is now well documented that arctic landscapes have been changing and are continuing to change more rapidly than any other terrestrial landscapes on the planet. Canada's arctic national parks have been established to â maintain or restore the ecological integrity' of 10 protected areas over about 160,000 km2 of the Canadian arctic, and ongoing ecological change presents a complex challenge for park managers and scientists. The presentation focuses principally on two key elements of proactive adaptive management systems - the development of a cost effective method to develop dynamic ecological inventories in large remote parks, and the establishment of effective park monitoring programs.

P2.69 McPhearson, P. Timon*; Felson, Alexander; Karty, Richard; Palmer, Mathew; Tishman Environment and Design Center, The New School, Yale School of Forestry and the Environment, Columbia University; *mcphearp@newschool.edu*

Urban Forest Restoration in New York City: Assessing the Effect of Tree Planting on the Ecological Structure and Function of Urban Parkland

Terrestrial ecosystems in NYC are in the midst of a significant restoration effort which includes the addition of two thousand acres of forest to the city with the goal of increasing canopy cover, reducing invasive species, and mitigating climate change effects while increasing other ecological functions and services. This effort constitutes a large natural experiment in the most densely populated urban center in the nation. The NYC Urban Forest Restoration Study was established in 2008 in order to comprehensively understand the effect of MillionTreesNYC forest restoration efforts on urban ecosystem structure and function. This is a long-term study that focuses on the abiotic and biotic drivers that may impact vegetation structure, biodiversity, invasive species dynamics, soil nutrients, and carbon sequestration and storage in urban forests. This research links multiple plot-scale investigations across all five boroughs of New York City together to create a regional scale analysis of the changing urban forest ecosystem. Analyses make use of annually sampled vegetation and soil data, and documentation of forest management activity. Study design and preliminary soil heterogeneity, plant diversity, and invasive species results of the first full study year will be presented.

P2.167 McRae, L; Institute of Zoology, Zoological Society of London; *louise.mcrae@ioz.ac.uk*

Monitoring trends in vertebrate abundance from the global to the regional scale

Biodiversity monitoring is an essential component of conservation practice with uses ranging from assessing the global status of biodiversity to addressing local management effectiveness. Tracking trends in vertebrate population abundance can be a straightforward and cost-effective approach to monitoring biodiversity. Such data can be fed into an indicator of biodiversity such as the Living Planet Index (a global indicator of vertebrate population trends) which has been adopted by the Convention on Biological Diversity. This is used to measure progress towards international biodiversity targets such as the target to reduce the rate of biodiversity loss by 2010, and is considered a robust measure at a global scale. At smaller scales, this method could be applied to produce indicators at the national level, for regions of interest or specific habitat types. To investigate this, the average trends of 2500 vertebrate species populations were modelled at different spatial scales from the global to regional level to elicit how patterns of abundance differ and to assess the utility of using such an approach. Results from averaging the population trends globally show that on average, vertebrate abundance has been in decline since 1970. When applying the method at smaller scales, robust results can be produced but in some cases caveats such as data availability and representation also need to be considered. One strategy to pursue in the future would be to scale up from representative monitoring schemes at a local level to give accurate indicators of vertebrate trends all the way up to the global level.

P1.36 MD. ABDULLAH ABRAHAM HOSSAIN*; Mazlin Bin Mokhtar; Mohd Ekhwan Hj. Toriman; Institute for Environment and Development (LESTARI), Universiti Kebangsaan Malaysia; *nobu_fd@yahoo.com*

Institutions and Organizations for Conservation: A Case of Langat River Basin, Malaysia

According to contemporary policy paradigm, a river basin is an acquiescent interface for conservation interventions under integrated approach. But challenges of complexities and uncertainties in river basin management faced by institutions and organizations are causing mismatch between policy intentions and policy outcomes. Therefore, using institutional analysis and development (IAD) framework, we explored challenges in terms of learning environment and policy outcomes in terms of conservation in Langat River Basin. This analysis revealed that absence of learning environment for individual stakeholders is the major challenge to achieve policy objective. However, polycentric institutional arrangements of Federal administration could addresses conservation challenges by extending the scope of iterative learning processes for individual stakeholders. Findings of this study are envisaged to be useful to those who are concerned for strategizing integrated river basin management for sustainable development and further research on Langat River Basin and else where.

P2.47 Meadows, DW; NOAA Fisheries; *Dwayne.Meadows@noaa.gov*

NOAA Fisheries Species of Concern Proactive Conservation Program

Species of Concern are those species about which NOAA's National Marine Fisheries Service has some concerns regarding status and threats, but for which insufficient information is available to indicate a need to list the species under the Endangered Species Act (ESA). "Species of concern" status does not carry any procedural or substantive protections under the ESA. There are currently 42 Species of Concern. The Species of Concern Program: 1) Identifies species potentially at risk; 2) Identifies data deficiencies and uncertainties in species' status and threats; 3) Increases public awareness about those species; 4) Stimulates cooperative research efforts to obtain the information necessary to evaluate species status and threats; and, 5) Fosters voluntary efforts to conserve the species before listing becomes warranted. Funding for projects is available through our Proactive Species Conservation Grant Program. We wish to draw proactive attention and conservation action to these species through research, conservation, capacity building, and education and outreach partnerships.

P2.206 Meer van der, E*; Fritz, H; Painted Dog Conservation project Zimbabwe, Lyon University, CNRS, France; *ester@painteddog.org*

Why African wild dogs (Lycaon pictus) move outside the safety of a protected area; testing the ecological trap hypothesis

African wild dogs in Hwange National Park, Zimbabwe, show a tendency to make maladaptive habitat choices by actively establishing new home ranges outside the national park. Leaving the safety of the protected area inevitably means this endangered species regularly becomes the victim of snares and cars. When an animal shows a preferential choice for a habitat in which its reproductive success or adult survival is less than in other available habitat it is said to have been caught in an ecological trap. Ecological traps can lead to rapid extinction of a species especially when population sizes are low. African wild dogs coexist with other carnivores such as lions and spotted hyenas. Lions and/or hyenas can affect wild dogs indirectly by excluding them from preferred habitat or directly by killing and through kleptoparasitism. In order to test whether interspecific competition with lions and hyenas could led the African wild dogs to make a maladaptive habitat choice a call up experiment with dog sounds was designed. Preliminary results show that the potential risk of kleptoparasitism could indeed create an ecological trap for the African wild dogs in Hwange National Park.

P1.41 Mendel, J*; HalaÄ ka, K; VeteÅ¡nÃ–k, L; PapouÅ¡ek, I; BartoÅ ovÃ¡, E; Å anda, R; KonÃ–Ä kovÃ¡, M; UrbÃ¡nkovÃ¡, S; Institute of Vertebrate Biology, v.v.i., National Museum; *jmendel@seznam.cz*

Molecular biodiversity inventory of the ichthyofauna in the Czech Republic

Our current knowledge of the genetic diversity in fish species from the Czech Republic is still insufficient. This project is based on international collaboration and has contributed significantly to the recognition and description of species diversity in all Czech fishes by using a comprehensive approach (literary data search, morphology, DNA barcoding, nDNA analysis). Indigenous and non-indigenous species of fish and lampreys living in the natural waters of the Czech Republic are the subject of recent inventory-taking and subsequent cataloguing. The acquired results are used for intercontinental comparison using DNA barcode within the BoLD platform. The study has contributed to the updating of information for Natura 2000 monitoring and has provided information and recommendations to the Agency for Nature Conservation and Landscape Protection of the Czech Republic. New designs for species collection of type specimens and the development of detailed vouchers are an important contribution to national museums. This study was carried out within the framework of research project no. M200930901 supported by the Program of internal support for international collaborative projects of the Academy of Sciences of CR.

P1.40 Meredith Martin*; Eugenia Naro-Maciel; Claudio Bellini; Armando JosÃ© Barsante Santos; George Amato; Rob DeSalle; Sacker Institute for Comparative Genomics, American Museum of Natural History, New York, NY 10024 USA, Biology Department, College of Staten Island/City University of New York, 2800 Victory Boulevard, Staten Island, NY 10314 USA, TAMAR-ICMBio, Av. Alexandrino de Alencar 1399, Tirol Natal RN, Brazil, FundaÃ§Ã£o PrÃ³-TAMAR, Alameda do BoldrÃ³ s/ nÃºmero, Fernando de Noronha PE, Brazil; *meredithpmartin@gmail.com*

Green Turtles (Chelonia mydas) of the Fernando de Noronha and Atol das Rocas World Heritage Sites: Insights from mitochondrial DNA sequencing

The protected Brazilian islands Rocas Atoll and Fernando de Noronha are important feeding grounds for green turtles. Although turtles at these sites are protected, they may face threats when migrating, underscoring the importance of understanding population connections. To investigate their population distribution, we sequenced a segment of the mitochondrial control region (862 bp; n = 119 for Fernando Noronha, n = 81 for Rocas Atoll). At Rocas Atoll, seven mtDNA haplotypes were revealed, and average haplotype diversity (h) was 0.699 + 0.037, while nucleotide diversity (Ï) was 0.010 + 0.005. In Fernando de Noronha eleven mtDNA haplotypes were found, and average haplotype diversity (h) was 0.641 + 0.027, while nucleotide diversity (Ï) was 0.008 + 0.005. At both sites the most common haplotypes were CMA-08 and CMA-05. To identify the natal origins of these foraging turtles, we used two kinds of "many-to-many" mixed stock analyses, either including or disregarding nesting population sizes. Results of these analyses varied depending on whether all feeding grounds from the Atlantic were included. For comparison, we performed traditional "one-to-many" MSAs, with results more consistent with expectations. The study will provide data necessary for conservation prioritization and management of endangered green turtles foraging at these World Heritage Sites.

SY9 Merenlender, Adina M.; University of California, Berkeley; *adinam@berkeley.edu*

The Role of Outcomes Research for Adaptive Land Use and Conservation Planning

A full integration of conservation and land use planning is required to overcome the implementation crisis that conservation biologists face in trying to stave off the biodiversity crisis. As part of our proposed integrated framework we need to critically assess the extent to which current policies to conserve open space and reduce sprawl actually produce the desired effect. This means we need to see planning as adaptive by nature, and be willing to expend resources on monitoring and evaluation. That is, we need to complete the full cycle of informing land use decisions by assessing trade-offs, monitoring changes in land use and biodiversity, evaluating these changes, and then adapting our policies accordingly. Currently there is very little information on the effectiveness of "environmentally friendly" land use planning regulations such as urban growth boundaries, agricultural zoning, and cluster development. However, we can learn from our initial efforts to evaluate the benefits of direct protection of natural resources through conservation finance measures, most of which support full or partial land acquisition. Recent research on conservation easement outcomes illustrates how this type of retrospective analysis is useful for informing future implementation.

6.1 Metzger, KL*; Sinclair, ARE; Hilborn, R; Hopcraft, JGC; Mduma, SAR; University of British Columbia, University of Washington, Frankfurt Zoological Society, Tanzania Wildlife Research Institute; *metzger@zoology.ubc.ca*

Evaluating the protection of wildlife in parks: the case of African buffalo in Serengeti

Human population growth rates on the borders of protected areas in Africa are nearly double the average rural growth. Increasing human populations could be a threat to biodiversity through increases in illegal hunting. In the Serengeti ecosystem, Tanzania, there have been declines in African buffalo (Syncerus caffer) inside the protected area during a period when there was a reduction of anti-poaching (1976-1996). Subsequently, protection effort has increased and has remained stable. During both periods there were differences in buffalo population decline and recovery in different areas. Possible causes of the spatial differences are explored using a spatially structured population model to analyze the impacts of three factors - hunting, food shortage and natural predation. Population changes were best explained by illegal hunting but model fit improved with the addition of predation mortality and the effect of food supply in areas where hunting was least. Buffalo populations in close proximity to areas with higher rates of human settlement had low or negative rates of increase and were slowest to recover or failed to recover at all. The increase in human populations along the western boundary of the Serengeti ecosystem has led to negative consequences for wildlife populations, pointing to the need for enforcement of wildlife laws to mitigate these effects.

P1.27 Meunier, G.; Darveau, M.; Boudreau, S.*; Ducks Unlimited Canada, Ducks Unlimited Canada & Laval U.; *s_boudreau@ducks.ca*

Will the woodland caribou be the only mascot species ever used in communication and awareness campaigns for boreal conservation?

Emblematic, flagship, or mascot species are often used in education programs and public campaigns to promote natural area conservation or nature tourism. In Boreal Canada, the woodland caribou is the most widely used, if not unique, mascot. However, in trying to evoke the complexity of northern ecosystems, and also because campaigns do not all have the same objective, relying on the caribou as ambassador of the Boreal is not the best strategy. We sought to find alternatives: starting with a list of 151 vertebrates present in the boreal forest, taiga, and tundra in Quebec, we used four basic selection criteria (native, charismatic, easily identified, and non detrimental to human activities) to create a list of 65 acceptable mammalian (12), bird (39), amphibian (4), and fish (10) species. Among the 86 species that were rejected through very strict application of the criteria, some decisions were counterintuitive, namely the gray wolf (Canis lupus) that has been long seen as a nuisance, and the Canada goose (Branta canadensis) that is detrimental to agriculture in the South. In a second step, we categorized the 65 acceptable species using eleven classification criteria, including: distribution (large/local); population status (common/threatened); habitat (specialist/generalist); cultural value (for local communities); and indicator value (umbrella species). Our analysis shows that a number of species may fit the criteria and replace or accompany the caribou in boreal campaigns.

P1.43 Michaud, C*; Rhymer, JM; University of Maine; *corinne.michaud@umit.maine.edu*
Metapopulation structure and genetic diversity of the endangered Clayton's copper butterfly
Clayton's copper (Lycaena dorcas claytoni) is a wetland butterfly found almost exclusively within the state of Maine, where it was listed as state-endangered in 1997. It occurs only in rare circumneutral fen habitat, in conjunction with its host plant, shrubby cinquefoil (Dasiphora fruticosa). Recent population surveys estimated population sizes of less than 3000 butterflies at 6 of 8 extant sites, supporting the need for continued protection of this rare butterfly. Microsatellite markers have been used to assay the diversity within and among populations of Clayton's copper in Maine. Specimens for genetic analyses were collected from each of 7 sites in Maine during flight seasons in 2008 and 2009. Patterns of genetic diversity are compared with respect to spatial trends within sites and also across generations. Dispersal rates among sites have been estimated from genetic data to elucidate the metapopulation structure, and these data are being linked to analysis of a gene that affects the propensity of individuals to disperse or remain sedentary. A landscape genetic approach is being used to determine the effect of geographic features on the partitioning of genetic diversity among populations. Results of these experiments will help to understand population dynamics and genetic diversity of Clayton's copper - information that is crucial for effective conservation planning for the species.

P1.200 Milian-Garcia, Y*; Espinosa-Lopez, G.; Ramos-Targarona, R.; Sosa-RodrÃ–guez, G; PÃ©rez-Fleitas, E; Guerra-Manchena, L; Frias-Soler, R; Benitez-Alvarez, L; University of Havana, Empresa Nacional para la ProtecciÃ³n de la Flora y la Fauna, Empresa Nacional para la ProtecciÃ³n de la Flora y la Fauna; *yoamelmg@gmail.com*
Genetic characterization of captive Cuban crocodiles (Crocodylus rhombifer) and suspected hybrids to inform in situ/ex situ conservation
Among crocodilians, Crocodylus rhombifer is one of the world's most endangered species and has the smallest natural distribution, restricted to two locations in the Cuban archipelago. This endemic species coexists with the American crocodile (Crocodylus acutus), which are known to hybridize both in the wild and in captivity with important implications for the genetic integrity of source populations of these species. Hybrids may occasionally be detected based on morphological characters, but such data may be unreliable due to phenotypic plasticity. In this study, we used genotypic data at six polymorphic microsatellite loci collected for 22 individuals across 2 wild population and 139 captive individuals to: 1) determine the direction and degree of Cuban crocodile and American crocodile hybridization in the primary on-island ex situ population; 2) quantify the extent, distribution and in situ representation of genetic variation in captivity; and 3) reconstruct relatedness among C. rhombifer founders to inform breeding strategies and interactive in situ/ex situ conservation management. Results from this study will directly inform captive breeding programs to avoid out-crossing of divergent lineages and improve the efficiency of reintroduction programs.

SY15 Miller, Daniel C*; Agrawal, Arun; Roberts, J. Timmons; University of Michigan, Brown University; *dcmille@umich.edu*
Aid-ing Biodiversity? Official Development Assistance for Conservation, 1980-2008
Financial transfers from wealthy to developing countries comprises 1 of the 7 indicators set by the Convention on Biological Diversity to assess progress toward the goal of significantly reducing the rate of biodiversity loss by 2010. Despite the importance of biodiversity aid to conservation outcomes, knowledge of actual funding flows and whether they correlate with biodiversity need remains limited. Using the PLAID 1.9 database, we provide the first comprehensive examination of patterns of foreign aid for biodiversity. We conducted a keyword search to identify more than 9,000 biodiversity-related projects in 171 countries totaling approximately $18 billion funded by multi- and bi-lateral aid agencies from 1980-2008. We present summary data on official biodiversity assistance during this period, identify major donors and aid recipients, and examine trends in funding flows over time. We analyzed the relationship between biodiversity aid and biodiversity conservation significance at the country level. The conservation significance of each country was measured using data on endemic and threatened species and protected area coverage from the IUCN Red List and the World Conservation Monitoring Centre. Controlling for country size, we find that these measures are positively associated with greater amounts of biodiversity aid. We conclude by highlighting the importance of empirical evidence on funding flows and their relationship to biodiversity priorities for achieving conservation targets.

SY67 MILLER, DAOUD NEIL*; Coble, Theresa; Stephen F. Austin State University, Nacogdoches, TX USA; *Daoud_Miller@comcast.net*
Volunteer Role Investment And Caring Identity Development: Institutionalizing Beach Conservation
Puget Sound regional organizations promote conservation of the marine ecosystem; yet individual and institutional behavioral change is complex. Insufficient understanding exists concerning people's emotional connections to natural environments, their caring practices, and their adoption of conservation behaviors. A localized qualitative investigation sampled twelve long-term volunteer shoreline interpreters in the Seattle Aquarium Beach Naturalist program. Through oral responses and concept map construction over two in-depth interviews, respondents disclosed perspectives on their volunteer role and the nature of caring relations among interpreters, shoreline life, and beach visitors. Study findings are: (1) the central qualities of belonging, meaningfulness, and caring describe interpreters' connections with Puget Sound shorelines and beach visitors; (2) the development of a caring identity appears to mediate personal transformation and the process by which conservation and other benefits return to ecological and social communities; (3) the process of change is central and can be explored on three dimensions: beach-visitor, self-interpreter, and ecological-social community. Results suggest that volunteer role investment, continuous learning, and interactions with passionate, caring, and supportive staff are institutional factors that support volunteer belonging, meaningfulness, caring, change and ultimately, retention.

P1.44 MILLER, J.M.*; Poissant, J.; Kijas, J.W.; Sheep Genomics Consortium; Coltman, D.W.; Department of Biological Sciences, University of Alberta, Edmonton, Alberta, T6G 2E9, Canada, CSIRO Livestock Industries, St. Lucia, Queensland, 4067, Australia, www.sheephapmap.org; *jmm1@ualberta.ca*

SNP discovery in wild sheep through application of the OvineSNP50 BeadChip

Conservation genomics, where a multitude of genetic markers distributed throughout a genome can be used to study adaptive variation, holds the prospect of dramatically informing and enhancing current management strategies that rely on demographics and population structure estimates inferred from a few neutral markers. Single nucleotide polymorphisms (SNPs) are fast becoming the genetic marker of choice for such endeavors as they provide several advantages over other markers including: abundance in the genome, distribution in both expressed and intronic sequences, and ease of genotyping through automation. However, the development of genomic resources for wild species is still in its infancy. Cross-species utilization of technologies developed for their domestic counterparts has the potential to unlock the genomes of organisms that currently lack genomic resources. Here we apply the OvineSNP50 BeadChip, developed for domestic sheep, to two related wild ungulate species: the bighorn sheep (Ovis canadensis) and the thinhorn sheep (Ovis dalli). Over 95% of the domestic sheep markers were successfully amplified in bighorn sheep while over 90% were amplified in thinhorn sheep. Pooling both species we found 868 SNPs distributed on all autosomes and the X-chromosome. This panel of SNPs was able to discriminate between the two species, assign individuals to their population of origin, and detect substructure within a population corresponding to known family groups. In taxa where no genomic resources are available typing individuals on a platform such as the OvineSNP50 BeadChip can be more efficient and cost effective than other SNP discovery methods.

SP10.5 Miller, KA; School of Biological Sciences, Monash University; *Kim.Miller@sci.monash.edu.au*

Effective Management of Genetic Diversity in Reintroduced Populations: Understanding The Effects of Supplementation and Serial Translocation

Maintaining genetic variation is important for the success of reintroduced populations, yet founding events and genetic drift may cause losses of genetic diversity. The effective management of genetic diversity is central to population success. Here we test how life history traits influence the maintenance of genetic diversity and model the genetic consequences of management actions. We sampled source and reintroduced populations of three skink species (Oligosoma spp.) to assess the genetic effects of reintroduction, and modelled genetic diversity over 10 generations under different scenarios for management. In the first 1-2 generations (14-18 years) following reintroduction, effective population sizes did not reflect the number of animals released. Models showed that supplementation would not reduce the loss of heterozygosity over 10 generations in species with high reproductive output, but would for species with low reproductive output or small release groups by decreasing the time required to reach carrying capacity. Further, harvest of animals with low reproductive output for a second-order reintroduction would accelerate losses of heterozygosity in both first- and second-order reintroductions. Supplementation of reintroduced populations will have the greatest effect during the initial period of population growth, by aiding in rapid recovery from a bottleneck and limiting genetic drift. Actions that slow population growth (e.g. harvest) should be avoided.

P2.48 Miller, RJ; Hocevar, J*; Stone, R; UCSB Marine Science Institute, Greenpeace, NOAA National Marine Fisheries Service; *rjmiller1@gmail.com*

Abundance and ecological significance of structure-forming taxa in the Bering Sea: implications for conservation

Marine benthic ecosystems harbor diverse communities of organisms that may depend on large sessile taxa like corals for habitat structure. Benthic trawl fisheries may severely impact this habitat, potentially adversely affecting populations of commercially valuable species. In the Bering Sea, trawl-based fisheries operate in a region rich with cold-water coral fauna that has been sparsely explored. Here we report results from video surveys of benthic communities in two virtually unexplored canyons, Zhemchug and Pribilof. Abundance of biogenic structure-forming taxa (corals) and associations between commercially valuable species, e.g. Pacific ocean perch (Sebastes alutus) and corals are evaluated.

SY7 Mills, Julianne; Davidson College; *jumills@davidson.edu*

Prosperity, Consumption, and the Environmental Kuznets Curve: Implications for Biodiversity and Forest Conservation

Many conservationists contend that economic growth and biodiversity conservation are incompatible goals. Others contest this viewpoint, arguing that wealthy countries have the luxury of investing more heavily in conservation. Under this assumption, one might expect a U-shaped relationship between per capita wealth and proportion of species conserved, as predicted by the environmental Kuznets curve (EKC). Using deforestation rates to index species threat, I employ quantile regression and find some initial evidence for an EKC relationship. However, this support is deceptive. Incorporating forest product consumption into the relationship between GDP and conservation reveals that the EKC is driven by global trade patterns; rich countries practice preservation within their borders but appropriate resources from poorer countries to sustain high levels of consumption. The policy implications of these findings are significant. The data indicate that unhindered economic growth increases consumption at the expense of global conservation. Simple application of the EKC theory, which suggests constant economic growth as the best practice for conservation, is thus clearly unwarranted. To facilitate biodiversity conservation, initial support for growth and poverty alleviation in low-income countries must be combined with policies that acknowledge limits to growth and strive for steady state economies amongst high-income countries.

P2.180 Mohammad Ayub Alavi; Wildlife Conservation Society, conservation specialist; *ayubalavi83@yahoo.com*

The First Nation's National Park: an Anchor for Landscape Sale Conservation in Central Afghanistan

The Hindu Kush Mountains of Central Afghanistan contain some of Afghanistan's most intact ecosystems. Since 2006, the Wildlife Conservation Society (WCS) has been working in the Hindu Kush assisting the Islamic Republic of Afghanistan in conservation planning, wildlife and range surveys, environmental legislation and community involvement resulting in Afghanistan establishing Band-e-Amir as the country's first national Park in May 2009. Reconnaissance surveys done in the area larger area in and around Band-e-Amir suggests the 7000 km2 high altitude plateau to the north of the National Park is inhabited only seasonally by graziers and continues to harbour significant populations of urial (Ovis orientalis) and Siberian ibex (Capra siberica). This unanticipated pocket of rich biodiversity is proposed for a diverse, community-based, landscape scale conservation program using the established National Park as the administrative focus and well known example of the locally new concept of protected area. Current plans, dependent on funding, entail assisting in developing and training Community Conservation Councils (CCCs) and hiring the community game guards from the 4 community clusters distributed geographically throughout the plateau. Based on advice from the CCCs, a spectrum of protection measures will be employed to protect natural values while enhancing the livelihoods of local people. Managing the entire plateau will act as a buffer zone and will provide a source for repopulating the National Park's currently depleted wildlife populations.

9.8 Mohammad Mohsinuzzaman Chowdhury; Wildlife Biologist (ex-IUCN-Bangladesh Employee); *chowmm2004@yahoo.com*

Survival of the Bengal Tiger in the Sundarbans of Bangladesh - A big Challenge.

Bengal tiger-Panthera tigris is a keystone species in the Sundarbans of Bangladesh. In the past tigers were wiped-out from other areas. Now they ranked as critically endangered animal due to multi-dimensional impacts. In situ tiger survival is big challenge to Bangladesh. Field research, questionnaire survey & interviews were main methods. Result demonstrates that relative abundance of tiger and its prey-base is higher in western-side of Sundarbans. Human-tiger conflict is severe there though entire Sundarbans has no human settlement. Millions of people depend on Sundarbans natural resources, significant number of them have negative attitude for in-situ tiger conservation. Tigers kill men and men kill tigers - a common phenomena in & around Sundarbans violating Bangladesh Wildlife Preservation Act-1974. Recent cyclone destroyed tiger, its prey and habitat and no authentic record is available. Prey depletion, huge natural resource collection, natural calamities, climate change have direct impact on tiger population declination. Sea-level rise due to climate change will contribute significantly for wiping-out entire Sundarbans tiger population forever. Future relocation and re-introduction programme may contribute to tiger survival with dignity in past tiger-land of Bangladesh. New approach needs to tiger conservation showing respects to ecological processes of Sundarbans, and also involving local people at all-stages of development.

P1.77 Mollik, M.A.H.*; McField, R.; Hossain, A.B.M.A.; Hossain, M.F.; Sen, D.; Zahid. M.I.; Hassan, A.I.; Chowdhury, M.O.F.; Peoples Integrated Alliance, Bangladesh, SHACO-Health & Education Society, Bangladesh, State College of Health Sciences, Bangladesh, North South University, Bangladesh, Biogene Life Care, Bangladesh, Mohona Environment Development Society, Bangladesh; *mollik_bge@live.com*

Status of Ethnobotanical Skills in Bangladesh: A Survey on Tippra Ethnic Group of Rema-Kelenga Wildlife Sanctuary

Indigenous peoples are often considered potential allies in the conservation of biological diversity. Here we assess whether ethnobotanical skills of indigenous people contribute to a reduction in the clearance of Rema-Kelenga Wildlife Sanctuary. We measured ethnobotanical skills of male household heads and area of Rema-Kelenga Wildlife Sanctuary cleared for agriculture among 108 households of Tippra, one important ethnic group can be found living within the boundaries of the forest. We used multivariate regressions to estimate the relation between ethnobotanical skills and area of Rema-Kelenga Wildlife Sanctuary cleared while controlling for schooling, health status, number of plots cleared, adults in household, and village of residency. We found that when the ethnobotanical skills of the male household head were doubled, the amount of Rema-Kelenga Wildlife Sanctuary cleared per household was reduced by 024%. The association was stronger when the area of old-growth forest cleared was used as the dependent variable than when the area cleared from fallow forest was used as the dependent variable. People who use the forest for subsistence might place a higher value on standing forest than people who do not use it, and thus they may be more reluctant to cut down the forest.

24.2 MOLLOY, PP*; Anticamara, JA; Vincent, ACJ; Project Seahorse, UBC Fisheries Centre, Institute for Resources, Environment and Sustainability, University of British Columbia; *philip.p.molloy@gmail.com*

Frugal conservation: what does it take to detect changes in fish populations?

Many conservation projects have to develop practical and feasible ways to detect changes in populations. We compare the ecological information obtained using intensive monitoring of fish populations with that which would be procured from less exhaustive sampling. At each of four sites in the Philippines, we surveyed all fish in eight monthly transects for up to three years. We first tested for changes in fish density, size and species richness; we then compared these results obtained by using all data to those obtained in simulated protocols that restricted effort in ways that were relevant to marine conservation practitioners. Bimonthly surveys retained high power to detect overall trends. Similarly, statistical power remained high when at least four monthly transects were carried out. However, power and accuracy fell and if fewer transects or surveys were considered. Most trends were also detected when all possible easily-identified species or at least 75% of fished species were considered. Indeed, power to detect overall trends remained high even when only fished species were considered in four transects monthly. We conclude that sampling protocols can be powerfully streamlined using strategic and inventive approaches and that the choice of protocol will depend on the objective of the research or management.

P2.123 Montambault, JR; Groves, CR*; The Nature Conservancy; *jmontambault@tnc.org*
Improving Conservation Practice by Investing in Monitoring Strategy Effectiveness
Monitoring is an investment many governmental and non-governmental organizations make while managing natural resources. Monitoring can demonstrate the success of management interventions, or guide a change in course when desired outcomes are not achieved. However, monitoring is often the last component in a project to receive funding and among the first to get eliminated when budgets tighten. Historically, The Nature Conservancy focused most monitoring efforts on population trends of species of concern on nature preserves. Today, our monitoring questions have evolved to focus on assessing under what conditions and to what extent our conservation management interventions accomplish desired outcomes and why. Investment in this monitoring must be balanced against what else might be done with these resources. We provide guiding principles for making these investment decisions based on two key factors: a) potential for risk to an organization (ecological, reputational, legal, and the risk of uncertainty) and b) leverage (potential for multiplying the influence of a demonstration site or approach). We use a sampling of Conservancy projects to illustrate the interplay between these factors with monitoring costs ranging from minimal (<US$500/year) to significant (>US$100,000/year). We also provide a simple framework to help managers balance the level of scientific rigor (inference) with the need for rapid and inexpensive results to inform management decisions.

SY76 Montes de Oca, Enrique*; Spence, John R.; Ball, George E.; Instituto de Ecologia A.C., University of Alberta; *enrique.montesdeoca@inecol.edu.mx*
Subtropical montane beetle assemblages in transformed anthropogenic landscapes
Human beings have shaped extensive mountain areas over hundreds of years. Anthropogenic transformation modifies natural ecosystems that were originally forests and generates landscape heterogeneity represented by land use mosaics (pasture, crop fields and rangelands). Landscape transformation affects zoning gradients and influences floral and faunal dynamics in mountain systems. Biodiversity conservation and ecosystem functioning depend upon land management practices. We analyze the assemblages of ground beetles on these land use mosaics following an altitudinal gradient in central Veracruz, Mexico, where topographic and climatic variations acting over a short range interact with plant and animal agricultural practices to determine biotic composition. Variation in ground beetle assemblages according altitude and land use (habitat) are analyzed in relation to diversity, biogeography, and some life history features. A short term historical comparison (35 years) of the regional beetle fauna composition is also presented. It seems that major impact on this insect group occurs through conversion of the middle and high elevation forests to corn and potato fields. Thus it is important to maintain forest patches and increase their area as integral parts of the landscape through improving management practices to sustain the full range of native forest beetle species.

19.4 Montevecchi WA*; Buren AD; Burke CM; Fifield DA; Hedd A; McFarlane-Tranqulla L; Regular PM ; Wilson EE; Memorial University of Newfoundland; *mont@mun.ca*
The Eastern Canadian gill-net removal experiment: Tracking the population responses of seabirds to the ground-fishery closure
During 1992, the eastern Canadian fishery for northern cod was closed on the Grand Bank and coastal waters of Newfoundland and Labrador. This moratorium resulted in the immediate and prolonged removal of many 1000s of km of gill-nets known to inflict high levels of seabird mortality. This action in turn provided an unprecedented opportunity to engage an ocean-basin experiment on the after-effects of the removal of fishing gear on the eastern Canadian seabird community and other taxa. We compared the population trajectories of the surface-feeders and divers of the breeding seabird community of the Northwest Atlantic. Preliminary results indicate that those species most vulnerable to entanglement in fishing gear, diving species show population increases consistent with reductions in the mortality of breeding adults. This top-down release appears to be over-riding pervasive bottom-up influences expressed through the poor condition of forage fishes following a pervasive regime shift forced by a cold water perturbation in the early 1990s. This bottom-up effect in combination with the removal of tonnages of fishery discards is evidenced through declines in the populations of surface-feeding seabirds that not vulnerable to gill-net mortality. We are modeling the sources of anthropogenic and climatic mortality that influence the marine bird community of eastern Canada. These studies can help with mitigation efforts to reduce anthropogenic influences that interact with climatic effects on marine animals and coastal communities.

SY43 Mooers, A; Whitton, J *; Simon Fraser University, University of British Columbia; *amooers@sfu.ca*
The use of science in the Canadian Species at Risk Act
I will outline how science is currently used to inform decision-making in Canada's Species at Risk Act (SARA, 2002). The act was designed to separate the independent science necessary when publically proposing wildlife species for legal protection from the political decision whether to legally list and so protect those species. Independent science input at this listing stage and subsequently (particularly the identification and protection of critical habitat, decisions on feasibility of recovery, attendant population and distribution objectives, even the general definitions of survival and recovery) require close scrutiny in this young piece of legislation. Relatiavely minor adjustments to the legislation and attendant policy could help better identify the necessary tradeoffs required when managing imperiled natural heritage.

SY12 Moola, F.M.*; Pinkus, S.; Ferguson, K.; Connolly, M.; Page, D. ; David Suzuki Foundation, Ecojustice; *fmoola@davidsuzuki.org*

WAITING FOR THE ARK: the biodiversity crisis in British Columbia, Canada and the need for a Species and Ecosystem Protection Act

British Columbia (BC) is atypically rich in biodiversity for a northern temperate region. It is home to 76 per cent of Canada's bird species, 70 per cent of its freshwater fish species and 60 percent of its evergreen trees. Well over 1600 known taxa are now ranked at risk by the province's Conservation Data Center and levels of endangerment are extremely high in some wildlife groups, such as reptiles and amphibians. However, the existing fragmented policy landscape for BC's species at risk provides little legal mandate for protection and is ineffective to actually protect and recover wildlife at risk or their habitat. For example, we found that eighty-nine per cent of known threatened and endangered species in British Columbia are not protected under BC's laws or policies for species at risk (e.g., the IWMS policy of the Forest Range and Practices Act and the Wildlife Act) or under federal endangered species legislation (Species at Risk Act). Furthermore, existing provincial laws do not require habitat protection and do not require recovery planning and action. Given the magnitude of the biodiversity crisis in BC and the inadequacy of the current policy response, we argue in favor of new legislation to protect the province's species and ecosystem at risk (a Species and Ecosystem Protection Act; SEPA). We outline the principles of an effective SEPA, based on a review of other provincial and international species protection laws and best practices.

SP8.9 Moon, KA; James Cook University; *katie.moon@jcu.edu.au*

The social dimensions of conservation program design for privately-managed land

Biodiversity conservation programs are increasingly employed by governments and natural resource management agencies to encourage landholders (freeholders and leaseholders) to deliver environmental policy objectives on their property. However, failure of program designers to consider adequately the social dimension of landholders, such as their personal and financial circumstances, environmental attitudes, and land use aspirations, can limit participation rates and compromise policy outcomes. To examine how well conservation programs account for landholders' willingness and ability to participate in biodiversity conservation, interviews were conducted with 45 participants in three conservation programs in Queensland, Australia, which used different policy instruments (voluntary, direct-payment, and market-based) and were administered by different agencies (state and local government and non-government). The results revealed that: 1) the locally-based non-government program best responded to the social dimensions of participants; 2) the government programs did not offer landholders their preferred incentives (money and on-ground advice); and 3) the programs did not remove the barriers that landholders perceive to limit environmental sustainability on privately managed land. There is much scope for improvement of conservation programs designed for privately-managed land, specifically incorporation of landholders' social dimensions and removal of barriers to conservation.

17.4 Moore, JA*; Nielsen, JK; Pyare, S; Tallmon, DA; University of Alaska Southeast; *moore.jennifer@gmail.com*

Landscape Effects on Gene Flow and Connectivity of a Widespread Amphibian at the Northern Range Margin

Natural and anthropogenic landscape features can have profound effects on gene flow and connectivity, ultimately affecting population dynamics and the evolutionary trajectory of a species. Amphibians are particularly susceptible to changes in the landscape due to their sensitivity to microclimatic regimes and their generally low dispersal capabilities. Boreal toads are widespread across western North America, yet local extinctions are occurring. We examined the effects of the landscape on gene flow and connectivity of boreal toad populations in Southeast Alaska, which encompass an impressive array of landscape features and are at the extreme northern edge of their geographic range. Using GIS and circuit theory, we analyzed neutral genetic variation in relation to physiographic and microclimatic landscape features, and compared populations from pristine wilderness and urban areas to further investigate the influence of anthropogenic environmental changes. The landscape has dramatically shaped the genetic structure of all populations (wilderness and urban), with low connectivity even at short geographic distances and at low elevations. Alteration of climate regimes and landscape features in this region will affect amphibians in ways that differ from more southern latitudes. Our results will enable conservation planners to mitigate the effects of anthropogenic landscape changes in light of decreased connectivity of toad populations.

9.4 Morehouse, AT*; Boyce, MS; University of Alberta; *morehous@ualberta.ca*

Using resource selection functions to map livestock depredations by wolves

The sharp interface between mountains and parries in southwest Alberta means wildlife habitats overlap prime cattle grazing lands. Consequently, a number of stakeholder groups are concerned over wolf (Canis lupus) depredation on livestock. Producers are compensated for confirmed losses to predators, but missing cattle remain a persistent problem. Such conflicts often result in the removal of these predators. A lack of information about wolf diets and activity in this multi-use landscape makes management decisions more difficult. To asses the impact of wolves on cattle we collared wolves with GPS radiocollars programmed on a 1-hr duty cycle and analyzed these data for clusters of activity. Year-round field visits of 698 cluster sites revealed 213 kill or scavenge sites. Wolf diets shifted dramatically from livestock during the grazing season to wild prey in the winter months, but cattle depredation remained a year-round problem. We used kill-site locations and spatial layers in a GIS framework to estimate resource selection functions (RSF) and maps of these RSFs highlighted areas of highest relative risk of wolf depredation. These "hotspot" maps represent an important management tool in narrowing the areas of focus for wolf-livestock mitigation efforts, especially in the grazing areas of the public forest reserve.

P2.51 Morena Mills*; Vanessa Adams; Stacy Jupiter; Bob Pressey; Natalie Ban; Preetika Singh ; ARC Centre of Excellence for Coral Reef Studies, Fiji Wildlife Conservation Society, University of South Pacific; *morena.mills@jcu.edu.au*

Planning for action: Tackling the mismatch of scales between regional planning and local implementation in Fiji

The mismatch of scale between regional conservation planning and local-scale implementation can prevent the translation of conservation plans into conservation actions. While systematic conservation plans might provide theoretically optimal solutions for meeting national goals, community-based approaches can be more effective at a local scale. This study aims to understand the relative roles and potentials for systematic conservation planning and community-based actions to achieve an effective and functional network of no-take areas (NTAs) in Fiji. We address three questions: (1) How well are current national conservation goals in Fiji being achieved through community-based conservation actions? (2) What is the potential for community-based conservation action to achieve national scale goals in the future? (3) Is there a role for regional-scale systematic conservation planning to complement local conservation action in achieving national goals in Fiji? We use time-series and geographic mapping of established NTAs and expert interviews to inform a model of the expansion of community-based NTAs. Our model allows us to examine the potential for community-based NTAs to meet national goals and to be scaled up with systematic conservation planning to form functional networks. Our study shows that conservation planning and local-scale community-based action can be complementary.

P2.88 Morris, D.W.; DUPUCH, A.; Ale, S.B.; Moore, D.E.; Department of Biology, Lakehead University, Thunder Bay (ON), P7B 5E1, Canada, Department of Fisheries, Wildlife and Conservation Biology, University of Minnesota, Hodson Hall, 1980 Folwell Avenue, St. Paul (MN), 55108, USA, Lake Superior College, 2101 Trinity Road, Duluth (MN), 55108, USA; *adupuch@lakeheadu.ca*

Can density-dependent habitat selection predict evolutionary adjustments to habitat change?

The long-term success of conservation planning depends on its success at anticipating ecological and evolutionary adjustments to habitat change. Both types of adjustments emerge from underlying theories of density-dependent habitat selection. The densities of individuals living in alternative habitats represent current strategies of habitat selection. The existing strategies can be converted into the underlying adaptive landscape of habitat selection under different scenarios of habitat change. We tested these ideas on three species of small mammals living on a small Arctic island undergoing rapid climate-induced habitat change. The adaptive landscapes yield unique insights into each species' habitat selection and predict evolutionary trajectories under habitat change. It is thus possible to use rather simple assessments of population density to model habitat selection and to inform the long-term success of conservation programs.

P1.194 Morris, J; Semmens, BX; Akins, L; Green, SJ; Cote, IM*; NOAA, Reef Environmental Education Foundation, Simon Fraser University; *imcote@sfu.ca*

The Lionfish Tissue Repository: unique record of an on-going marine invasion

The invasion of the northwest Atlantic by Indo-Pacific lionfish (Pterois spp.) began in the mid-1980s off the coast of Florida, USA. By 2000, individuals had been sighted as far as North Carolina and Bermuda. Since then, the range of the invader has steadily increased southward, now encompassing much of the Caribbean. This invasion by a predatory fish that is largely immune to predation is generating grave concerns about its impacts on native reef fish population and fisheries in the region. Key questions regarding lionfish dispersal and plausible control strategies remain unanswered. It is to address these questions that the Lionfish Tissue Repository (LTR) project has recently been launched. The LTR is a large, multi-national collaborative program intended to maintain tissue samples for research into the ecological and evolutionary processes driving the ongoing invasion of lionfish in the Caribbean and western Atlantic. The repository is jointly managed by NOAA (Beaufort Lab) and the Reef Environmental Education Foundation (REEF). There are currently more than 2,000 tissue samples from lionfish throughout the Caribbean and representing a decade-long series from the eastern coast of the US. As samples continue to accumulate, we expect that this tissue repository will yield a unique, detailed genetic history of a major invasion. Our intent is to carry out collaborative research that will help understand the invasion, identify mechanisms for mitigating its impacts, and prevent future marine invasions. The aim of this poster is to raise awareness of the existence of the LTR and to encourage scientists working in the Caribbean region to contribute to this important effort.

P2.36 Morrison, LW*; Peitz, DG; Missouri State University, National Park Service; *LloydMorrison@MissouriState.edu*

Monitoring Black-Tailed Prairie Dog Population Dynamics at Scotts Bluff National Monument, Nebraska: A 28-Year Record

Black-tailed prairie dogs, Cynomys ludovicianus, are keystone grassland species, although they have been excluded from all but a small fraction of their native range in the Great Plains. We monitored a population of black-tailed prairie dogs at Scotts Bluff National Monument, Nebraska, for 28 years, from colonization in 1981 through 2009. Visual counts and mark-recapture techniques were employed to estimate population densities. Colony boundaries were mapped with a GPS by delineating clip lines and active burrows. Estimates of total population size of the main colony revealed four distinct periods of changing dynamics: (1) a linear increase, (2) a decline and prolonged depression, (3) an exponential increase, and (4) a period of high variability. Area occupied revealed similar, although less-defined trends, whereas densities fluctuated greatly (8 - 80 individuals/ha). Two new colonies were founded, although one disappeared, apparently due to illegal poisoning. Decreases in the main colony were correlated with predation by badgers, although sylvatic plague cannot be ruled out. Even after almost 30 years, this population remains relatively small. Attempts are underway to reintroduce prairie dogs to areas of their native range, and introductions or natural dispersal events have the potential to result in large, established colonies; incipient colonies, however, are susceptible to predators, disease, and illegal shooting/poisoning, and should be closely monitored.

7.5 Morrison, Scott A.*; Sillett, T. Scott; Boyce, Walter M. ; The Nature Conservancy, Smithsonian Migratory Bird Center, Wildlife Health Center, UC Davis; *smorrison@tnc.org*
Multiple co-benefits of proactive management of North America's lone insular bird species
North America has over 50,000 islands and nearly 1000 bird species but only one insular bird species-the island scrub-jay (Aphelocoma insularis). Its global range is the smallest of any North American bird:

16.4 Muhly, TB*; Alexander, M; Boyce, MS; Creasey, R; Paton, D; Pitt, J; Musiani, M; University of Calgary, Government of Alberta, University of Alberta, TerrainFX, University of Alberta; *tmuhly@ucalgary.ca*
Cascading effects of humans, through wolves, on a terrestrial ecosystem
Predators play integral roles in shaping ecosystems through cascading effects to prey and vegetation. Such effects can occur when prey species alter their behaviour to avoid predators, a phenomenon called the risk effects of predators. Risk effects of predators such as wolves have been documented for wild prey, but not for free ranging domestic animals such as cattle. We compared risk effects of satellite-collared wolves (n=16) on habitat selection by global-positioning-system-collared elk (n=10) and cattle (n=31). We calculated Resource Selection Functions (RSFs) in periods before, during and after wolf visits in elk home ranges or cattle pastures to test for changes in prey habitat selection. When wolves were present, elk stayed closer to forest cover and selected less for high-quality-food habitat. Cattle responded to wolf presence by avoiding high-quality-food habitat and selecting areas closer to roads and trails, but these effects manifested only after wolves had left. Artificial selection in cattle may have attenuated natural anti-predator behaviours. The effects of predators on ecosystems are likely different when mediated through risk effects on domestic compared to wild animals. Furthermore, predator control in response to livestock predation may produce broad ecosystem effects triggered by decrease of an important predator species. Conservation planners should consider these effects where domestic herbivores are dominant species in the ecosystem.

P1.25 Muir, Matthew J*; Schwartz, Mark W; Foundations of Success, U California, Davis; *matt@fosonline.org*
Academic Training for a Nonacademic Workplace: a case study and recommendations for graduate education in conservation
Graduate education in conservation biology has been criticized as ineffective and inadequate to train the professionals needed to solve conservation problems. To identify how graduate education might better fit the needs of the conservation workplace, we surveyed practitioners and academics about the importance of particular skills on the job and the perceived importance of teaching those same skills in graduate school. All survey participants (n=189) were alumni from the University of California Davis Graduate Group in Ecology and received thesis-based degrees. Academic and practitioner respondents clearly differed in workplace skills, although there was considerably more agreement on what should be taught. Skill sets particularly at risk of under-emphasis in graduate programs are decision making and policy implementation, whereas research skills may be overemphasized. Because practitioners vary widely in types of jobs and necessary skill sets, we suggest that ever-increasing calls to broaden training to fit this range of careers will lead to a trade-off in the teaching of other important skills. We recommend a community approach to improving graduate education in conservation, including roles for conservation employers, academic programs, and students; and present initial findings from a May 2010 meeting that will bring these three groups together.

17.8 Mukesh; Sudhanshu Mishra*; Sathyakumar, S. ; Wildlife Institute of India, Dehradun, India; *mishra.sudhanshu30@gmail.com*
Emerging trends of biotechnology and their application in wildlife conservation
Biotechnology has become the most fascinating field for wildlife conservation. Recently, there has been a complete shift in the study of traditional wildlife biology. Molecular methods have been applied in various fields of wildlife biology including Medical and Veterinary Science. This paper reviews the importance and putative function of molecular markers for wildlife conservation. Wildlife diversity including flora and fauna is shrinking rapidly because of poaching, habitat degradation and majorly by human encroachment. There is an urgent need to define strategies to prioritize the species conservation. A large number of genetic markers that show different Mendelian pattern of inheritances (maternal, paternal, bi-parental) are now available for most of the wild species. Today, number of wild species is under endangered category or on the edge of extinction while there is no concrete data for their origin and distribution. Along with ecology, there is a strong need to study the species genetically. Today, various molecular tools are being used for species identification, molecular taxonomy, phylogeny, sex determination, assigning & estimating population, admixture analysis, inbreeding depression, gene flow, distribution and also molecular tracking of the wild animals. Such information can guide the choice of species and geographic areas for conservation actions.

P1.193 Mukherjee, N; Feagin, RA; Shanker, K; Baird, AH; Cinner, J; Kerr, AM; Koedam, N; Sridhar, A; Vrije Universiteit Brussel-VUB, Texas A&M University, Dakshin Foundation, James Cook University, University of Guam, Dakshin Foundation; *nibedita.41282@gmail.com*

SHELTER FROM THE STORM? USE AND MISUSE OF COASTAL VEGETATION BIOSHIELDS FOR MANAGING NATURAL DISASTERS

Vegetated coastal ecosystems are known to provide myriad ecosystem services to billions of people globally. However, in the aftermath of a series of recent natural disasters, including the Indian Ocean Tsunami, Hurricane Katrina and Cyclone Nargis, coastal vegetation has been singularly promoted as a protection measure against large storm surges and tsunami. In this paper, we review the use of coastal vegetation as a "bioshield" against these extreme events. Our objective is to investigate the long-term consequences of rapid plantation of bioshields on local biodiversity and human capital. We begin with an overview of the scientific literature, in particular focusing on studies published since the Indian Ocean Tsunami in 2004 and discuss the science of wave attenuation by vegetation. We then explore case studies from the Indian subcontinent and evaluate the detrimental impacts bioshield plantations can have upon native ecosystems. We draw a clear distinction between coastal restoration and the introduction of exotic species in inappropriate locations in the name of coastal protection. We conclude by placing existing bioshield policies into a larger socio-political context and outline a new direction for coastal vegetation policy and research.

P2.118 Mullen, Maureen; Monfort, Steven*; Stolk, Ruth Anna; Renick-Mayer, Lindsay; Christen, Catherine; Smithsonian Conservation Biology Institute, Smithsonian National Zoological Park; *christenc@si.edu*

Strategic Alignments for Conservation: The Smithsonian Conservation Biology Institute (SCBI)

"Understanding and sustaining a biodiverse planet" is one of the Smithsonian's new strategic goals. So it is timely that Smithsonian leaders in January 2010 established the Smithsonian Conservation Biology Institute (SCBI), encompassing the Zoo's Conservation and Research Center (established in 1973) and its Rock Creek Park research complex, to facilitate Smithsonian's ongoing global efforts to conserve species and train future generations of conservation scientists. SCBI researchers specialize in genetics, reproductive science, ecology, and wildlife health and husbandry sciences, while education and training programs are expanding at the Front Royal and global partner sites. We aim to increase our cutting-edge conservation science programs, and expand our convening role through symposia and more collaborations with like-minded organizations. This includes developing and sharing new strategies for conservation practice as they emerge from dialogue among students, global trainees, and conservation science practitioners and partners at field locations worldwide. National Zoo/SCBI scientists have long been closely involved with SCB and we look forward to more opportunities for SCB-SCBI synergies. This poster explores the new benefits SCBI seeks to build for conservation biology.

P2.202 Murray, M*; Cembrowski, A; St. Clair, CC; Department of Biological Sciences, University of Alberta; *mhmurray@ualberta.ca*

The movement patterns, home range sizes, temporal activity patterns, and diet of urban coyotes (Canis latrans) in Edmonton, Alberta

Urban coyote populations and rates of human-coyote conflict are increasing in cities across North America. In Edmonton, Alberta coyotes were once considered rare, but city officials now receive several reports per week describing human-coyote interactions. Managers need information on urban coyote habitat use, movement, and diet to create an effective public education campaign and reduce coyote attractants. To monitor these attributes, we collared six adult coyotes in Edmonton with GPS collars set for three hour fix rates. We calculated home range sizes using the local convex hull method and modeled habitat selection with individual resource selection functions. To determine diet composition, we collected scats in urban parks and microscopically analyzed prey hairs. Coyotes mainly preyed on small rodents and consumed relatively little anthropogenic food. Individual collared coyotes appeared to have different home range sizes and habitat preferences. Four coyotes preferred natural habitat, one coyote selected for both natural and residential areas, and one coyote selected for residential and commercial areas. Interestingly, range sizes were larger for older coyotes, but did not vary with habitat type. One coyote with severe mange made the most extensive use of anthropogenic habitat. Our results suggest that older coyotes may be more habituated to humans and coyotes in poor physical condition may accept higher risks of encountering humans to exploit anthropogenic food sources.

9.9 Musiani, M*; Boitani, L; Paquet, P; University of Calgary, University of Rome; *mmusiani@ucalgary.ca*

Ecological Functions of Wolves and Wavy Interpretations for Conservation Planning

Wolves and other carnivores are species of choice for conservation planning due to their ecological importance and charisma, and are used to address broader issues of coexistence between wildlife and human interests. Due to wolf's importance for conservation planning, new syntheses are needed regularly that venture beyond describing local adaptations of wolves. In collaboration with sixteen groups of wolf researchers and managers from Europe and North America, we compiled data and literature on (a) wolf community ecology, (b) attitudes towards wolves, and (c) the incorporation of both points (a) and (b) in conservation planning. Our analysis indicates that important ecosystem effects are initiated by wolves or mediated by wolves in natural and also in human-dominated areas. Wolf's well-known ecological plasticity, which is likely correlated to genetic diversity of several interbreeding canids, has been key to recovery. Human attitudes toward wolves are improving despite depredation of livestock, which explains recovery in densely populated areas. Ironically, findings about wolves seem to be revisited in 5-year cycles. Some scientists and conservation groups claim that wolf recovery may represent a management action to lower prey densities and improve abundance and diversity of plants. However, new data demonstrate that wolves often do not control ecosystems from the top, and this will likely influence conservation planning in an opposite direction than in the recent past.

P1.189 Musilova, Z*; Kalous, L; Petrtyl, M; Chaloupkova, P; Laboratory of Fish Genetics, Institute of Animal Physiology and Genetics AV Ä R v.v.i., 277 21 LibÄ chov, Czech Republic, Department of Zoology and Fisheries, Faculty of Agrobiology, Food and Natural Resources, Czech University of Life Sciences Prague, 165 21 Praha 6 - Suchdol, Czech Republic, Institute of Tropics and Subtropics, Czech University of Life Sciences Prague, 165 21 Praha 6 - Suchdol, Czech Republic; *zuzmus@email.cz*

Angola headwaters: the white spot on the Serranochromis biogeographic map

Although the African cichlids can be considered as enormously studied group of fishes, there is no record of this group from central Angola since 1975 due to lack of any field work in the area. Up to now our project comprises first molecular study on cichlids from BiÃ© Plateau. This Angolan headwater region includes five important river basins in relatively small area and we have collected samples from three of them, i.e. Kubango (Okavango), Kwanza (Cuanza) and Kunene (Cunene). In the presented work we focused on biogeographic and phylogeographic study of serranochromine cichlids, based on four genes, three mitochondrial (16S rRNA, cytochrome b , NADH 2) and one nuclear marker (S7 intron). We included additional sequences from GeneBank, especially from specimens originated from two other river systems missing in our sampling, i. e. Congo and Zambezi. 1) We found separate lineage of upper Cuanza and upper Okavango serranochromine fishes. 2) Further we formulated hypotheses about the river history in Angola: our results show the possibility of fish colonisation from Okavango River system to the Cuanza River system. 3) Finally, we combined our data with previous analyses in haplochromine cichlids and we thus significantly enlarged sampling area of this fish group in Africa. The work was supported by Official Development Cooperation Program of The Czech Republic specifically by project "PoradenstvÃ– v oblasti chovu ryb a drÅ¯beÅ¾e, Angola" No. MZe/B/2. Further support was realized within Centre for Biodiversity LC06073 (MSMT), IRP IAPG AVOZ50450515 and IRP FAPPZ, CZU MÅ MT 6046070901.

SY67 Myers, O. E.; Western Washington University; *Gene.Myers@wwu.edu*

Psychology for conservation institutions: Synthesizing and looking forward

What are the implications of recent descriptions of human cognitive, motivation and social functioning, such as those presented by contributors to this symposium, for the design of conservation institutions and interventions? This talk will seek to synthesize trends in the field of psychology that offer promise for conservation application, as well as concrete suggestions for how they might be used. Among the themes to be discussed are: -what psychological factors composing an autonomy supportive environment in which conservation goals can be pursued without undermining by over-controlling actions; -using insights from the psychology of risk to ensure conservation is not perceived as a threat, and to help communities employ effective coping skills as an outgrowth of conservation interventions to help with problems they already face; -understanding and anticipating reliable cognitive biases in conservation choice architectures; -getting smart about emotion and motivation: using positive psychology and anticipating motivational pitfalls in conservation programming and economic tools; -activating central, peripheral and meta-level information processing routes to increas mental adaptability and resilience. The aims of this discussion will be to summarize symposium contributions, and to prompt a more articulated dialog and new research agendas between conservation biology and conservation social sciences, and particularly among psychology, political science and economics.

P1.106 Nabe-Nielsen, J*; Sibly, RM; Forchhammer, MC; Forbes, VE; NERI, Aarhus University, University of Reading, Roskilde University; *nabe@dmu.dk*

The Importance of Landscape Structure for the Long-Term Conservation of Species

The presence of corridors and the way patches are arranged in a landscape are thought to be important for the long-term conservation of many species, and may determine whether species are able to recover from large-scale disturbances. Here we used individual-based models to investigate how population recovery was affected by landscape structure for four species in an agricultural landscape: skylark (Alauda arvensis), vole (Microtus agrestis), a ground beetle (Bimbidion lampros) and a linyphiid spider (Erigone atra). We characterized population persistence based on equilibrium population sizes (K) and the time it took populations to recover from perturbations. We separated the effects of corridors and patch arrangement by comparing results from a real landscape with results from two virtual landscapes: One where linear corridors were removed by homogenizing patch shapes, while leaving the spatial arrangement of the patches unaltered, and one where patches were shuffled around, while still leaving the landscape composition unaltered. Patch arrangement and the presence of corridors had a large effect on population dynamics for species whose local success depended on the identity of the neighbouring patches. The short-dispersing beetle and vole recovered slowly from perturbations in landscapes where they had low K. Our study demonstrates that it is necessary to consider the dynamics of populations in a spatially explicit context when designing landscapes for conservation of species.

SY31 Nagy, JA*; Larter, NC; Johnson, DH; Campbell, M; Derocher, AE; University of Alberta, Government of Northwest Territories, University of Sasakatchewan, Government of Nunavut; *jnagy@ualberta.ca*

Subpopulation structure of caribou in Arctic and sub-Arctic Canada

Issues related to conservation, management, biodiversity, and gene flow within species, subspecies, or ecotypes can only be addressed effectively if we understand how populations are structured and how they use space. Using hierarchical and fuzzy clustering we verified 6 migratory (Cape Bathurst, Bluenose-West, Bluenose-East, Bathurst, Beverly, and Quamanirjuaq) and 3 sedentary (Baker Lake, Wager Bay, and Lorillard) subpopulations of barren-ground caribou Rangifer tarandus groenlandicus in the Northwest Territories (NT) and Nunavut (NU). These are different from the Dolphin & Union island caribou R.t. groenlandicus X pearyi subpopulation that occupies Victoria Island and coastal mainland winter ranges in the NT and NU. We also identified two subpopulations of boreal caribou R.t. caribou, in the NT and northern Alberta that are structured by habitat discontinuity. We used a statistical approach to determine seasonal activity periods based on movement rates of satellite-collared caribou and used these to map range wide patterns of space use. Understanding population structure, seasonal movements, and patterns of range use is key to the effective management of populations and the impacts of natural and anthropogenic disturbances on their habitats.

SY19 Naidoo, R*; Stuart-Hill, G; Weaver, LC; Tagg, J; Davis, A; Davidson, A; WWF-US, WWF in Namibia, Ministry of Environment and Tourism, Namibia, Namibia Association of CBNRM Support Organisations ; *robin.naidoo@wwfus.org*

Effect of structure and composition of wildlife on conservancy financial benefits in northwest Namibia

There exist few quantitative assessments of the relationship between biodiversity and human welfare at scales that are relevant for conservation. Similarly, the merits of Community-Based Natural Resource Management (CBNRM) programs for both wildlife and people are contested. Here, we harness two databases, on wildlife surveys and financial benefits (mostly from nature-based tourism and trophy hunting), to address these issues for communal conservancies in northwest Namibia. We use ordination methods to characterize wildlife composition on conservancies, and demonstrate that after controlling for confounding factors, the structure of wildlife assemblages is an important predictor of conservancy financial benefits. Our results indicate that for this area of Namibia, biodiversity, as represented by diverse wildlife assemblages, has an important, positive effect on the tangible financial benefits that people derive from conservation programs.

SP10.2 Napolitano, C*; Bennett, M; Sanderson, J; Johnson, W; Ritland, K; Poulin, E; Laboratorio de Ecologia Molecular, Instituto de Ecologia y Biodiversidad, Facultad de Ciencias, Universidad de Chile, Santiago, Chile & Laboratory of Population Genetics and Genomics, Department of Forest Sciences, Faculty of Forestry, University of Brit, Departamento de Ecologia, Facultad de Ciencias Biologicas, Pontificia Universidad Catolica de Chile, Santiago, Chile, Small Cat Conservation Alliance, Laboratory of Genomic Diversity, National Cancer Institute, Frederick, Maryland, USA, Laboratory of Population Genetics and Genomics, Department of Forest Sciences, Faculty of Forestry, University of British Columbia, Vancouver, Canada , Laboratorio de Ecologia Molecular, Instituto de Ecologia y Biodiversidad, Facultad de Ciencias, Universidad de Chile, Santiago, Chile; *gato.andino@gmail.com*

PHYLOGEOGRAPHY AND CONSERVATION GENETICS OF THE SMALLEST FELID IN THE AMERICAN CONTINENT, THE GUIGNA (Leopardus guigna, Mammalia, Felidae)

The guigna (L. guigna) is the smallest felid in the American continent, and also one of the smallest in the world. It also has the most restricted geographic range of all the New World cat species, inhabiting only around 160,000 km2. It is currently threatened by habitat loss, fragmentation and human persecution. In order to devise adequate conservation and management strategies for this endangered species, we characterized for the first time the distribution of its genetic diversity, investigated its population structure and the existence of demographic partitions across its geographical range by analysing â 2,000 base pairs of the mitochondrial DNA (mtDNA) (ND5, 16S, HVS-I, ATP8 and Cyt-b genes) and 20 microsatellite loci in 80 individuals sampled from 32Â°S to 47Â°S in Chile and Argentina. Guignas display moderate to high levels of mtDNA diversity and moderate to low levels of microsatellite size variation. Both mtDNA and microsatellite variation show evidence of geographical structure within populations in Chile, while the lack of genetic structure between chilean and argentinean guigna populations suggests that the Andes mountain range is not a complete barrier for effective guigna migration. Our results have implications for the conservation of guignas, contributing to come closer to defining, for the first time, the situation of guigna populations over their restricted distribution range, facilitating future research and conservation efforts on this largely unknown small cat.

9.1 Naidu, A*; Smythe, L; Thompson, R; Culver, M; University of Arizona, U.S. Fish and Wildlife Service, Arizona Game and Fish Department, University of Arizona, U.S. Geological Survey; *ashwin@email.arizona.edu*

Genetic analysis of feces reveals minimum number, sex, and diet of mountain lions on Kofa National Wildlife Refuge, Arizona

Recent records of mountain lions (Puma concolor) and concurrent declines in desert bighorn sheep (Ovis canadensis mexicana) numbers on Kofa National Wildlife Refuge have prompted investigation into estimating the number of mountain lions and their diet on the refuge. We used genetic techniques and identified 53 mountain lion fecal samples from a total of 105 fecal samples collected from the Kofa and Castle Dome mountains in the refuge from 2007 through 2009. We genotyped the mountain lion samples and identified 11 individual mountain lions. These individuals consisted of six males, two females, and three of unknown sex. Three of the 11 mountain lion individuals were identified multiple times over the study period. We also identified species of prey from bone and connective tissue remains inside the feces. A majority of mountain lion diet (62 %) was composed of desert mule deer (Odocoileus hemionus crooki). These estimates supplement previously recorded information on mountain lions in area where mountain lions were historically considered transient. We demonstrate the efficacy of non-invasive genetic techniques and their potential use by wildlife managers to obtain reliable information on elusive species.

4.5 Naujokaitis-Lewis, Ilona*; Fortin, Marie-Josee; University of Toronto; *ilona.naujo.lewis@gmail.com*

Potential impact of climate change on seasonal ranges of migratory birds

Despite evidence that climate change is leading to shifts in species distributions, few studies evaluate its potential effects on the full complement of ranges required by migratory birds. Because it is likely that climate change differentially influences breeding and wintering ranges, to ensure robust conservation decisions it is important to evaluate its potential impact across all ranges used within an annual cycle. Using niche ensemble forecasting we evaluate the potential influence of climate change on both breeding and wintering ranges of long-distance Nearctic-Neotropical migratory birds and compare results with resident and short-distance species. Our method explicitly quantifies multiple sources of uncertainty in projections by considering three climate change models and three gas emission scenarios projected to year 2050. Variability among projections was statistically partitioned and we present a novel map based approach to assess variability. Responses to climate change varied depending on migratory pattern. Patterns of species turnover were spatially structured with increased variability at range limits. The largest projected shifts occurred within breeding ranges, and long-distance species are likely to experience higher rates of species turnover. Our results highlight the complexity of responses migratory birds are likely to show to climate change and underscore the need to include all seasonal ranges to ensure the design of effective conservation strategies.

P1.185 Ndimukaga M.; Association pour la Conservation de la Nature au Rwanda; *lavamar50@yahoo.fr*

Non timber wetland products and their sustainable use: case of Rugezi wetland, Rwanda

Rugezi wetland plays an important role in different ways by acting as water catchments. It is also a refuge of endemic species i.e. the endangered Grauer's swamp Warbler Bradypterus graueri. The unsustainable utilization of Rugezi resources has affected the existence and health of the wetland and caused locals suffering, but also has affected the ecosystem as a whole and has contributed to national and even regional environmental problems. The study conducted in this swamp has showed that the unsustainable use of non timber wetland products has led to the extirpation of some species i.e. Sitatunga, papyrus Gonolek and papyrus Canary. Large areas of the swamp have been altered to other forms of land use namely settlement and agriculture. Alternative sustainable development options have been studied to be of significant help in improving the livelihood of adjacent communities. Some of which include improved agriculture and animal husbandry, small scale industries (improved oven), eco-tourism, etc. The swamp can be utilized sustainably by adding value of non timber wetland based products i.e. mats and baskets. This report shows the way wetlands can get conserved while providing goods and services to adjacent communities in particular, to the whole nation or region and even globally.

SP5.5 Nelson, C.R.*; Halpern, C.B.; University of Montana, University of Washington; *cara.nelson@cfc.umt.edu*

Do Forest Fragments Retained During Timber Harvest Provide Refugia for Late-Seral Herbs and Bryophytes?

Aggregated retention of overstory trees is now a standard method of regeneration harvest in the Pacific Northwest. Patches of retained forest are thought to enhance structural and biological diversity in managed forests, but the extent to which they maintain components of the original understory or promote recovery in adjacent harvest areas remains unknown. We examined responses of understory plants to disturbance and creation of edges in structural retention harvest units in western Washington. Abundance of vascular plants and bryophytes was measured along transects from the centers of 1-ha patches of intact forest into surrounding logged areas; data were collected before, and one, two, and six years after treatment. In year 2, compositional change was correlated with proximity to forest edge, and 28% of common herbs and 13% of common bryophytes showed edge-related declines. In year 6, edge-related declines were not apparent. However, all species had greater (as much as 90%) declines throughout the patch in year 6 than in year 2, suggesting incursion of edge effects into centers of aggregates. Findings indicate that the small (â ¤ 1 ha) forest remnants that are typically left during retention harvest may not provide suitable habitat for plants that require interior forest conditions.

SY15 Nelson, F; Maliasili Initiatives ; *fnelson@habari.co.tz*

Markets and Politics: Confronting Conservation Paradoxes in Africa

During the past several decades, biodiversity conservation efforts in sub-Saharan Africa have increasingly focused on developing strategies that integrates conservation into economic development efforts. In seeking to make â conservation pay its way', practitioners have developed paradigms that include â integrated conservation and development projects', â community-based conservation', and now â payments for ecosystem services'. Even as conservation efforts have widely promoted the twin planks of market-based benefits and localized rights to use and manage resources such as forests and wildlife, natural resource governance arrangements in African countries have become increasingly contested and subject to conflict. As the economic value of natural resources has risen, it has encouraged greater investments in conservation- such as in the case of wildlife-based land uses in East Africa- but also more intense struggles amongst different groups and individuals over resource rights and control. This paper will examine these political struggles over resource rights and tenure in east and southern Africa, drawing on recent case studies, and discussing the underlying institutional challenges facing efforts to promote market-based conservation strategies across the region.

P2.160 Nelson, K; The Natuer Conservancy; *kara_nelson@tnc.org*

Integrating Climate Change into Conservation Plans: A Case Study from Moses Coulee, WA

Climate change creates unique challenges for the practice of conservation and designing effective climate-adapted strategies is critical for long-term biodiversity protection. We outline an approach to climate integration in conservation planning by highlighting a case study in shrub-steppe habitats. First, we used climate models to understand climate impacts to the major habitat types. We explored how projected increases in temperature and decreases in summer precipitation would alter ecosystem dynamics and found that more wildfires create openings for the expansion of the invasive species, cheatgrass. In addition, the human response to climate change is leading to wind energy development in the region. Both of these outcomes are anticipated to cause a reduction in shrub-steppe habitat area and decreased connectivity between remaining core habitat. We evaluated strategies focused on individual species conservation and determined that when population viability was poor, conserving habitat and ecological processes would be more successful for overall biodiversity persistence. We updated the conservation strategies, emphasizing shrub-steppe habitat resiliency and connectivity, with strategies focused on limiting cheatgrass expansion and favorable alternative energy siting. Considering climate impacts at multiple stages in project design leads to a more comprehensive understanding of the system and is critical for developing effective adaptation strategies.

SY26 Nelson, N*; Miller, K; Miller, H; Keall, S; Moore, J; Victoria University of Wellington, Monash University, University of Alaska Southeast; *nicola.nelson@vuw.ac.nz*
Can we effectively conserve the tuatara in the face of climate change?
Climate change poses a particular threat to species with disjunct distributions and little or no capacity to migrate. Increasing the range of species distributions through management actions may help in establishing populations where they are expected to survive as temperatures increase. We present the potential for assisted colonization to counter effects of climate change in tuatara (Sphenodon), a taxon that was once widely distributed, but where anthropogenic habitat change and the introduction of predators caused the extinction of many populations. Assisted colonization per se is not controversial in this example, because the proposed introductions are to areas where the same or very closely related species occurred in the recent past. However, remnant populations of tuatara cover only a small portion of their pre-human latitudinal range, presenting issues related to local adaptation to ecological conditions. We include the following considerations in our experimental design aimed at securing the demographic and genetic potential of tuatara: potential source populations (acknowledging molecular diversity); affiliation of sources with local Maori communities; and the potential region for convergence of northern and southern sourced tuatara.

9.7 Nemeth, Lynne; Prescott College; *lynnenemeth@npgcable.com*
Measuring Success: A Comparative Study of Wolf Reintroductions in the US
Wolf reintroduction programs in the US have been called both successful and unsuccessful. One population has been delisted amidst great controversy. What constitutes success with regard to endangered species reintroductions? Are there proven management protocols that can be applied to all such programs? This presentation compares three wolf reintroductions--the species recovery plans, current scientific findings, and management protocols, examining the disconnect among the three. I conclude that appropriate management protocols do exist, but that determination of "success" has been arbitrary.

13.5 Neumann, W*; Ericsson, G; Dettki, H; Swedish University of Agricultural Sciences; *Wiebke.Neumann@vfm.slu.se*
Behavioural side effects of human harvest in ungulates?
Understanding the indirect predator effects on wildlife behaviour becomes increasingly important when human harvest dominates mortality in the absence of natural top-predators as in many ungulate systems. Modification in prey anti-predator behaviour towards human predation may result in predator facilitation when natural top predators re-colonize, and thus are particularly of interest for wildlife management and conservation. In a controlled field experiment in Northern Sweden devoid of wolves, we exposed GPS-marked adult female moose to hunting activity using a moose baying dog. Scandinavian moose are excellent to study individual decision-making under hunting impact, because of their experience of long-term predominance in human predation, heavy hunting pressure and expansive absence of natural predators. Moose response was distinct, but short-lived. Instead of fronting, which is the natural defense behavior for adult moose charged by wolves, moose most commonly fled when confronted with the hunting dog. Distance at the initial encounter, dog tracking time and reproductive status influenced moose escape pattern. We suggest the observed moose response to reflect an alteration of moose anti-predator behavior produced by human hunting using moose baying dogs as moose were more prone to escape when confronted. This may explain the high predation success of wolves on Scandinavian moose where human and wolf predation co-exists, and needs to be considered in future management.

SY15 Neves, Katja; Concordia University; *katja.neves_graca@me.com*
A Whale of a Dilemma: Analyzing the Contemporary Intersection of Capitalism and Nature Conservation
This presentation provides an overview of Marx's notion of â metabolic rift' and its relevance forÂ the analysis of core elements in the historical relation between capital and nature, and their role in the emergence of our current global environmental predicament. It examines the recent greening of capitalism and the concomitant emergence of a "conservationist mode of capitalist production" (Katz 1998). It shows moreover, that as capitalism and nature conservation become increasingly intertwined, purported â causes' and â solutions' to our environmental crises are at times difficult to discern. These issues are illustrated via consideration of data from two empirical studies (organic agricultural production in Quebec - Canada, and whale watching in the Azores - Portugal). Together they reveal the extent to which â nature conservation' tends to be co-opted by capitalist interests, as well as the production of a new - post-industrial - type of \'metabolic rift\' in nature conservation. Alas alternatives do exist at the margins, and these will also be considered in this presentation. This will entail revising Marx's notion of â metabolic rift' through the lenses of contemporary ecological sciences which bring forth a qualitative understanding of the role of connection and communication in ecosystems, rather than emphasizing nutrient and material exchanges.

14.5 Nevin, OT; University of Cumbria; *owen.nevin@cumbria.ac.uk*
Importing carnivore encounters: conservation and ecotourism in a new carbon economy
For several decades eco-tourism has been presented as a viable income source to local communities when considering the protection of species and ecosystems and in the declaration of national parks and protected areas. Whether in East Africa, India, even North America it is carnivores which are the key species in many of these systems. Large numbers of well educated, relatively high income with an interest in wildlife and the environment have been travelling to remote regions around the world assigning real economic value to the sites and species they travel to encounter. In many regions this income stream has assured local and regional support for protection and in some cases funded protection and restoration efforts; however, with increasing awareness of the climate impacts of long-haul travel will this continue in the new carbon economy? The typical carnivore ecotourist fits a similar demographic profile to those most likely to monitor and reduce their personal "carbon footprint" and while nature tourism has been is the fastest growing sector in the $3 trillion global annual tourism market this is unlikely to continue. What impacts will this have on the conservation of these areas and the species which are found there?

SY71 Nevin, OT*; Gilbert, BK; University of Cumbria, Utah State University; *owen.nevin@cumbria.ac.uk*
Habitat security and diets for recovery of Alberta grizzlies: lessons from coastal BC, Alaska and Yellowstone
Brown bears (Ursus arctos) in North America vary widely in their densities from a maximum of 550 bears /1000 km2 in coastal Alaska to less than 5 bears /1000 km2 for mountain bears in the north; this variation has been attributed to differences in food base. The impacts of security and perceived risk on the exploitation of energy rich environments also have significant impacts on demographic rates within populations. Increasing the energy density of habitat has been identified as an important step in the restoration and maintenance of small brown bear populations in Europe and this is equally applicable to bear populations at risk in North America. Where bears persist at high densities they are in productive ecosystems, where protection has been of low productivity land populations which survive are marginal. Drawing on examples from Yellowstone, coastal British Columbia and Alaska we will present the case for using areas of enhanced habit security and energy density as source populations within a source-sink model of conservation of a species at the edge of its current range to halt the retreat of bears in Alberta.

P1.171 Newell, FL*; Rodewald, AD; Ohio State University; *felicity.newell@gmail.com*
Shelterwood harvests provide suitable habitat for canopy-nesting songbirds
Forest management efforts such as shelterwood harvesting aim to replicate historical disturbance regimes and promote oak regeneration. We evaluated the short-term response of canopy songbirds to opening of the forest canopy through removal of fifty percent of the overstory trees. From 2007-2009 we studied settlement, abundance, and reproductive success for a guild of five sensitive canopy songbirds in shelterwood stands 1-4 years post-harvesting and mature second-growth forest in Ohio, USA. Although densities of canopy songbirds were slightly higher in shelterwood stands, similar patterns in settlement suggested that there were no strong preferences for stand type. Daily nest survival rates (>700 nests) varied among species but did not differ between harvested and unharvested stands. Our data suggest that shelterwood harvests containing abundant overstory trees can provide suitable nesting habitat for canopy songbirds. We caution that the long-term responses of birds to partial harvesting may differ from those documented here while management for oak regeneration will typically remove all overstory trees later in the cutting cycle.

20.8 NEWMARK, WILLIAM*; Rickart, Eric; Utah Museum of Natural History; *bnewmark@umnh.utah.edu*
High-Use Movement Pathways and Habitat Selection by Ungulates
The cumulative movements of large mammals are expressed in many areas as semi-permanent wildlife trails. The mapping of semi-permanent trail networks offers a direct approach to assess habitat selection of high-use movement routes at relatively fine spatial scales across a landscape. Here we examine an ungulate trail network in north-central Utah created and maintained by the repeated movements of mule deer (Odocoileus hemionus) and elk (Cervus elaphus). In a resource selection analysis using multivariable spatial regression analysis, we show that at a spatial scale of 70 m open and low cover and distance to water are important predictors of movement pathway density. We also demonstrate at a scale of 10 m that elk and deer movement pathways are less steep than adjacent terrain. The mapping of trail networks should be a particularly useful technique for examining functional connectivity among resource patches across a landscape and identifying important high-use movement routes.

SY14 Nichols, JD; USGS; *jnichols@usgs.gov*

Matching Monitoring to Program Needs: The Key to Successful Monitoring

Biodiversity monitoring is most useful when viewed as a component of a larger program of either science or management. In both cases, the design, conduct and analysis of the monitoring are inherited from the objectives of the larger program. Structured decision making (SDM) provides a logical framework for addressing problems in biodiversity conservation. The basic components of SDM are: (1) objectives, (2) set of available actions, (3) models predicting system response to management actions, (4) monitoring program, and (5) an approach (e.g., optimization algorithm) for deciding on the appropriate action. Dynamics and responses of natural systems are typically characterized by substantial uncertainty. Adaptive resource management (ARM) is a SDM process developed for use with recurrent decision problems characterized by uncertainty, and is thus a natural choice for use in biodiversity conservation. In ARM programs directed at biodiversity conservation, monitoring programs provide estimates of state variables and vital rates that are used for: (1) making state-dependent decisions, (2) assessing the degree to which conservation objectives are being met, (3) discriminating among different hypotheses about system response to management actions, and (4) populating new models of system dynamics and response to management. An example illustrates the importance of tailoring monitoring to these specific uses within a conservation program.

SY71 Nielsen, SE*; Stenhouse, GB; University of Alberta, Foothills Research Institute; *scottn@ualberta.ca*

Conservation Planning for Recovery of Grizzly Bears in Alberta

High rates of human-caused mortality threaten the long-term persistence of grizzly bears in Alberta. One management action that has proved successful for recovery of grizzly bears elsewhere is to limit motorized access. When enforced, such actions reduce the frequency of encounter between humans and bears and thus vulnerability towards poaching. Since the eastern limit of grizzly bears in Alberta occurs within a multi-use landscape dominated by forestry and energy extractions, a major challenge to implementing access restrictions is the delineation (prioritization) of areas where this would most benefit bears. We used a simulated annealing optimization method for identifying conservation areas where motorized access should be limited for six of seven population units in Alberta. Road density was used to define a cost or penalty for selection of conservation sites, while habitat selection models for 81 radiocollared grizzly bears were used to define grizzly bear habitat. We illustrate patterns in conservation areas for the six population units and evaluate the effectiveness of these sites as source-like habitats for grizzlies using DNA hair-snag detections. Finally, we discuss the need for further conservation strategies, including clear targets for and monitoring of population recovery and the need for implementing a long-term habitat banking strategy where conservation offsets are used to decommission roads within core habitats in a planned and coordinated manner.

P2.25 Nimirskaya, SA; Murzakhanov, EB*; ecological centre Strizh; *strizh@mail.tsu.ru*

Conservation of white-headed duck in Barabinskay lowland

2006-2007: the number and distribution of WHD in Western Siberia were estimated, the reduction of WHD number in Siberia up to 10 times was shown. 2007-2009: the data on success of the species reproduction in Western Siberia was obtained, the educational campaign among local population (more than 10.000 people) was conducted, the recognizability of WHD among hunters increased from 3 to 13%. The partner relations were established practically with all stakeholders of conservation WHD in Russia. Became the initiators for establishment of the National working group of conservation of WHD in Russia. The results were shown at 3 international conferences and 3 articles

8.3 Nirlungayuk, G*; Dean, B; Lee, D.S.; Nunavut Tunngavik Inc.; *gnirlungayuk@tunngavik.com*

Inuit participation in wildlife management in Nunavut

Inuit participation in wildlife management has been identified by the Government of Canada as critical to any conservation efforts in Nunavut. One major objective of Article 5 of the Nunavut Land Claims Agreement is the creation of a system of wildlife management that respects and secures Inuit harvesting rights and involvement. While Inuit participation in wildlife management has progressed, there are still areas that require significant improvement. One area that requires attention is the inclusion of Inuit Qaujimajatuqangit (IQ) and traditional ecological knowledge into the decision making process. Nunavut Tunngavik Inc. is working to elucidate a process that effects the inclusion of IQ into wildlife management decision policy. Three specific case studies will be used to highlight current challenges and potential solutions to advance Inuit and IQ involvement. These include the establishment and participation of Inuit with the Nunavut Wildlife Management Board, consultation and accomodation by agencies with affected parties, and the development and support of community based management programs in Nunavut.

11.5 Nobert, BR*; Merrill, EH; Pybus, M; Coltman, D; University of Alberta, University of Alberta & Alberta Sustainable Resource Development; *brnobert@ualberta.ca*

Modeling Deer Movement: Implications for Chronic Wasting Disease Spread In East Central Alberta

Chronic wasting disease (CWD) was first detected in free-ranging deer in Alberta in 2005 and is continuing to spread despite management efforts to contain the disease. To help direct surveillance and management in Alberta, we developed an individually based movement model based on a correlated random walk of deer to identify movement corridors that can potentially facilitate disease spread. Movement data, including step lengths and turning angles, were collected from 58 GPS-collared mule deer (Odocoileus hemionus) and white-tailed deer (Odocoileus virginianus) relocated every 2 hours from 2006 to 2008 in a CWD-infected area near Chauvin, AB. We used a step selection function (SSF) approach to describe the selection bias of deer dispersing across a heterogeneous landscape. The best SSF among a set of a priori competing SSFs was chosen for both mule and white-tailed deer as a final movement model based on Akaike's information criterion and parsimony. Our results indicated during movement deer responded to vegetation cover type, topography, hydrology, roads and human dwelling density. To evaluate disease spread, we simulated deer movement from known clusters of CWD to determine movement corridors and connectivity among deer populations.

P2.32 Nomoto, K*; Koizumi, I ; Fukaya, K; Edo, K; Akiba, K; Omiya, H; Higashi, S; Hokkaido University, Agency for Cultural Affairs, HuchoWorks, JHERCN; *nomoto@ees.hokudai.ac.jp*

Negative impacts of land use changes on endangered salmonid, Sakhalin taimen abundance in eastern Hokkaido, Japan; Management implications for conservation

Sakhalin taimen, (Parahucho perryi), is one of the biggest salmonid species in the world. They have been rapidly diminished in the last few decades, and listed under "Critically Endangered species" in the IUCN red list. Our field surveys revealed that as many as >75% of local populations have become extinct in the past five decades in eastern Hokkaido, Japan. We investigated the factors of the local extinction in the same region, by correlating number of redds and environmental variables in 32 tributaries (subbasins) of two neighboring river basins. An information theoretic model suggested that the percentage of the subbasin grazed, suitable spawning area, and the interaction of the two were important for Sakhalin taimen's persistence. This model also suggested that the cumulative level of livestock grazing in the past five decades has resulted in as many as 52.8% reduction of Sakhalin taimen redds. To develop management strategies that minimize cumulative negative effects of live stock grazing on the endangered population, we forecasted the number of Sakhalin taimen's redds in response to simulated changes of percent grazing land based on the same model. The important point was the effects of habitat changes (both in positive and negative) were remarkably different depending on the individual basin. Response to habitat change was more dramatic in the basins less grazed. This suggests that conservation efforts should be directed toward less impacted basins.

SY63 Noon, BR; Colorado State University; *brnoon@cnr.colostate.edu*

Clarifying the critical habitat concept: insight from conservation planning for Spotted Owls

Critical habitat can generally be defined as the set of locations on the landscape needed for a listed species to reach an appropriate population size and geographic distribution so that its risk of extinction meets some predetermined recovery criterion (e.g., a 5% chance of extinction over the next 50 years). Implicit in this definition is a set of scale-dependent biological criteria that must be addressed in critical habitat designations: 1) habitat provides the resources and physical conditions necessary for individual organisms to survive and reproduce (individual organism scale); 2) habitat is sufficiently extensive and connected so that it has a high probability of supporting local populations of sufficient size to be resilient to natural and human disturbance events and not experience local extinction (local population scale); and 3) habitat is sufficiently extensive at the scale of the target geographic distribution that it is highly unlikely that all local populations will simultaneously experience catastrophic events (geographic range scale). I will discuss how these spatial scales of critical habitat were addressed in the Northwest Forest Plan for the Northern spotted owl (Strix occidentalis caurina). In addition, I will discuss how these insights can used to improve the recovery planning process for threatened and endangered species.

SP3.3 Norden, Wendy*; McNaught, Doug; Athearn, Kevin; Larkin, Sherry; Teisl, Mario; University of Maine at Machias, University of Florida, University of Maine; *wnorden@maine.edu*

Assessing the impact of Marine Stewardship Certification to improve the Environmental Management of Marine Fisheries

Review of literature and theoretical analyses suggest that market-based incentives for sustainability, such as the Marine Stewardship Council (MSC) certification of marine fisheries, may have significant potential to change fishing behavior and improve ecological outcomes. Hoki (Macruronus novaezealandiae), one of New Zealand's most valuable fisheries, has been certified by the MSC since 2001, with re-certification granted in 2006. Using a suite of variables (biological, economic and personal interview data) we conducted both qualitative and quantitative analysis of the impact MSC certification had on environmental decision making and conservation outcomes for the New Zealand Hoki fishery. In addition, we examined if the certification of hoki had any spillover effects on the management of other deepwater New Zealand fisheries that may seek environmental certification in the future. We conclude that (1) the MSC process increased stakeholder engagement on environmental issues among government, NGO's, research and industry; (2) MSC has the ability to highlight areas that need environmental improvement and (3) de-coupling the impact of MSC versus governmental regulations remains difficult, but the MSC process can create situations where industry may be more susceptible to new government initiated environmental regulations.

SY9 Norton, RK; University of Michigan; *rknorton@umich.edu*
A Meta-framework for Integrating Land Use and Conservation Planning at the Urban-Rural Fringe
Land use change poses serious threats to biodiversity, especially at and beyond the urban-rural fringe on privately owned lands, where natural and rural landscape values still predominate and the impacts from ongoing exurban development are greatest. The generation of scientific knowledge on ecosystems and nature-human dynamics is necessary to effectively address biodiversity decline in these settings, but it is not by itself sufficient. It is also necessary to understand and engage in the generation of practical knowledge. From a research perspective, it is especially important to understand the ways in which scientific knowledge is perceived, interpreted, and transformed into practical knowledge, and then how it is actually used within decision-making processes. Failing to account for these distinctions and relationships between scientific knowledge and practical knowledge, and attempting to use scientific knowledge as practical knowledge without critical reflection or engagement with decision-makers, can yield incomplete scholarship on nature-human dynamics in research, as well as a range of perverse policy outcomes in practice. This paper builds upon contemporary efforts to integrate natural and social science scholarship, offers a meta-framework for reconceptualizing such integration, and concludes by discussing several overarching issues and challenges.

SY9 Noss, Reed F; University of Central Florida; *rnoss@mail.ucf.edu*
Habitat quantity, quality, and spatial configuration as central criteria in urban and regional planning
Land-use planning usually is poorly linked to conservation planning. Biodiversity is seldom a consideration in land-use planning; regulations requiring conservation actions are uncommon; and planners seldom make use of scientific methods, information, or modern conservation planning tools. The link between conservation science and land-use planning must be strengthened in order to maintain and restore biodiversity and ecological processes in landscapes inhabited by humans. Conservation biologists interested in land-use planning commonly assume that high-density (clustered) development with reserved open space is preferable to low-density (dispersed) development with large lot sizes. This assumption is not necessarily valid. Conservation outcomes depend on habitat content and habitat context for particular species and on the influence of landscape pattern on ecological processes - and vice versa. The few studies that compared clustered development and dispersed development found little or no difference in biodiversity outcomes. These results are not surprising, given what is known about the importance of habitat quantity (e.g., patch size and total available habitat in the landscape), habitat quality in patches and matrix for species of interest, and the spatial configuration of the landscape. Although comparisons to date might suggest that each planning exercise is idiosyncratic and case-specific, some empirical generalizations have emerged, which can guide land-use planning toward better ecological outcomes. I offer suggestions for making land-use planning more ecologically and biologically responsible, which mainly derive from well-established principles of conservation planning.

SY72 Noss, Reed F; University of Central Florida; *rnoss@mail.ucf.edu*
Coming of age for continental conservation: cores, connectivity, and the matrix
Conservation in North America began with utilitarian watershed and forest protection, on the one hand, and protection of special places for scenic and recreational purposes on the other. This dual emphasis resulted in large, multiple-use landscapes and large scenic parks. By the mid 20th century reserves were established to protect biological features; these reserves were usually small and poorly buffered from surrounding land uses. The idea of buffering reserves emerged in the early 20th century but has been poorly implemented, even within Biosphere Reserves. The idea of maintaining connectivity among reserves, for example via habitat corridors, also has a long history, but usually has been implemented on fine scales and for single species. The concept of core reserves surrounded by multiple-use zones and connected via broad habitat corridors on regional scales emerged as a primary model of conservation planning in the late 20th century. This model has been challenged by studies demonstrating the value of the landscape matrix for its inherent biodiversity and as movement habitat. Some studies questioned the value of reserves. Others questioned the "binary" model of protected and useful vs. unprotected and useless, which led to a more integrated model where the areas of highest value are protected as core reserves, but are surrounded by managed lands that provide suitable habitat for many species. Corridors remain a key component of this new model, but are often envisioned as permeable landscape units rather than distinct linear swaths. Nevertheless, especially in regions where the landscape matrix has been heavily altered, clearly defined and strictly protected cores and corridors remain essential elements of conservation planning.

P2.181 NOWICKI, PIOTR*; Woyciechowski, Michal; Institute of Environmental Sciences, Jagiellonian University, Gronostajowa 7, 30-387 KrakÃ³w, Poland; *piotr.nowicki@uj.edu.pl*
Natura 2000 helps to preserve endangered grassland butterflies
The effectiveness of the pan-European system of protected areas Natura 2000 is strongly debated. We report a promising case of eight Natura 2000 sites devoted to endangered wet meadow butterflies, established in the KrakÃ³w region, southern Poland, in late 2009. The best known of the sites, monitored since 2003, contains the largest metapopulations of Maculinea teleius (ca. 55,000 adults), M. nausithous (30,000), Lycaena helle, and L. dispar (each 4000), so far described in Europe. Butterfly numbers at four other sites are comparable, while the three remaining sites include smaller, but still viable metapopulations. All eight sites comprise a network with the inter-site distances of 1-17 km; the resulting exchange of individuals estimated at tens (in Lycaena) to hundreds (in Maculinea) per generation should allow maintaining high genetic variability. The metapopulations are relatively stable, and their main threats, i.e. habitat destruction due to urban development and its deterioration through natural succession on abandoned meadows, should be easy to eliminate under new management plans. It appears that Natura 2000 may be a highly successful tool in insect conservation, which stems from the following reasons: (i) its focus on less charismatic species and semi-natural habitats, (ii) spatial scale more appropriate for small animals, and (iii) enhancing the survival of species living in dynamic metapopulations through networking of protected areas.

SY51 NUNEZ, TRISTAN*; Lawler, Josh; University of Washington; *tristan.nunez@gmail.com*

Identifying and Evaluating High-integrity Conservation Linkages for Climate Change in the Western U.S.

In the past, as climates changed, many species moved great distances to track suitable climates. However, today's fragmented landscapes will make it far more difficult for species to track projected climate changes for the coming centuries. We propose and demonstrate a coarse-filter approach to prioritizing areas for climate-change connectivity based on ecological integrity and simple rules of thumb for promoting species' range shifts. We begin by indentifying areas of high ecological integrity (low human impacts) that provide connectivity between larger relatively intact areas. We then highlight the subset of linkages that tend to cross climatic, elevational, ecological or latitudinal gradients. To evaluate the potential utility of these linkages, we examine the overlap between prioritized linkages and areas of high projected change in vertebrate species composition derived from bioclimatic envelope models. We provide results from analyses conducted at two scales, that of the Pacific Northwest and across the Western U.S.

P1.140 Nuno, A.*; Bunnefeld, N.; Milner-Gulland, E.J.; Imperial College of London, UK; *ana.nuno08@imperial.ac.uk*

Measuring illegal bushmeat hunting in the Serengeti: application of novel approaches

The unsustainable use of wildlife resources poses a threat to biodiversity and to the livelihoods of those who depend upon it. To devise effective strategies for sustainable use, information is required on activities which are often illegal. Bushmeat has been identified as an important ecosystem service in Tanzania but, due to its mainly illegal nature in this area, information may lack accuracy. Previous studies have estimated the prevalence of illegal bushmeat hunters within the Serengeti ecosystem but conventional survey techniques intended to provide data on non-compliance may be inappropriate. Attempts to estimate its rate through direct survey techniques are expected to generate misleading and evasive responses. Using rule breaking among Serengeti households as a case study, this study aims to test a range of novel approaches to better understand illegal behaviour. The application of these indirect questioning techniques allows inferences to be drawn concerning the prevalence of hunting in communities surrounding a protected area. It also enables us to analyse the probability of hunting in different social groups and areas, and hence to target conservation interventions more effectively.

18.3 Nyssa, Z; University of Chicago; *znyssa@uchicago.edu*

Global Science and Global Policy: A Survey of Collaborative Networks in Conservation Biology

Conservation biology is unusual in that it has explicitly ethical objectives: global biodiversity is considered to be a good in its own right and the scientific study, and protection, of biodiversity itself a moral imperative (Soule 1985). Daly (1999) infamously dubbed this uneasy relation between scientific and ethical purposes conservation biology's "lurking inconsistency:" biologists teach blind natural selection to students on Mondays while nonetheless pleading with legislators to save particular species on Tuesdays. When asked, many scientists convey a necessary the role for values in science, but recent surveys document conservation biologists' uneasiness with policy advocacy (Takacs 1996, Steel 2004, Scott 2007). However, a detailed picture of the actual activities and affiliations of professional conservation biologists is still missing. As a step to bridging this gap, this talk reports on interviews and a survey conducted July-November 2008 with members of the Society for Conservation Biology as well as an online census of conservation projects. Our results provide a more nuanced picture of the work of conservation biologists, who simultaneously occupy a range of roles (median = 10.08), particularly in non-government organizations with explicitly advocacy-oriented missions. Through their professional activities, conservation researchers articulate a range of standpoints toward the "lurking inconsistency" that complicate neat pure-applied and science-policy divides.

SA2 O'Farrill, G*; Gonzalez, A; CalmÃ©, S; McGill University, Universite de Sherbrooke; *georgina.ofarrill@mail.mcgill.ca*

Connectivity of a scattered resource in a continuous seasonal tropical forest

The maintenance of landscape connectivity is important for species and ecosystems especially given the current rates of land use transformation and climate change. Little attention has been given to the connectivity of critical resources, such as water, within threatened habitats. Our study area, the Greater Calakmul Region of the Yucatan Peninsula is undergoing climate change. From 1950 to 2009 the mean decrease in precipitation was approximately 16%; this decrease in precipitation influences water availability in the area, as water is only present in seasonal waterholes. We performed a graph analysis of the connectivity of the waterhole network for 4 endangered species: Baird's tapir (Tapirus bairdii), spider monkey (Ateles geoffroyi), jaguar (Panthera onca) and white-lipped peccary (Tayassu pecari). We treated waterholes as nodes and linked those pairs that fell within the range of each species maximum known dispersal distance. We deleted waterholes from the network based on their size to mimic the natural drying-up process. We found that the waterhole network is very sensitive to the loss of waterholes; the landscape fragments easily when small waterholes disappear. Our scenario analysis revealed that our study species experience fragmentation of the network at different rates and scales. The results indicate that resource connectivity analyses are necessary to improve our understanding of reserve functioning and functional habitat connectivity in seasonal landscapes.

SY52 O'Leary, John A.*; Buckley, Jack; Galbraith, Hector; Massachusetts Division of Fisheries and Wildlife, Manomet Center for Conservation Sciences; *john.oleary@state.ma.us*

Massachusetts Division of Fisheries and Wildlife Adaptation Planning Using an Expert Panel Based Habitat Vulnerability Assessment

We are using the results from a recently completed Habitat Vulnerability Assessment (HVA) for adaptation planning within the Massachusetts Division of Fisheries and Wildlife. Results of the expert panel based HVA include a relative ranking of vulnerability to climate change for twenty key habitat types, a confidence score for each habitat evaluated and an identification of the various factors which influence the confidence of our vulnerability ranking. These results will inform "climate smart" adaptation strategies for agency management, acquisition, and research and monitoring programs that build on and do not replace existing implementation strategies. An additional result of the HVA process we engaged in has been the creation of a grassroots organization called the Massachusetts Wildlife and Climate Change Alliance. This partnership of conservation organizations and state and federal agencies addresses an important need by building local support for on-the-ground climate change projects. We believe that the adaptation planning process that we outline in this presentation could serve as a model for resource agencies and others who are in the process of developing their response to anticipated impacts from climate change conditions.

P1.197 O'Hara, E.; University of Missouri; *elizabeth.ohara@mail.mizzou.edu*

A Tale of Two Horses: Examining the Ecological Exchangeability of Island Feral Horse Populations

Domestic horses (Equus caballus) have been living feral on islands along the eastern seaboard for generations; their presence on Assateague Island, a 37-mile barrier island off the coast of Virginia and Maryland, has been documented since the 1600's (Zimmerman et al., 2006). Other populations are found on Shackleford Banks off the coast of North Carolina. All three of these populations are managed by the National Park Service and are considered "desirable exotics" (US Dept of Interior, 2008). Managers must have plans to maintain the integrity of the herds, both socially and genetically, while also maintaining the integrity of their habitat. Should genetic diversity become compromised, current management plans assume total exchangeability between these island horse populations. Genetic divergence, as well as differences in habitat and potential local adaptations, may affect the ease of exchangeability between these populations. As the world's climate changes, the issue of exchange and/or relocation will become more and more relevant in conservation biology. I am performing a comparative study of the three populations to assess their genetic and ecological exchangeability. Genetic characterizations, diet composition analysis and differences in parasite communities are presented as a measure of ecological exchangeability.

P1.116 Ocana, M.*; Heppell, S.S.; Department of Fisheries & Wildlife, Oregon State University, Corvallis, OR 97331; *melis.ocana@gmail.com*

Conservation of Olive Ridley Sea Turtle Mass-nesting (Arribada) Populations: Considering Nest Density at La Escobilla, Mexico

This project informs conservation efforts for the Olive ridley sea turtle (Lepidochelys olivacea) by exploring mass-nesting (arribada) dynamics. During arribadas, tens of thousands of turtles come ashore to lay eggs over a few days. As home to one of the largest arribada populations, La Escobilla is a critical location for research exploring currently underspecified but essential indicators of population health, such as nest density. Nest destruction is the most obvious potential impact of high density nesting, as later turtles often dig up previous nests. Our objective was to investigate nest densities and how they relate to nest destruction. In a series of study plots, we monitored nesting behavior, sand temperature, and excavated nests post-incubation. No hatchlings emerged from the arribadas studied, likely due to unfavorable climatic conditions and widespread beetle predation. Nest density exhibited a quadratic relationship during an arribada and considerable nest destruction was observed. Eggs are historically a community resource at many beaches, giving rise to the popular compensatory argument that eggs otherwise destroyed can serve as an economic resource. This project was undertaken with community members and regional scientists to contribute to future discussion of how to best manage dynamic nesting populations.

P2.24 Ojo,S.O; Dr.; *so.ojo@mail.ui.edu.ng*

Aquatic Tourism Promotion As An Arsenal In Conservation Of Nigerian Protected Areas: A Case Study Of Old Oyo National Park

The study aimed at determining composition, abundance and distribution of some aquatic resources for sustainable ecotourism development and management. The study was based on typical wet and dry seasons and river stratification. Fish sampling of Ogun River in the park done with monofilament gillnets of 38mm to 127mm and graded hooks. Physico-chemical properties of the river also determined. 12 fish families and 30 species were identified, 5 families classified as fishes of ecotourism importance. Optimal fish catches achieved with mesh sizes 51mm and 76mm. Highest species diversity found in upstream and decreased downward with Sex ratio 6.48 female: 3.52male. Effect of seasons and mesh sizes were significant for total catches, however significant difference observed in number and weight of fishes among mesh sizes (P

P1.184 OJOYI M.,*; MWACHALA G.,; UCAKUWUN E.,; NATIONAL MUSEUMS OF KENYA, MOI UNIVERSITY, KENYA; *mercyojoyi@yahoo.com*

Applications of spatial tools in conservation of fragile ecosystems; a case study of Dakatcha and Marafa forests in Malindi District, Kenya

A combination of human induced and natural changes have led to drastic reduction in biodiversity of major ecosystems including forests. A study to investigate land cover changes and its impacts on forest biodiversity as well as the status of Warburgia stuhlmannii was carried out in two forests in Marafa and Dakatcha forests in Coast province in 2007. LANDSAT satellite imageries were processed using (IDRISI, GEOVIS and Arc View 3.3). Relationships between socio-economic processes and environmental factors influencing the conservation of forest biodiversity were obtained by use of questionnaires. The status and recent developments in forest cover were also examined. Results from analysis of satellite imageries indicate reduction in land cover. There was evidence that different forms of human pressures exerted varying degrees of impacts. Warburgia stuhlmannii was found to be vulnerable to extinction based on the 2007 IUCN summary criteria. The study recommends the need to alter land use practices to address losses in forest ecosystem biodiversity. The findings are expected to be useful to forest managers and policy makers in the conservation of forest resources. Key words: Spatial tools forest biodiversity, degradation, land cover, conservation

2.1 Olalla-TÃ¡rraga, MA*; McInnes, L; Bini, LM; Diniz-Filho, JAF; Hawkins, BA; Hortal, J; RodrÃ–guez, MA; Purvis, A; Div. Biology, Imperial College London, Silwood Park Campus (UK), Dep. Biologia Geral,Universidade Federal de GoiÃ¡s (Brazil), Dep. Biologia Geral,Universidade Federal de GoiÃ¡s (Brazil), Dep. Ecology & Evolutionary Biology, University of California, Irvine (USA), CPB, Imperial College London, Silwood Park Campus (UK), Dep. Ecology, University of AlcalÃ¡ (SPAIN), Div. Biology, Imperial College London, Silwood Park Campus; *m.olalla@imperial.ac.uk*

Macroevolutionary dynamics of species' climatic tolerances: strong patterns of niche conservatism across mammals and amphibians globally

Species' geographic distributions reflect both environmental tolerances and geographical opportunities, now and in the past. Phylogenetic niche conservatism in climatic tolerances, defined as the tendency of species to maintain their ancestral climatic niches, is expected to depend on both taxonomic and spatial scales of analysis, but no phylogenetically-inclusive global study has examined this to date. We use complete global distributional databases to estimate and map the phylogenetic signal of climatic tolerances in extant continental mammals and amphibians. We decompose the multidimensional climatic niche into a set of axes and investigate the phylogenetic pattern in each. While amphibians displayed higher levels of phylogenetic conservatism than mammals explaining on average 10% more variation, both taxa showed a strong pattern of conservatism in temperature seasonality and temperature in the coldest quarter. In the face of global warming, given the observed phylogenetic conservatism in climatic tolerances, species must respond by moving polewards and upwards along latitudinal and elevational gradients, respectively, to be able to track their current preferred climatic regimes as already confirmed by recent empirical studies. Niche conservatism and rapid climate change provide the necessary ingredients for major biotic turnover in the coming century.

SY45 Olden, JD; University of Washington; *olden@uw.edu*

Latent extinction risk of freshwater fishes: A traits-based approach to inform conservation ranking schemes

Conservation biogeography has predominantly been studied from a taxonomic perspective, but over the past two decades ecologists have increasingly found that species traits, rather than species identity, may be a more powerful currency of investigation. For freshwater fishes, efforts have focused on endogenous (life-history, dispersal, tolerance) traits that are repeatedly associated with high likelihood of extinction, with the goal of safeguarding the most vulnerable species. Although previous studies have shed considerable insight into the trait correlates of fish extinction risk, recent years have witnessed little progress in both advancing the basic science and the conservation relevance of this work. Here, I highlight a number of important knowledge gaps regarding the specific pathways that traits may operate individually or interactively to predispose fish species to the stages of extinctions in response to different threats. In addition, I project geographic patterns of latent extinction risk across North America. Given the laborious process by which the extinction-risk of species are assessed by jurisdictional agencies and international conservation groups (i.e., precluding the assessment of many species, e.g., 11.3% of global fishes have been evaluated by the IUCN), I illustrate how a traits-based methodology can be used to provide immediate protection (or prioritize future assessments) in the absence of time, resources and detailed information for data-poor species.

11.3 Olival, KJ; Bogich, TB*; Daszak, P; Wildlife Trust; *olival@wildlifetrust.org*

The importance of phylogeny in wildlife-pathogen associations and human emerging infectious disease events

Emerging Infectious Diseases (EIDs) pose a significant burden on human health and global economies. Nearly 75% of EIDs originate in wildlife. However, no comparative study has been conducted to determine the relationship of wildlife host-pathogen associations to zoonotic events in humans. We analysed a databases of EID events in humans from 1940 to present and the reported wildlife hosts associated with these events to demonstrate non-random patterns in the phylogenetic relatedness of wildlife host species to humans and the number of human EID event causing pathogens carried by wildlife host species. Phylogenetic distance between hosts was quantified using a measure of branch length from the mammal super tree (Bininda-Emonds et al. 2007). Further we analysed a database of all discovered pathogens and their associated wildlife hosts to demonstrate non-random patterns in phylogenetic distance between different wildlife species and the number of shared pathogens. Understanding which wildlife hosts are more likely to cause an EID event based on their relatedness to humans and other wildlife species will then allow us to predict the consequences of anthropogenic activities such as logging, building roads, or hunting that will increase interaction between humans and wildlife.

P2.129 Opyene, V; Uganda Wildlife Authority; *opyenevicent@yahoo.com*

Application of DNA Bushmeat Barcoding in Prosecution of Wildlife Crimes in East Africa

APPLICATION OF DNA BUSHMEAT BARCODING IN PROSECUTION OF WILDLIFE CRIMES IN EAST AFRICA OPYENE V 1. Uganda Wildlife Authority, Kampala , Uganda 2. Bushmeat Free Eastern Africa Network, Kampala, Uganda Uganda, Kenya and Tanzania apply common wealth legal system. The three countries have the same legal system with the legal precedents (judgments) pronounced in one state binding on others. This paper assessed the application of DNA barcoding of bushmeat in prosecution of wildlife crimes in Kenya ,Uganda and Tanzania. The study shows that in courts in the study areas, application of scientific technology or opinion to prove cases are inadequate.The study also examine the laws in the three countries to ascertain the legal readiness to embrace bushmeat barcoding as a scientific tool in the prosecution of wildlife crimes in the region. The study shows that in Uganda and Kenya the Evidence Act has placed the burden of proof in criminal cases , wildlife crimes inclusive on the state/ prosecution to prove that the species poached is wildlife under section 104 of the Uganda Evidence Act The burden of proving any fact necessary to be proved in order to enable any person to give evidence of any other fact is on the person who wishes to give that evidence. and the required standard of proof is proof beyond reasonable doubt. Under section 105(b) of the Uganda Evidence Act the person accused shall be entitled to be acquitted of the offence with which he or she is charged if the court is satisfied that the evidence given by either the prosecution or the defense creates a reasonable doubt as to the guilt of the accused person in respect of that offence this provided for this was further illustrated in the case of Uganda Vs Dick Ojok [1992-93] HCB 54 Where court held that in all criminal cases the duty of proving the guilt of the accused always lies on the prosecution and that duty does not shift to the accused person and the standarad by which the prosecution must prove the guilt of the accused is proof beyond reasonable doubt except in a few statutory cases. Any legally acceptable doubt raised in court is always resolved to the benefit of the accused. This impacts on the prosecution of wildlife crime because in the absence of visible morphological features like trophies, hair , hooves , smoked or sundried ,bushmeat from antelopes are impossible to differentiate from goats meat , buffaloes from beef , warthogs and wild pigs from pork. In the absence of scientific proof courts in east Africa have always ruled that prosecution did not prove their case beyond reasonable doubt and the suspects are acquitted. The absence of Bushmeat DNA barcoding in prosecution has motivated the habitual wildlife criminals, commercial wildlife poachers in east Africa to poach while knowing that in the absence of visible morphological features the prosecution will miserably fail to prove their case beyond reasonale doubt.the provision of the law has frustrted the efforts of the wildlife crime law enforcement rangers who usally take their time going through a costly investigation processes. whereas in Tanzania in an attempt to improve on the prosecution of wildlife crime, the state have shifted the legal burden of proof on the accused to prove that the species found in his or her possession is not wildlife or that it was acquired legally .The study also examined the professional capacity of magistrates, prosecutors and law enforcement rangers in the use of DNA bushmeat barcoding in wildlife crime prosecution.The study finally recommended training of magistrates,prosecutors and police on use of DNA bushmeat barcoding in wildlife law enforcement,and development of wildlife crime prosecutors manual.

P2.85 Oriel, Elizabeth*; Frohoff, Toni; Bradshaw, G. A. ; Kaplin, Beth; Antioch University New England, Keene, New Hampshire, 03431, USA, Trans-species Institute of Learning and TerraMar Research, Santa Barbara, CA. 93101, USA, The Kerulos Center, Jacksonville, Oregon 97530, USA, Antioch University New England, Keene, New Hampshire 03431, USA; *lizzieoriel@earthlink.net*

Integrating the concept of well-being into harbor seal (Phoca vitulina) conservation and captive care

Historically, conservation focuses on the scale of populations and species. However, there has been a growing awareness of the social and ecological key roles that individuals play. Further, concerns for animal welfare bring ethical attention. It is therefore no longer ethically nor practically cogent to ignore factors such as individual well-being in conservation design and monitoring. Drawing from a literature review and interviews with seal researchers, rehabilitation care-givers, and a veterinarian, we introduce and discuss well-being as a core concept for the conservation of harbor seals. We use a working definition of well-being as "integrity of form, function, the ability to strive and utilize one's abilities" as a backdrop to this synthesis of the natural behavioral repertoire and characteristics of harbor seals. This definition can aid in decisions that concern coastal and oceanic environmental policy, laws that govern how humans treat marine mammals in captivity, rehabilitation, and in the wild, and in any actions that impact harbor seal individuals and colonies.

SP8.6 Ormsby, AA; Eckerd College; *ormsbyaa@eckerd.edu*
Sacred Forests of India: Ecological and Cultural Conservation
India contains thousands of community-protected forests, called sacred groves. Sacred forests or groves are sites that have cultural or spiritual significance to the people who live around them. These areas may also be key reservoirs of biodiversity. The sacred groves of India are shrinking or disappearing due to cultural change and pressure to use natural resources. Sacred forests often have associated taboos on the use of specific plants and hunting of animals within the area. These traditions can serve a conservation role. The size of groves varies greatly from very small plots (less than one hectare) to larger tracts of land. These fragments may represent the sole remaining forests in certain regions. Ethnographic research focused on the sacred groves of the Meghalaya region in northeastern India and the Western Ghats region of southern India, both biodiversity hotspots. Interviews were conducted with community residents to assess the status of groves and strength of cultural traditions in continued protection of the groves. Changing religious traditions and high demands for resource use have resulted in the reduction or loss of many groves, yet culturally protected sacred sites can still play a role as key biodiversity conservation areas if community conservation traditions are supported.

SY15 Osano, PM*; Said, MY; McGill University, International Livestock Research Institute (ILRI); *mcosano@yahoo.com*
Payments for Ecosystem Services (PES) and the Implication for Poverty Reduction Among Pastoral Communities In East Africa
Payments for ecosystem services (PES) are designed as a tool for natural resource management and not for poverty reduction. However, given the high poverty levels in the developing world, it has been argued that PES can also contribute towards poverty reduction through the provision of cash flow, and as a means of household income diversification. Yet, little has been documented on the actual impact of PES on the poor, and empirical studies of PES targeting wildlife conservation in Africa's rangelands are few. We used an integrated qualitative and quantitative research approach to evaluate the poverty impacts of PES schemes around a wildlife protected area in Kenya whose surrounding land is inhabited by predominantly poor pastoral communities, and to develop alternative plausible future scenarios for both wildlife resources and household poverty conditions. Preliminary analysis shows that PES payments account for 7% of total household income and 26% of the total off-farm income for participating households, and is particularly critical during periods of drought when livestock losses are large.

P2.3 Osborne, Neil Ever*; Steinwald, Molly; International League of Conservation Photographers; Queen's University, School of Environmental Studies, Kingston, Ontario, Canada, International League of Conservation Photographers; Miami University, Dept of Zoology, Oxford, OH 45056; Phipps Conservatory and Botanical Garden, 1 Schenley Park, Pittsburgh, PA 15213; *neophoto@mac.com*
Combining Art with Science: Assessing the role of visual communication in environmental conservation
Photography has a long history of being used as a conservation tool, dating back to its influence in the creation of the first national park to protect wilderness areas in the United States in the 1860s. And today, when the majority of the world's citizens reside in urban environments, disconnected from nature, and technology is heavily embedded in and substantially connects many societies' ways of life, there is both great need and great opportunity for including strategic visual communications in conservation. Conservation photography, photography that empowers conservation (Ward 2008), and other artistic visual communication is becoming increasingly used in environmental science, outreach and education activities. We examine the role of conservation photography in four case studies while assessing its effectiveness as a conservation tool. Results indicate the advantageous nature of this visually communicative platform for disseminating scientific information and conservation messages. And we suggest ways in which present day conservation practitioners can employ the use of visual imagery in their own work.

P2.14 Otieno, N. E.*; Analo, C.; National Museums of Kenya, Kakamega Environmental Education Project; *neotieno@yahoo.com*
Tapping indigenous ethno-botanical knowledge to track and mitigate climate change: the case of a Kenyan tropical rainforest
Kakamega forest is Kenya's only rainforest and is distinguishably rich in biodiversity but threatened by encroachment from a fast growing human population mainly in form of agriculture. It is also one of Kenya\'s Important Bird Areas and a significant source of natural products to neighbouring communities, including medicinal plants. By using local indigenous knowledge through involvement of elders, we identified a total of 40 medicinal plant species used by local people and assessed the chronology of their decline of over the years. Of these plants, 22 (55.0%) were shrubs, 13 (32.5%) were trees, 3 (7.5%) were herbs or forbs and 2 (5.0%) climbers. Decline in many medicinal herbs were attributed to changing weather patterns. Twenty-six of the medicinal plants (70.3%) occurred inside the forest itself and 29.7% outside. One of the medicinal plants (Prunus africana) is also listed by in the IUCN Red List as Vulnerable to extinction. Thirty-eight (95%) of the plants were indigenous and two (5%) exotic. Such extensive indigenous knowledge including plant distribution trends may be used to track climate changes and inform plans for adaptation measures including reforestation

P1.74 Ouko, EM*; Davidsen, C; Department of Geography, University of Calgary; *emouko@ucalgary.ca*

A Paradigm Shift in Forest Management in Kenya: Enabling Local Communities to take their Place in a Narrow Window of Opportunity

Kenya's ever declining forest resources have been managed for about a century by the state in a top-down approach aimed specifically at excluding local communities. But a new law in the form of the Kenya Forest Act 2005 promises to completely overhaul existing stakeholder relationships. Through the mechanism of the newly introduced Community Forest Associations (CFAs), it is envisaged that forest adjacent communities will, for the first time, be engaged in legally-recognized forest management partnerships with the state. The new law is to be implemented within an implicit adaptive policy framework. Its lack of rigid implementation mechanisms means it is open to varied interpretation in a highly complex and contested environment. With reference to complex adaptive systems, an innovative analysis of CFAs using political ecology was undertaken to analyze their introduction and functioning. It was concluded that it is critical that boundaries of participation at all levels of governance are initially agreed upon by all the stakeholders given the narrow window of opportunity before conflicting beliefs become entrenched once more. Specific boundaries include questions of tenure, description of a â forest-adjacent dweller', specific-implementation periods and deadlines. Furthermore, conflict resolution mechanisms, the important role of women and literacy levels and capacity-building for negotiation were found to be vital for the success of the CFAs.

P1.139 Packard, J.M.*; Weeks, P.; Paolisso, M.; Srinivasan, M.; Texas A&M University, Houston Advanced Research Center, University of Maryland, College Park, National Oceanic and Atmospheric Administration; *j-packard@tamu.edu*

Use of Principal Components Analysis to Assess Cultural Models of Land Conservation

The goal of this mixed-mode study was a deeper understanding of the diverse ways that stakeholders use cultural knowledge to understand approaches to protect working landscapes that are a mosaic of private and public properties. We applied principal components analysis to data from a survey instrument designed to measure validity of cultural schemas associated with the construct of "land conservation." Survey questions were informed by in-depth qualitative interviews structured to identify the range of cultural beliefs and values that stakeholders express about diverse topics, such as land conservation, development, rural livelihoods, rural heritage, nature and community. We show how disparities between the two complementary analyses can help sharpen the cultural model approach, by stimulating a closer look at survey items that do not load as expected on principal components.

SY71 Paczkowski, J*; Jorgenson, JT; Hanna, DA; Percy, MP; Donelon, S; Honeyman, JH; Alberta Tourism Parks and Recreation, Parks Division, Alberta Sustainable Resource Development ; *john.paczkowski@gov.ab.ca*

Conservation of Grizzly Bears in a High Human Use Landscape

The persistence of grizzly bears in Alberta's Kananaskis Country, represents a unique and successful model for maintaining grizzly bears in an area of increasing and diverse human activity. Research has informed managers and the public about the behavioural and biological requirements of bears in the region. Despite high levels of human activities, grizzly bears continue to persist and successfully reproduce in this landscape. The current management approach in Kananaskis Country comes from an evolving relationship between biologists, managers and the public, resulting in a genuine shift in values towards a grizzly bear conservation ethic. Guided by changing values and available science, land managers endeavour to maintain effective grizzly bear movement corridors at various scales around human transportation corridors, communities and facilities. These initiatives are increasingly supported by the public despite personal impacts and increased potential for interactions with bears. In an effort to mitigate human-bear conflicts, provincial agencies employ bear conflict specialists, attractants management, aversive conditioning programs, natural vegetation management and systematic area closures, as well as, public education and involvement. Increasingly, multiple interest stakeholders are becoming involved in the implementation and facilitation of monitoring, management and education initiatives. Regionally, interagency cooperation and coordination is also improving, resulting in more consistency in grizzly bear management actions.

P2.42 Padron, MC*; Fernandez, MA; Hamilton, H; California Academy of Sciences; *mariana.padron@gmail.com*

Estimating suitable habitat for Western Atlantic seahorses using ensemble niche models

Being exploited for international trade, and occurring in some of the ocean's most threatened habitats, the life history of seahorses makes them particularly vulnerable to population decline. In order to manage a species effectively, knowledge of the target species geographical distribution and its habitat use is needed, but the survey data to describe species presence at every location in a landscape is rarely available. Therefore, ecological niche models are used to extrapolate, by relating species to environmental variables, beyond the locations where species presence is known. Here we address predictive distribution modeling for two seahorse species with largely sympatric distributions in the Caribbean: Hippocampus reidi and Hippocampus erectus. We obtained presence only data from the Ocean Biogeographic Information System and the Global Biodiversity Information Facility databases and 8 marine environmental (temperature, salinity, bathymetry, etc) layers. We then use an ensemble modeling approach to predict habitat suitability based on 4 different method/algorithms (Maxent, GARP, Aquamaps and a simple environmental envelope). The results address fundamental questions in seahorse conservation, such as, the location of suitable habitat for these Western Atlantic seahorse species, the identification of the environmental variables responsible for niche differentiation, and the extent to which existing protecting areas encompass suitable habitat for West Atlantic seahorses.

P2.162 Pagacz, S*; Witczuk, J; Griffin, SC; Mills, LS ; Museum and Institute of Zoology, Polish Academy of Sciences, Wilcza 64, 00-679 Warszawa, Poland, Wildlife Biology Program, College of Forestry and Conservation, University of Montana, Missoula, MT; *js.p@wp.pl*

Optimizing Methods for Wildlife Monitoring Programs in Logistically Challenging Mountainous Areas

We designed a large-scale, long-term monitoring program for Olympic marmot (Marmota olympus), a species of conservation concern throughout its range across a logistically challenging, mountainous park. Our multiple-stage process of survey design accounts for the difficulty imposed by funding constraints and access to remote habitats. The Olympic marmot is endemic to the Olympic Mountains, Washington State. Although nearly all of its range is enclosed within Olympic National Park, declines and local extirpations of the species have been documented. We considered several possible alternative survey approaches, and proposed a monitoring program designed to reflect extinction-recolonization dynamics using presence-absence data. The sampling design is based on annual surveys of a set of at least 25 randomly selected clusters (closely located groups of sites) which constitute 1/3 of all known locations with records of current or historical occupancy by marmots. To detect potential new colonizations, the sampling is supplemented by sampling 15 never-occupied sites in appropriate habitat. The monitoring plan will be implemented in 2010. It provides a framework that park managers can use for assessing changes over time in Olympic marmot distribution across the range of the species. Our sampling design may serve as a useful case study for establishing monitoring programs for other species with clumped distributions in logistically challenging areas.

P1.147 Pagacz, S*; Witczuk, J; Gliwicz, J; Museum and Institute of Zoology, Polish Academy of Sciences, Wilcza 64, 00-679 Warszawa, Poland; *js.p@wp.pl*

Intensive Exploitation of Amphibians by European Otter (Lutra lutra) and the Implications for Otter Conservation

Otters, top predators of freshwater ecosystems, are food limited; thus, local species conservation plans should consider local food resources. We used scat analysis to assess seasonal changes in the diet of European otters inhabiting a mountain river in the Polish Carpathians (Bieszczady National Park). Although elsewhere in their range, otters feed mainly on fish, in our study area amphibians were equally important prey. Furthermore, in winter and spring, the frequency of occurrence of amphibians in scats (86% and 93% respectively) was significantly higher than that of fish (51% and 34%). In the fall, both prey groups were equally frequent (72%). Only in the summer were fish the staple diet of otters (90%), with amphibians present in 10% of scats. Three factors could explain seasonally high consumption of amphibians: i) fish availability might be temporally limited; ii) low water temperatures might increase the energetic cost of fishing in cold seasons, causing otters to minimize time in this activity; and iii) amphibians gathered in streams to spawn and hibernate constitute a readily accessible prey. This study raises the possibility that amphibian declines could negatively affect otters in cold, mountainous regions. The phenomenon of intensive otter predation on amphibians warrants further study.

SY35 Pague, C.; Robertson, P.B.*; The Nature Conservancy-Colorado; *probertson@tnc.org*

Restoring Wild Bison to the Southern Rocky Mountains Ecoregion: Opportunities & Challenges

Restoring Wild Bison to the Southern Rocky Mountains Ecoregion:Opportunities and Challenges In combination, The Nature Conservancy's Medano-Zapata Ranch and contiguous federal lands (Great Sand Dunes National Park and Baca National Wildlife Refuge) total more than 121,000 hectares of ecologically unfragmented, historical bison habitat that also includes the majority of native species dependent upon or associated with bison. This rare assemblage of conservation compatible ownerships and ecological integrity represents one of the largest suitable landscape for bison restoration in the Southern Rockies, and one of the largest sites available in the near-term in the continental US. The optimality of the site for restoration is indicated by scoring exceptional or large contribution in 10 of the 16 scorecard categories used to characterize the quality of ecological recovery for bison herds. This high scorecard ranking has been validated on-the-ground by the viability of a herd of approximately 2000 animals on the Medano Ranch that has functioned as a nearly wild herd within an 18,000 hectare area without any form of supplementation for over a decade. Not represented in the scoring system but of critical importance is the consideration currently accorded to bison recovery by both the National Park Service and the Fish and Wildlife Service. Despite the many factors supporting restoration at this site, there are substantial challenges related to site ecology, genetics, management, economics, and the nexus of federal, state, and local laws and policies, as detailed.

13.6 Palazy, L.*; Bonenfant, C.; Courchamp, F.; Gaillard, J.M.; UniversitÃ© Claude Bernard, Lyon 1, UniversitÃ© Paris-Sud XI, Orsay; *lucille.palazy@u-psud.fr*

Are protection measures efficient for threatened species of large herbivores?

Protection measures such as IUCN or CITES statuses should prevent exploited species from extinction but their efficiency is much discussed. Some failures of the CITES system have been evidenced. In 2007, Rivalan et al. have shown that legal trade among 46 animal species increase disproportionately during the period between species proposition for uplisting to CITES appendix 1 (total ban) and protection measure application. Many large herbivore species are classified as threatened (i.e., IUCN status) and most of these species are target to trophy hunting. This commercial activity being the first income to several developing countries, the sustainability of trophy hunted species is essential from both a biological and an economical point of view. We investigated the effect of IUCN status changes on the intensity of hunting harvests (Safari Club International data bases) at the species level. We show that the trends of the exploitation according to species protection status is opposite from the expectations, with an increase of the harvest coinciding with the period of change to a higher protection status. If the unexpected reverse effect of trade regulation we evidenced is a general pattern, changes and improvement of wildlife trade system management is acutely needed for the survival of exploited species.

P2.95 Palmarola, A.*; GonzÃ¡lez-Torres, L.R.; Cruz, D.; National Botanic Garden, University of Havana; *palmarola@fbio.uh.cu*

Conservation status of the Cuban population of Magnolia virginiana

Magnolia virginiana, a North American endemism was recently discovery in Majaguillar swamp, Matanzas, Cuba. This locality constitutes the southern record for this species. In this work, we make a census of M. virginiana in Majaguillar swamp, map the population, characterize their demographic structure, and identify main threats for this species in the locality. In Majaguillar, this species grows like shrubby trees forming large clusters. The mean diameter of the clusters is 3.06 m and the maximum diameter of is 18.83 m wide. The mean high of the clusters is 2.51 m but some single trunks may reach 9 m high and 52 cm of radio. During the survey, 245 clusters of plants were censed, 84 of them contain mature plants and 68 were constituted by sprouting of old plants damaged by fires. Only 57 plants show flowers and/or fruits during the sampling. The development of forestry plantations in the locality is leading to the invasion of species that are not native of this ecosystem changing the dynamics of this community.

10.4 Parolo, G*; Abeli, T; Bonomi, C; Rossi, G; Trento Natural History Museum, Dipartimento di Ecologia del Territorio - University of Pavia, Dipartimento di Ecologia del Territorio - University of Pavia, Trento Natural History Museum; *gilberto.parolo@unipv.it*

Using population biology to develop cost-effective translocations of Leucojum aestivum (Amaryllidaceae) in the valley of the river Po (NW Italy).

Plant translocations are a vital component in conservation biology of threatened species. However, successfully reintroducing a species needs preliminary long-term studies (PVA), and the lack of time or money could be a limitation in planning such efforts. The aim of this study is to develop a cost-effective study for translocation activities, using Leucojum aestivum L. (a threatened wetland species in Europe, due to the intensification of agriculture) as a case study. Our method aimed at inferring the typical population traits for the species, analysing natural populations spatially instead of temporally. In 2007, twenty-six populations of L. aestivum were identified in northern Italy. In each population, environmental conditions, the performance of plants (size and reproduction), the population size and density were determined. Germination features were studied in the laboratory. Population biology studies showed the following structure: seedling (50%), sub-adults (35%) adults (15 %), population size (at least 1000 individuals), density (2.6 plants/sqm). From this data we inferred the mortality of each stage: ca. 87 % between seedling and flowering plant and the typical size and density of the L. aestivum populations. Using these data, we are planning a translocation activity (restocking) in farmed areas that have recently been made available to experiment plant conservation activities (Corinat project funded by Lombardy Region, Agriculture Department).

SY26 Parrini, F*; Owen-Smith, N; School of Animal, Plant and Environmental Sciences, University of teh Witwatersrand; *francesca.parrini@wits.ac.za*

Rare Antelope Decline in Kruger National Park, South Africa: the Interplay of Ecological and Managerial Causal Effects.

Sable and roan antelopes, two Hippotraginae species at the southern edge of their range in South Africa, have experience a drastic decline in their relative numbers and range shrinkage in the Kruger National Park, one of Africa's largest and most managed protected areas. We analyse the potential factors that have contributed to the threatened extinction of the roan population and the drastic decline of the sable population; and we suggest what actions might be needed to counteract the potential loss of these and other large herbivore species from the park's fauna. The proximate mechanism was enhanced predation by lions on the adults, brought about by an increase in prey base caused by expanded provision of water points. Low quality forage and poor habitat conditions following dry years may also have increased the susceptibility of the rare antelopes to predation. Some of the water points have been closed, however the two populations are not showing signs of recovery. The closure of water points alone was possibly not adequate to restore the functional heterogeneity in habitat conditions that enabled sable and roan to be thriving. The Kruger case illustrates how for managerial interventions to be effective they need to be implemented from an ecosystem prospective, with awareness of the consequences for the habitat heterogeneity necessary to maintain species diversity, while buffering against the effects of climate shifts.

SP5.6 PARRIS, KM; School of Botany, University of Melbourne, VIC 3010, Australia; *k.parris@unimelb.edu.au*

Acoustic communication in urban noise: the benefits of vocal adjustment for frogs and birds

Urban areas continue to encroach upon the habitats of non-human species around the world. While urbanisation causes obvious changes to the physical structure of habitats, it also brings a marked change to the acoustic environment. Urban noise interferes with acoustic communication in species such as frogs and birds by dramatically reducing the distance over which their calls and songs can be heard (the active space). This may disrupt communication in diverse social settings from mate attraction to territory defence and predator warning, with wide-ranging consequences for individual fitness. Some urban songbirds can adjust the pitch, amplitude (loudness) and/or timing of their songs to make them more audible in urban noise, while one species of frog is known to call at a higher pitch in traffic noise. However, the benefits of these vocal adjustments are uncertain. Using mathematical models of the active space of frog calls and bird song in urban noise, I will demonstrate that calling/singing more loudly confers a greater increase in active space than calling at a higher pitch. Given the moderate metabolic cost of singing louder in birds, this may be the more adaptive strategy in this taxon. But the high metabolic cost of calling louder in frogs could limit chorus tenure and ultimately reduce breeding success. I conclude that vocal adjustments by frogs and birds in urban noise can only compensate partially for lost communication distance, and may come at a substantial cost.

SY72 Parrish, J; Freedom to Roam; *jparrish@freedomtoroam.org*
Freedom to Roam -- Bringing New Constituencies to advance Conservation
Both science and conservation are often relegated to the margins of societal priorities and political agendas. For decades the Society for Conservation Biology has espoused the need to engage broader disciplines in conservation science, and large landscape scale conservation demands engagement of broad and diverse constituencies if core areas are to be protected and connected. The corporate sector is one such constituency that, from a biological conservation perspective, has yet to be fully engaged as an agent of positive change - in fact, most corporate social responsibility programs fail to include conservation in their sustainability conversations. How can we better inspire businesses to make biodiversity conservation part of their corporate bottom line? Two years ago, Patagonia Company, a private outdoor clothing entity, developed a new corporate conservation campaign known as Freedom to Roam to inspire far more and more diverse sectors of society - particularly influential businesses - to support wildlife conservation with their practices and resources. Freedom to Roam seeks to increase awareness and conservation of wildlife corridors and ecological connectivity conservation in response to continuing habitat fragmentation and as a climate adaptation solution. Today, the Freedom to Roam coalition includes a diverse array of partners from Walmart, and BP America to the Wildlife Conservation Society and Theodore Roosevelt Conservation Partnership. This presentation will not only convey the Freedom to Roam story to date but also describe core initiatives efforts to connect conservation science and stories with audiences of societal and political influenceâ ¦thus making conservation a topic that matters.

SY76 Parry, D.*; Hoven, B.; Frye, J.; State University of New York, The Nature Conservancy and Albany Pine Bush Preserve; *dparry@esf.edu*
Direct and Indirect Effects of Pine Barrens Restoration on Threatened Lepidoptera
Pitch pine-scrub oak barrens are a unique ecosystem embedded within deciduous forests across the Northeastern United States. Characterized by nutrient poor xeric soils, wide fluctuations in daily temperatures, and until recently, frequent low-intensity fires, they are home to a significant number of endangered and threatened invertebrates. Approximately half of the state-listed Lepidoptera in New England and New York are associated with this habitat. Rampant development, fire suppression, and the proliferation of invasive plants threaten remaining pine barrens, which comprise only a small fraction of their historic extent. In the Albany Pine Bush, a fragmented remnant of what once was an extensive inland pine barrens, intensive management efforts have focused on restoring periodic fire and removing invasive woody plants. We discuss the direct (habitat and host quality) effects of management strategies on the federally listed Karner blue butterfly (Lepidoptera: Lycaenidae) and direct and indirect (shifts in the natural enemy complex) effects of restoration on a threatened species, barrens buck moth (Lepidoptera: Saturniidae)

SY33 Parsons, KM*; Balcomb, KC; Durban, JW; Ford, JKB; NOAA Fisheries, Center for Whale Research, Alaska Fisheries Science Center, Fisheries and Oceans Canada; *Kim.Parsons@noaa.gov*
Multi-decadal Social Dynamics of Fish-eating Killer Whales
Among marine mammals, odontocete cetaceans provide some extreme examples of highly stable matrilineal social structuring. The natal philopatry of both males and females exhibited by fish-eating killer whales in the eastern North Pacific is often cited as a unique example of such sociality in mammals. These whales are characterized as comprising closed maternal lineages from which effective dispersal has never been documented. However, even such apparently stable social systems may experience changes over time in response to critical changes in their ecosystem. The so-called southern resident killer whale (SRKW) population, consisting of less than 100 whales, has become the focus of much conservation and management concern in recent years. This population, typically described as consisting of three matrilineally-based social units (pods), has been photographically censused on an annual basis for nearly three decades, providing a unique opportunity to examine temporal changes in the social dynamics of this long-lived highly social cetacean. Here we use this longitudinal dataset to assess changes in the social structure of the SRKW population at the level of both the individual and the matriline. Using both coefficients of association and novel Bayesian clustering methods, we quantify the stability of social affiliations within this killer whale population based on data from more than 1360 encounters, and 118000 high quality individual killer whale identifications. Inter-annual comparisons of social patterns from these photographic data demonstrate dramatic changes in the social affiliations of these killer whales within the last decade, coinciding with the most recent period of population decline. Moreover, pod-specific changes suggest differences in the social stability within pods. Understanding these social dynamics may provide insight into the influence of social structure on population demographics, and help identify critical changes in key anthropogenic and ecological forces driving such social changes.

P1.2 Pascual LÃ³pez-LÃ³pez; University of Valencia, Spain; *Pascual.Lopez@uv.es*
Protected Areas, NATURA 2000 And Conservation Status Of Biodiversity Hotspots For Terrestrial Vertebrates In SW Europe
The Mediterranean basin is an outstanding \'hotspot\' of biological diversity with a long history of integration between natural ecosystems and human activities. Using fine scale deductive distribution models we provide an evaluation of the conservation status of biodiversity hotspots based on species richness, vulnerability and endemism, for terrestrial vertebrates (amphibians, birds, mammals and reptiles) in the Iberian Peninsula (including Spain and Portugal), considering both existing and proposed protected areas (Natura 2000). We found no clear surrogacy among the different types of hotspots in the Iberian Peninsula. The most important hotspots (considering all criteria) are located in western and southwestern portion of the study area, in the Mediterranean biogeographic region. Existing protected areas are not specifically concentrated on areas of high species richness, and Natura 2000 network can potentially constitute an important improvement for protecting vertebrate diversity. However, further improvements are needed. We suggest taking a step forward in conservation planning in the Mediterranean basin, explicitly considering the history of the region as well as its present environmental context. This would allow moving from traditional reserve networks (conservation focus on patterns) to considerations about the processes that generated present biodiversity, and to consider the traditional practices in conservation planning.

P2.41 PATANKAR V.J.*; D'souza E.; Kumaraguru A. K. ; Nature Conservation Foundation, Centre for Marine and coastal studies, Madurai Kamaraj University ; *vardhan@ncf-india.org*

Reconstructing the Past: Coral Damage and Recovery Four Years After 2004 Tsunami in the Nicobar Group of Islands

The reefs of the Nicobar Islands in the Bay of Bengal were in the path of the tsunami of 2004. This provided a natural experiment to study damage to the reefs at varying distances from the epicentre. In 2008, we carried out a broad-scale benthic survey of coral communities by quantifying percentage cover of different benthic substrate categories and size-class structure of corals to understand (1) tsunami-related damage and subsequent reef recovery; (2) whether the damage to reefs varied between the islands; (3) response of corals to catastrophic destruction. We found that though the tsunami was most severe in the Nicobar Islands, damage to the reefs was minimal. Damage was greater in islands closer to the origin of the tsunami than those farther away. There were strong geographical trends in benthic community structures between islands that are in proximity. An overall high percentage of live coral cover and high number of smaller individuals of corals highlight the inherent resilience of coral reefs to a natural catastrophic disturbance in the region sampled. The study forms a baseline for future studies and we outline the potential of reef recovery on a longer timescale.

P2.212 Paton, D.*; Pitt, J. ; Muhly, T.; Boyce, M.; Creasey, R.; Musiani, M.; Quinn, M.; University of Calgary, University of Alberta, Shell Canada; *ptarmig@telusplanet.net*

Permeability of elk (Cervus elaphus) migration linkage zones in southwestern Alberta.

The conservation of ungulate migration routes has received increased attention throughout the world, largely because the landscapes necessary to maintain migrations are becoming increasingly fragmented. Migration is a behavioral tactic that enables ungulates to circumvent resource shortages and perhaps ease predation risk. In southwestern Alberta's Crown of the Continent ecosystem elk herds are migrating from low elevation winter ranges to high elevation summer ranges seeking nutrient rich forage necessary for survival and successful reproduction. These traditional migratory routes of elk are being impacted by ever-increasing levels of resource extraction and recreational activity. For each collared elk (n = 114), location fixes are acquired every 2 hours, 24 hours a day, typically for 2 years if the elk is not harvested by hunters or a predator. Using this wealth of data, the migration linkage zones of elk are modeled to investigate the possible effects of human disturbance to the permeability of these zones. Identification of migration linkage zones provides managers with spatial data necessary to conserve landscape connectivity by using strategies such as restricting development, controlling human activity, or in the case of major highways, to provide safe crossing areas. The impetus for modeling and delineating elk migration and linkage zones is to promote towards management of landscape connectivity.

SY65 Patricio, HC*; Demko, D; FISHBIO; *harmonypatricio@fishbio.com*

Playing with Aliens: Impacts of introduced aquatic species in the California Delta

Alien fishes, plants and other introduced aquatic organisms have substantial impacts on the native species and functioning of the California Delta system. Native fishes, such as ecologically and economically valuable pacific salmonids, have declined precipitously and many populations are protected under endangered species legislation. Effects from introduced aquatic organisms include predation, competition, habitat alteration, and interbreeding. Here we summarize the history of introduced organisms, the development of fisheries for alien species, and the comprehensive impacts of these species in California. We conducted literature and database reviews of sources reporting effects of introduced species on native fishes, along with economic analyses that compare use-values of the system for alternate purposes, including water provision and recreational fishing. We also compared the percentages of fish species captured that are introduced versus the percentages that are native, and the relative economic value of these fisheries. Habitat alteration, including water resource infrastructure, has undeniably impacted native fishes, so we compared the effects of habitat alteration on native salmonids to the effects of predation by alien species. Research in the Columbia River system has shown that nonindigenous species may have as much influence on native salmonid stocks as other major stressors, including habitat alteration, hatcheries, hydropower, and harvest. Our results support a similar conclusion for the California Delta, and elucidate the ecological and economic trade-offs occurring from attempts to manage the system for both native and alien fishes.

7.4 Patrick, D. A.*; Shirk, P.; Vonesh, J. R.; Harper, E. B.; Paul Smith's College, Virginia Commonwealth University, SUNY-ESF; *dpatrick@paulsmiths.edu*

Assessing the sustainability of harvesting endemic chameleons in the East Usambara Mountains, Tanzania.

Unsustainable harvesting for the pet trade is a principal cause of declines in reptile populations. We assessed sustainability of harvesting chameleons in the East Usambara Mountains of Tanzania. Although these species are protected under CITES Appendix II, insufficient demographic and socio-economic data are available to assess the effects of harvesting on population viabilities. Transects were established in or adjacent to forest, with the goal of spanning both ecological and socio-economic gradients including proximity to forest edge and human traffic. We observed 124 chameleons representing seven species with a clear separation of species depending on the habitat type surrounding each trail. The sex ratio of one species, Chameleo deremensis, differed greatly between juveniles and adults, with 60% of juveniles and only 9% of adults being male. Our results indicate that current harvesting levels of chameleons from the East Usambara Mountains may not be sustainable. Of particular concern were the low number of captures of Kinyongia matschei, an endemic species that has been recently identified, and the skewed sex-ratio seen in C. deremensis, a highly prized species in the international pet trade. We recommend continued monitoring of chameleons with possible revision of collection permits based on our data.

19.3 Patterson, K.W.*; Parsons, E.C.M.; George Mason University; *katherynpatterson@yahoo.com*

Conservation, captivity and whaling: a survey of Belize whale-watching tourist attitudes to cetacean conservation issues

With whale watching activities and associated expenditures increasing annually, governments in coastal countries have a vested interest in the growth and protection of cetacean populations and associated tourism. In 2007 and 2008, a survey investigating whale watchers' attitudes towards cetacean conservation issues (e.g., whaling, captivity) was administered to volunteers at Blackbird Caye, Belize (n=166). The majority considered dolphins and whales to be under protected (37.1%) or only slightly protected (45.3%) and marine mammal conservation laws and policies to be very important (83.1%). Additionally, 94.4% opposed the hunting of whales and the majority of participants were against keeping dolphins in captivity (75.4% and 66.0% respectively). Furthermore, 91.9% of participants stated that they preferred to observe dolphins in the wild rather than in captivity. Almost three-quarters (70.2%) of participants felt that it was very important that Belize maintain a strong commitment to dolphin conservation. Additionally, 69.3% would actively boycott pro-whaling countries. More specifically, 83.8% stated that they would boycott Belize if the country supported whaling, which has implications for Belize's policies at the International Whaling Commission. Basing future policies and decisions on the environmental attitudes of visitors can further secure the country's tourism potential and the viability of species populations.

SP10.10 Paul Wilson*; Laura Finnegan; Mark Ball; Laura Thompson; Micheline Manseau; Trent University, Alberta Fish and Wildlife Division, Parks Canada; *pawilson@trentu.ca*

A genetic assessment of the Designatable Unit status of Canadian boreal caribou ecotypes

Assigning conservation status to wildlife population requires a delineation of Designatable Units (DU) below the species level that meet specific criteria under Federal Species-at-Risk Acts (e.g. SARA). For Canadian caribou populations this requires an assessment of the genetic or geographic distinctiveness of subspecies, ecotypes and herds. Two ecotypes of boreal caribou (Rangifer tarandus caribou) are recognized in Ontario, Quebec and Manitoba: the migratory forest-tundra ecotype, and the forest dwelling ecotype. While the national SARA Threatened status applies to the forest type, the northern forest-tundra caribou is currently not listed under COSEWIC. However, the migratory nature of the tundra ecotype and potential sympatry or even current genetic exchange with the forest-dwelling ecotype, limits application of geographic criteria and raises the question whether these "ecotypes" are distinct and can be distinguished genetically. We have assessed the relationship between boreal caribou ecotypes using genetic markers, specifically mitochondrial DNA and microsatellite loci on over 1000 caribou to determine whether these ecotypes can be distinguished and whether they overlap geographically. These findings are highly relevant to government and industry, as one caribou ecotype is listed under the Act and the other is not, thereby influencing what mitigation will be required under SARA and associated provincial legislation.

SY61 Pellatt, MG; Parks Canada; *marlow.pellatt@pc.gc.ca*

Climate change impacts on past and future ecosystems: Using Paleoclimatology and Bioclimate Envelope Modeling to Guide Protected Area Planning and Management

Understanding how species respond to past and future environmental change and what drivers dictate the structure and function of ecosystems are crucial questions for protected area managers. Paleoecological studies can help discern between natural and anthropogenic drivers of ecosystem change, and are the only empirical information available to examine ecosystem responses to climate change at the rate and magnitude projected using general circulation models (GCMs). When coupled with bioclimate envelope modeling and GIS, a better understanding of how well species representation in a protected area can be inferred at both the individual protected area and systems level. This paper discusses research using paleoecology and bioclimatic envelope models to understand the ecology and distribution of the endangered Garry oak ecosystems of western Canada. A multi-proxy approach using paleoecology and bioclimate envelope modeling is used to assess the extent of Garry oak ecosystem change and to determine if the level of protection under future climate scenarios is sufficient for Garry oak to persist. The results of this study are being used in the evolving management plans for the Gulf Island National Park Reserve of Canada and Garry oak ecosystem management as a whole.

P1.161 Pengelly, CJ; Cartar, RV*; University of Calgary; *cartar@ucalgary.ca*

Boreal Forest Logging Affects the Bumble Bee-Flower Relationships in Adjacent Unlogged Stands

Boreal forests face mounting logging pressures, yet we know little about impacts of logging on the pollination community. This study extends research done one year before and after logging, to consider its longer-term effects. We censused bumble bee and flower communities 8-9 years after experimental logging. Harvest treatments left 0%, 10-20%, 50-75%, or 100% of the original trees after logging. Bumble bees in low retention treatments (i.e., 0% and 10-20% of trees remaining) were in an ideal free distribution (IFD) with their floral resources, which implies equal per-flower rate of visitation, regardless of local flower density. Bees in high retention areas (i.e., 50-75% trees remaining) were in an IFD when resources were quantified as flower abundance, but deviated from an IFD by "undermatching" (i.e., too few bees in the best patches, too many in the poorest ones) when resources were quantified as nectar production rate. Bees in unlogged forests adjacent to logged forest deviated from an IFD by undermatching. Unlogged forest appears to be negatively affected by the presence of logging in adjacent forests, in that numerical responses of bees to flowers are altered, with implications for bee foraging success and plant pollination service. Forest reserves should therefore incorporate buffer zones when adjacent to logged forest, to preserve the bee-influenced pollination community inter-relationships.

SP3.4 Perera, N; Linnaeus University, Sweden; *boraluwa@gmail.com*

Small scale fisheries by-catch and the marine aquarium trade: a case study of seahorses in Sri Lanka

Currently very little attention has been paid to understanding the importance of by-catch fisheries as a source of species for the marine aquarium trade. While this is a relatively minor component of the overall trade it can be locally important and may also have significant local conservation implications. In Sri Lanka, small-scale push net fishers have been a major source of live seahorses for the aquarium trade. Information on catch rates, historical trends, fisher perceptions and trade data was collected though interviews, catch inspections, and a logbook system. The number of seahorses caught fluctuated seasonally, with importance to fishers varying by location, season, and abundance and price of both seahorses and target species. Since the listing of seahorses in CITES there has been a sharp decline in the demand for wild caught seahorses among middlemen and exporters in Sri Lanka, primarily due to difficulties in obtaining export permits. However, despite the decline in demand, significant numbers continue to be caught in push nets and the lack of an economic incentive has reduced interest among fishermen in keeping them alive. In the future, increasing value of small scale fisheries by-catch through a sustainably managed trade of live seahorses may increase conservation interest among fishermen and allow better monitoring and management of seahorses in Sri Lanka.

SP4.8 Pergams, ORW*; Lawler, JJ; University of Illinois at Chicago, Field Museum , University of Washington; *pergams@uic.edu*

Climate change and human population growth are associated with rapid and global morphological change in rodents

In general, rapid morphological change in mammals has been infrequently documented. Examples that do exist are almost exclusively of rodents on islands. Such changes are usually attributed to selective release or founder events related to restricted gene flow in island settings. Here we document rapid morphological changes in rodents in 20 of 28 museum series collected on four continents, including 15 of 23 mainland sites. Approximately 17,000 measurements were taken of 1302 rodents. Trends included both increases and decreases in the 15 morphological traits measured, but slightly more trends were towards larger size. Generalized linear models indicated that changes in several of the individual morphological traits were associated with changes in human population density, current temperature gradients, and/or trends in temperature and precipitation. When we restricted these analyses to samples taken in the US (where data on human population trends were presumed to be more accurate), we found changes in two additional traits to be positively correlated with changes in human population density. Principal component analysis revealed general trends in cranial and external size, but these general trends were uncorrelated with climate or human population density. Our results indicate that over the last 100+ years, rapid morphological change in rodents has occurred quite frequently, and that these changes have taken place on the mainland as well as on islands. Our results also suggest that these changes may be driven, at least in part, by human population growth and climate change.

P1.71 PETELIN, DMITRY; HSE Department, Sakhalin Energy Investment Company Ltd.; *dp1957@yandex.ru*

Approaches To Conservation Of Biodiversity And Northern Ecosystems In Oil And Gas Projects: Lessons From Sakhalin II Project, Russia

The Sakhalin II Project (Sakhalin Island, NW Pacific) is one of the largest integrated oil & gas projects in the world. Construction occurred during 1998-2009. Activities for conserving biodiversity and Northern ecosystems within the footprint of the Project included: (1) baseline surveys (with an emphasis on biodiversity, protected areas and sensitive habitats) before construction; (2) development of EIA and mitigation measures for key biodiversity interests (including (a) re-routing of offshore and onshore pipelines to avoid impact on Western Gray Whale feeding areas and onshore colonies of protected dunlin and Kamchatka tern, and (b) postponing construction activities during the nesting period of endangered Steller's Sea-Eagle and other bird species); (3) regular monitoring of biodiversity and sensitive areas (wetlands, protected areas) during construction phase; (4) monitoring of critically endangered Sakhalin taimen; (5) implementation of Biodiversity Action Plan and Environmental Monitoring Project during operational phase; and (6) stakeholder engagement through (a) regional Biodiversity Working Group, and (b) Sakhalin Salmon Initiative for conservation of wild salmon spawning areas. These approaches allowed successful mitigation of impacts on important biodiversity interests associated with the Project.

11.6 Peters, VS; The King's University College; *vernpeters@shaw.ca*

Uncoupling of seed availability and regeneration processes in endangered limber pine populations of Alberta

Limber pine (Pinus flexilis) is endangered at the northern limits of its range, primarily due to white pine blister rust that kills both adult and juvenile trees. Recovery plans in Alberta will require rapidly identifying populations where the capacity for natural population growth exists, and mitigation measures in declining populations. We tested the effects of infection level, seed production, and pre-dispersal seed predation on regeneration density in a heavily infected and a lightly infected metapopulation of limber pine. Differences in cone predation relative to blister rust levels were minor compared to the much greater production of cones in the heavily infected metapopulation. Greater seed availability did not result in better regeneration success, as the lightly infected metapopulation had 24 times more seedlings regenerating. Our results suggest that red squirrels are more active cone predators in the northern part of the limber pine range, than reported in the central Rocky Mountain states. Preliminary findings suggest an uncoupling of seed availability and regeneration processes in northern limber pine populations. This phenomena could occur from a variety of causes including greater mortality of seedlings from blister rust, disperser limitation with the mutualistic Clark's Nutcracker, or differences in germination microsites between metapopulations.

P1.121 Peters, VS; Gelderman, M*; The King's University College; *vernpeters@shaw.ca*

Spatial and temporal dynamics of seed predation in the endangered limber pine

Red squirrels are a major cause of pre-dispersal seed loss in many species of masting conifers. Stands with varying combinations of conifers that have a 2-year (firs, spruce) versus 3-year cone maturation periods (limber pine), may produce large numbers of cones in different years (i.e. masting), and experience different amounts of cone predation by squirrels. We compared 17 populations that ranged from pure limber pine, to even mixtures of limber pine with either douglas fir, white spruce, or lodgepole pine. All non-serotinous species masted in 2007, and had low cone production in 2008 and 2009. Cone predation of limber pine averaged 80% in non-mast years, but was highly variable between populations, ranging from 0 - 100%. Preliminary analyses suggest cone predation, and squirrel midden abundance increases as tree basal area increases; however, tree species composition, and midden proximity were not significant predictors. These findings suggest that limber pine may frequently escape seed predation by squirrels, by virtue of it preference for open and exposed habitats. This research will assist provincial recovery efforts in Alberta by identifying forest stand types that are most subject to seed limitation, and in need of mitigation.

12.4 Pe'er, Guy*; Franz, Kamila W.; Turlure, Camille; Radchuk, Viktoriia; Matsinos, Yiannis; Verboom, Jana; Malinowska, Agnieszka ; Henle, Klaus; Dept. of Conservtation Biology, UFZ - Helmholtz Centre for Environmental Research, Dept. of Ecological Modelling, UFZ - Helmholtz Centre for Environmental Research, Museum National d'Histoire Naturelle, UMR CNRS-MNHN, Ecology and Biogeography Unit, Universite catholique de Louvain , Department of Environment, University of the Aegean, Alterra, Wageningen, Alterra, Wageningen, and Land Use Planning Group, Wageningen University; *guy.peer@ufz.de*

PVAs: Putting order into the mess

Population Viability Analyses serve as important tools in providing guidelines and developing management measures for species conservation. Of the hundreds of published PVAs, most are tailored to a specific species, landscape, and case. They derive from different conservation questions, apply different approaches, and explore the sensitivity of outputs to different parameters. But can we compare the different PVAs and generalize from them? Can we use them to optimize conservation strategies for the many species, for which no PVA is available? To tackle these questions, we performed a broad review of the PVA literature. We found that PVA studies lack systematic structure, and their description lacks important information for repeatability and comparability. To overcome these difficulties, we extracted information from several tens of papers into one database. We summarized how papers are structured, what inputs were used, what scenarii were explored and what were the outcomes in terms of viability under different conditions. Based on these data, we show how the PVA literature divides into taxa, approaches, analyses, and outcomes. We present a unifying protocol for structuring PVAs and depicting them, which enhances comparability and repeatability. We finally present preliminary results on the factors that affect the viability of populations and species in various conditions. We then discuss the contribution of our review for advancing both ecological theory and policy-design.

SP3.8 Pierce, R.; Podner, C.; Carim, K.*; Montana Fish Wildlife and Parks, University of Montana; *kellie.carim@gmail.com*

Evaluation of small stream restoration over two decades: strategies for success in wild trout conservation

In the past century, anthropogenic habitat degradation has led to range-wide salmonid declines. We examined the response of wild trout to reach-scale restoration projects from 1989-2009 on private ranchlands in Blackfoot River Basin, Montana. We used a single-pass electrofishing catch statistic to examine population response of age 1+ native and nonnative trout to restoration on 16 streams. Four years post-treatment, total trout abundance across all streams had increased 56% from pre-treatment (p

SY13 Piero Visconti*; Carlo Rondinini; Robert L. Pressey; Michel Bakkenes; Rob Alkemade; Luigi Boitani; Federica Chiozza; Alessandra Falcucci; James Cook University, University of Rome La Sapienza, Netherlands Environmental Assessment Agency; *piero.visconti@jcu.edu.au*

A conservation agenda for the persistence of the world\'s mammals

2010, the international year of biodiversity, is the time of a global biodiversity balance-sheet. While the 2009 IUCN Red List of Threatened Species yields a negative balance, the world leaders, in signing the Convention on Biodiversity, have committed to stop this trend and obtain "a significant reduction of the current rate of biodiversity loss". Achieving this objective is impossible without a prior evaluation of the effectiveness of different conservation policies and the cost involved. Using the most recent and fine-scaled suitability models for all world's terrestrial mammals, a land-use change model, and data on the opportunity cost of conservation actions globally, we simulate the likely consequences of different scenarios of land-use change and reservation policies on the persistence of all terrestrial mammal species until 2050. Our analyses allow us to answer four important questions: 1) What will be the status of the terrestrial mammalian fauna in the future with different scenarios of land-use and climate change assuming that no further conservation takes place? 2) Which prioritization method performs best in minimizing species extinction under which scenarios of climate change, land-use change and budgets? 3) For each conservation policy, what total budget would be necessary to meet a given conservation objective for reducing species loss under plausible conditions? 4) How does this budget change with different assumptions regarding climate and land-use change?

P1.21 Pikacha, P.; Boseto, D.; Osborne, T.; Weeks, B.; Filardi, C.*; University of Queensland, Texas A & M University-Corpus Christi, The University of the South Pacific, American Museum of Natural History, Center for Biodiversity and Conservation; *bweeks@amnh.org*

Melanesian Geo: A Grassroots Publication Dedicated to Regional Biological and Cultural Diversity

Melanesia, a globally significant region with incredibly rich biological and cultural diversity, is both one of the most threatened and yet intact tropical regions on Earth. Until recently, there has not been a platform devoted to discussions of regional biological and cultural diversity (e.g., Australian Geographic, Canadian Geographic, etc.) where Melanesians could share their experiences and research with others facing similar situations across the region. Melanesian Geo now fills this gap; it is a grassroots publication that focuses on the people and environment of Melanesia. Based in the Solomon Islands, by combining a mixture of journalism, creative writing, and local storytelling, Melanesian Geo raises the awareness of environmental and social issues affecting the people and ecosystems of Melanesia. With a focus on local researchers and writers, it provides a unique forum for regional dialogue that is fostered by, and accessible to, Melanesian decision-makers. Online availability (http://melanesiangeo.org) provides access to an international audience, and with 7 issues published to date, Melanesian Geo exemplifies a successful grassroots initiative. By bringing together a variety of voices related to biological and cultural issues, the journal has both empowered local actors and raised regional awareness of issues with clear global significance.

P1.196 Pinney, L.*; Cornick, L. ; Alaska Pacific University; *lcornick@alaskapacific.edu*

Using GIS to model Cook Inlet beluga whale critical habitat parameters at the Anchorage, AK land-sea interface

The Cook Inlet beluga whale (Delphinapterus leucas), one of five discrete US beluga whale populations, was listed as Endangered under the US Endangered Species Act in October 2008. The proposed critical habitat designation for this genetically distinct population is currently being assessed. The goal of this project is to define preferred habitat parameters using Geographical Information Systems (GIS) for the area of Cook Inlet in closest proximity to the city of Anchorage (Knik Arm). Cook Inlet is a hotspot for both near shore development and offshore natural resource exploration and extraction. Modeling preferential habitat use patterns in this area can provide valuable insights into habitat features and environmental conditions most likely to coincide with beluga whale presence. The habitat parameters modeled are sea ice cover, bathymetry, and proximity to anadromous streams and other food sources. Beluga whale presence data were collected from shore via theodolite tracking. Understanding habitat preferences is vital to inform marine spatial planning efforts that simultaneously optimize shoreline and offshore development as well as facilitating the recovery and conservation of this iconic species.

SY12 Pimm, SL; Duke University; *stuartpimm@me.com*

Why endangered species are essential to proper ecosystem management

The Cape Sable seaside sparrow is a Federally-listed Endangered Species that lives entirely within the Everglades ecosystem of southern Florida. The Everglades are the southern end of a watershed that flows out of Lake Okeechobee, whence, the water flows into Florida Bay. Immediately south of the Lake is an extensive area of sugar cane production, made possible be extraordinary agricultural subsides, and which massively pollute the areas downstream. Being downstream, the Everglades are particularly vulnerable to the vagaries of water deliveries through structures built and operated by the Army Corps of Engineers (ACE). Their most memorable sound-bite: "We can keep the Everglades alive on life-support forever." The sparrow lives in wetlands that dry out during its breeding season of March through June. ACE's unprecedented flooding during the breeding seasons of 1993 to 1996 halved the sparrow's population. Continued, highly artificial water deliveries have kept the sparrow numbers in serious jeopardy. The Fish and Wildlife Service reduced its determination of Critical Habitat to exclude those areas damaged by this flooding - and is being sued as a consequence. The central theme of this talk will be the power of endangered species in requiring proper ecosystem management and ecological restoration based on ecological principles, not political expediency.

P1.133 Pinotti, BT; Pagotto, C.; Pardini, R.*; University of SÃ£o Paulo, Department of Zoology, University of SÃ£o Paulo, Department of Ecology; *renatapardini@uol.com.br*

Mechanisms of faunal recovery during forest regeneration and the conservation value of secondary forests: Atlantic forest small mammals as a model

Despite the regeneration of part of deforested areas in the tropics, old-growth forests are still being lost, leading to the secondarization of remaining forests. The impacts of such process are poorly known, and, as well as the value of secondary forests for conservation, remain the focus of much controversy. Regeneration apparently favors forest specialist animals while negatively affecting habitat generalists, but no conceptual model has been proposed to explain this pattern of faunal recovery. By sampling 27 sites in a continuous Atlantic forest area, we assessed the effects of regeneration, and of the structure of the forest floor and food availability, on the distribution of forest specialist and habitat generalist terrestrial small mammals. We found a decrease in generalist species accompanied by a more subtle increase in specialist species in old-growth areas, mainly explained by changes in food availability. These results are congruent with the successional niche mechanism, a trade-off between competitive ability and ability to use abundant resources: while habitat generalists benefit from increased productivity in younger forests, forest specialists are able to occupy old-growth areas where food is scarce. The less pronounced negative effect on specialist species compared to the proliferation of generalist species indicates the potential value of secondary forests for conservation, especially for the restoration of highly fragmented biomes as the Atlantic forest.

SY76 Pinzon, J*; Spence, JR; Invertebrate Ecology Laboratory, Departmament of Renewable Resources, University of Alberta; *jpinzon@ualberta.ca*

Sustainable Management of the Boreal Forest by the Emulation of Natural Disturbances

Fire has been the main natural disturbance that shapes the structure of western boreal systems in Canada by maintaining a mosaic of successional stages and influencing the spatial distribution of species. Different types of legacies that persist from the pre-disturbance state contribute over time to recovery processes following disturbances. Consequently, different harvesting practices, such as variable retention harvesting and prescribed burning, are being implemented to emulate the effects of fire on the landscape as a management approach for maintaining biodiversity and preserving ecosystem integrity. Our research is focused to explore and better understand how these practices affect the diversity and composition of ground-dwelling arthropods and provide management recommendations to the forestry industry that best maintain biodiversity in the mixedwood boreal forest. Results suggest that the application of different harvesting practices as surrogates of fire disturbance are promoting and maintaining arthropod diversity on the landscape and thus meeting conservation and sustainability goals.

SY53 Pither, R; Parks Canada; *richpither@yahoo.ca*

The Challenge of Translating Academic Science into Regulatory Practice

There is a common perception that a major impediment to the implementation of the habitat provisions under SARA is the federal government's inability to effectively translate science into policy. While it is true that implementation of the Act has been much slower than desired thanks to major challenges (which will be discussed), policy is not one of them. In fact, one contributing factor has been the reluctance of academics and recovery team members to use SARA as it was designed to be used, rather than expecting the Act to adapt to scientific and other ideals. Furthermore, the recovery of species at risk will depend as much upon other factors, such as community participation, than just on the products of science. SARA has the power to be a useful tool for the recovery of species at risk in Canada. I argue that scientists can be more effective in their contributions to recovery planning if they assist in the development of products that meet the needs of SARA rather than expecting SARA to change.

P2.103 Pitt, Justin*; Paton, D; Creasey, R; Muhly, T; Musiani, M; Boyce, M; University of Alberta, Terrain FX Inc., University of Calgary; *pitt@ualberta.ca*

Effects of Motorized Access Closure on Elk Habitat Selection and Movement

Rapid industrial development for resource extraction and associated road construction into formerly road-less areas has greatly increased motorized access in Alberta. Roads are known to negatively affect elk in a variety of ways including displacement from habitats and disrupting movements. Managing motorized access using road closures is a commonly proposed mitigation approach which attempts to allow resource extraction while minimizing impacts on wildlife. However, it is unknown how disturbance-sensitive wildlife, such as elk, will respond to changes in access which are sometimes temporary and where the physical attributes of the road remains intact. We used a 45-day forestry closure to examine how elk would respond to a short-term access closure. During this short period, the response by elk was mixed. We used resource selection functions to document that during the closure elk selected more open habitats with higher forage values and decreased selection for cover. However, movement metrics and straight-line distance avoidance of roads remained unchanged. Our results suggest that elk can respond quickly to changes in access relative to certain aspects of their habitat selection. However, this short time period was not sufficient to negate avoidance behavior. Our results provide evidence that gating roads may be an inexpensive way to mitigate their impacts on elk ecology.

SY53 Plotkin, Rachel; David Suzuki Foundation; *rplotkin@davidsuzuki.org*

The Challenge of Critical Habitat Identification

This presentation will explore the challenges of identifying critical habitat, the tension between identifying critical habitat that is defensible and applying the precautionary principle, and the political reluctance to identify critical habitat in the face of uncertainty. The presentation will begin with a brief history of the federal government's track record on critical habitat identification under the Species at Risk Act, and will explore the policy framework that has, in some instances, influenced critical habitat identification. It will also touch on the legal challenges launched by the conservation community and how the outcomes of these legal challenges have changed the political playing field. The presentation will then examine the tension between the application of the precautionary principle and the need for certainty and defensibility of critical habitat identification. These issues will be explored through two case studies: one recovery strategy wherein critical habitat was not identified for a species but, in the opinion of the conservation community, could have been partially identified, based on area of occurrence, and the second wherein a species might have critical habitat reduced to residence due to lack of confidence of defining a broader foraging area as habitat. The presentation will pose the question: how can the precautionary approach best be applied? The conclusion will be the tenets of a potential framework for determining where partial critical habitat identification is possible and advisable, from an environmental non-government organization perspective.

SY51 Plowright, R.*; Dobson, A.; Pennsylvania State University, Princeton University; *rplowright@gmail.com*

Title: Climate change, connectivity and wildlife disease

Climate change is exacerbating the negative impacts of habitat fragmentation on the ecological integrity of landscapes. Conservationists have come to view ecological connectivity as a potentially powerful climate-change adaptation strategy, one that is being promulgated across the Western US, and in site-specific management efforts throughout the world, through a suite of new wildlife policies such as wildlife corridors and assisted migration. While connectivity conservation presents enormous opportunities for climate-change adaptation, the serious implications of wildlife-disease transmission have yet to be addressed. We will discuss attempts to fill a critical gap in understanding potential effects of connectivity-enhancing strategies on wildlife diseases in one of the most wildlife-rich areas in North America by providing a conceptual framework for understanding the relationships between connectivity and disease dynamics. We will discuss preliminary work on testing this framework using host/disease systems focal to climate-change adaptation efforts in the US Northern Rockies. This research is important for developing guidelines for incorporating disease considerations into decision support systems for connectivity planning-such as those being used in the implementation of the Western Governors' Association Wildlife Corridor Initiative.

SY32 Plummer, R*; Hashimoto, A; Brock University, Stockholm Resilience Centre , Brock University; *rplummer@brocku.ca*

Adaptive Co-Management in Policy and Practice: The Issues of Context and Fit

Adaptive co-management is a marked departure from past rational-comprehensive models of conservation and natural resources management. It brings together the ongoing learning and experimentation dimensions of adaptive management with the linking spirit of collaborative management to engender an approach characterized by pluralism and communication, shared decision making and authority, connections within levels and across scales, and capacity to adapt and change. The potential of adaptive co-management to enhance the social-ecological resilience makes its transference to different places and circumstances often desirable. This paper argues that attention to context and â problem of fit' are critical when professionals are contemplating applying adaptive co-management as a policy and/or practice. A framework is offered to assist professionals with these considerations. Its utility is illustrated by considering two distinct case studies - a recreational or sport fishery in Ontario, Canada and a shell fishery in Oita, Japan. Closing reflections stress the need for care and forethought when considering application of adaptive co-management.

P2.146 Pocewicz, Amy*; Kiesecker, Joseph M.; Jones, George P.; Copeland, Holly E.; Daline, Jody; Mealor, Brian A.; The Nature Conservancy, University of Wyoming, University of Wyoming; *apocewicz@tnc.org*

Evaluating whether existing conservation easements have reduced development and maintained biodiversity

Conservation easements are the primary tool used to restrict development and achieve conservation goals on private lands, but empirical evaluations of their effectiveness are lacking. We compared sagebrush ecosystem biodiversity and recent rates of change in road and structure densities on properties with and without easements held by The Nature Conservancy in Wyoming, USA. To distinguish easement effects from biological or management-related differences, properties were stratified by residential development pressure and property managers surveyed about management. We found that easements resulted in less development and positively influenced biodiversity. In areas with high development pressure, easement properties were less impacted by structures and tended to have fewer, less-developed roads than properties without easements. Easements in these areas also had increased use by some wildlife species relative to properties without easements. Development pressure had a significant effect regardless of easement status in some cases, including higher cover of exotic plant species and fewer mammal burrows in high pressure areas. There were no significant differences in land management practices, but managers of properties with easements tended to seek land stewardship support more often than other managers. Given the importance of easements and the significant financial investment being made, it is essential to continue to evaluate whether easements are effective elsewhere.

SY26 Poessel, SA*; Breck, SW; Biggins, DE; Livieri, TM; Crooks, KR; Angeloni, L; Colorado State University, USDA-Wildlife Services-National Wildlife Research Center, U.S. Geological Survey, Prairie Wildlife Research; *sharpoes@gmail.com*

Landscape features influence postrelease predation on endangered black-footed ferrets

Predation can be a critical factor influencing recovery of endangered species, although influences of predators are not always sufficiently understood to allow prediction of predation risk. We investigated whether landscape features could be used to model predation risk from coyotes and great horned owls on the endangered black-footed ferret. We used movement and mortality data of reintroduced ferrets from three sites in South Dakota and two landscape analyses to determine whether 1) exposure to landscape features associated with predators affected survival of ferrets and 2) ferrets considered predation risk when choosing habitat within the hunting range of owls or near coyote corridors. Exposure to areas near owl perches reduced ferret survival, but coyote movement corridors and electric fences had no appreciable effect on survival. Ferrets were located within the hunting range of owls more than would be expected at random in two sites. Densities of coyote corridors near ferret locations were no different than expected at random in all three sites. These results suggest that repatriated black-footed ferrets selected resources based on factors other than predator avoidance. We demonstrated that considering an easily quantified landscape feature (i.e., owl perches) can enhance success of reintroduction efforts for black-footed ferrets. However, development of predictive models and management strategies is not necessarily straightforward for all predators.

P1.91 Polakowska, A.E.*; Fortin, M.-J.; University of Toronto; *aleks.polakowska@gmail.com*

Quantifying Avian Species' Spatial Relationship to Landcover Heterogeneity in Southern Ontario

Although considerable research has examined the factors limiting species' ranges at local and continental spatial scales, less attention has been granted to the relationship between species' spatial distributions and landscape attributes at regional or landscape spatial scales. Since land management decisions are often made at these scales, understanding what features of the landscape maintain biodiversity is critical to the effective implementation of conservation strategies. This research investigates the spatial relationship between landcover heterogeneity (Ontario Land Cover - 1991-1998; 8 landcover types) and avian species' distributions (Ontario Breeding Bird Atlas - 2001-2005; 60 species) in terms of spatial boundary overlap. Boundary analyses (detection and statistics) were performed and tested using a randomization procedure. A positive and significant spatial relationship was found between landcover heterogeneity and avian distributions at the regional scale; the mean distance from avian to landcover boundaries was low and the direct spatial overlap of the two boundary types was high. These results have implications for conservation efforts in southern Ontario, and show that boundary analysis can effectively quantify ecological boundaries and could be used as a tool in conservation planning. Future research should focus on assessing the spatial relationship between landcover heterogeneity and avian distributions for different functional and taxonomic groups.

SA1 Polfus, JL*; Hebblewhite, M; Heinemeyer, K; University of Montana, Round River Conservation Studies; *jean.polfus@umontana.edu*

Woodland caribou habitat selection: A comparison of indigenous ecological knowledge and western science habitat modeling approaches

Woodland caribou (Rangifer tarandus caribou) are federally listed under the Species at Risk Act in Canada and are declining throughout their distribution. There is a growing need for an effective approach to integrate indigenous ecological knowledge (IEK) with western science to inform woodland caribou recovery plans. To test the hypothesis that IEK and western scientific approaches are equivalent, we compared predictions of resource selection function (RSF) models with habitat models derived from IEK. Winter RSF models were developed with data from 10 GPS collared caribou in the territory of the Taku River Tlingit First Nation (TRTFN) in northern British Columbia. Habitat suitability index models were generated with data from semi-directed interviews with TRTFN hunters and elders. Both models indicated caribou select for low elevations pine-lichen complexes and had high classification success. The RSF model also revealed that caribou avoided areas in the proximity of human activity and roads. Comparison of habitat rank between the two models established that the IEK model predicted higher habitat quality in areas near human developments. Thus, IEK reflects historical caribou habitat but does not include the cumulative effects of modern human activity. Our results suggest IEK could be used to identify baseline conditions necessary for caribou recovery. This approach has the potential to promote new methods for defining habitat recovery goals across northern Canada.

SY15 Pollini, jacques; Hendrix College; *pollini@hendrix.edu*

The REDD mechanism: new opportunity or disaster?

This paper explores the feasibility of achieving socially acceptable REDD projects. It shows that beyond a widely accepted rhetoric that emphasizes local participation and rights over access to resources, it is necessary to formally address the political economy of resource degradation and right violations. Strong regional and global tendencies to resource capture and social marginalization have already been identified as the key processes that could transform the REDD mechanism into a social and environmental disaster. Managerial tools like social standards and procedures for certification are currently being developed to tackle these issues, but can hardly be expected to address them at large scale. By translating concerns over access to resources into local indicators that mostly relate to the subsistence economy, these tools suggests that technical or managerial solutions will suffice to design efficient REDD projects. Against or in complement of this approach, this paper argues in favor of less planning and managerial efforts, and for the development of legally binding simple rules that explicitly address political economy issues at global scale. Such rules could be, for example, the channeling of REDD payments to communities having historically constituted use rights over the resources in question.

P1.16 Pongiluppi, T; De Paula, L.A.; Lima, F.P.; Develey, P*; SAVE Brasil, Universidade Federal de Pernambuco, Universidade Federal de GoiÃ¡s; *tati_pong@yahoo.com.br*

Long Term Conservation of Atlantic Forest through Education: Experiences from the Serra do Urubu Important Bird Area, Brazil

The Serra do Urubu is a complex of Atlantic Forest fragments, located in Northeastern Brazil. Ten globally threatened bird species are found there. Due to the high numbers of threatened and endemic birds, it is considered by BirdLife/SAVE Brasil an Important Bird Area for priority action. Despite this richness in diversity, the regional level of poverty is very high and remaining forests are being exploited, especially for charcoal production. In 2007 SAVE Brasil initiated a program to communicate the biological importance of the region to the local community. The program trained a group of 30 teenagers to act as disseminators of the Serra do Urubu's conservation importance to the general public. It showed that to effectively conserve the Serra do Urubu it is important to involve the community in the process of conservation, to target various audiences, to maintain a continuous process of education, and to establish a strong relationship based on trust and understanding with the local people. An Education Center was established to work with concepts, values and conservationist attitudes. To date, the educational activities involved about 860 participants. The group of teenagers is crucial to the activities proposed on the center, because they developed a feeling of responsibility for the local natural resources and their conservation. They inspire and motivate the community to preserve the Serra do Urubu biodiversity, and will hopefully continue to do so for future generation.

P2.137 PONNIKAS, SUVI*; Hannila, Riikka; Orell, Markku; Ollila, Tuomo; Luoto, Miska; Department of Biology, University of Oulu, Finland, Department of Geography, University of Oulu, Finland, MetsÃ¤hallitus, Natural Heritage Services, Finland, Department of Geosciences and Geography, University of Helsinki, Finland ; *suvi.ponnikas@oulu.fi*

Fitness-related habitat suitability modeling indicates extreme nationwide fragmentation of suitable breeding habitats of endangered raptors

We used fitness-related species data in habitat suitability modeling (HSM) to quantify the suitable breeding habitats of two endangered raptors in Finland. The study design based on a unique nationwide data set consisting of confirmed breedings of the Golden Eagle (Aquila chrysaetos) and the Peregrine Falcon (Falco peregrinus). We used presence-only nesting site data and 14 explanatory variables from five environmental factor groups (climate, topography, land cover, human impact and habitat connectivity) to construct Maxent models at the resolution of 2 x 2 km (n= 83 423). We found that the Golden Eagle avoids strongly human altered landscape and favors coniferous forests in topographically variable landscape. The distribution of the Peregrine Falcon is most correlated with highly connected open peatlands. The suitable breeding habitats of the Golden Eagle and the Peregrine Falcon were observed to be extremely fragmented in Finland. Inclusion of land cover variables to HSMs improved model performance and revealed the extreme fragmentation pattern of suitable nesting habitats. Our findings suggest that disregarding land cover in HSM would produce an overoptimistic figure of the breeding habitat of the raptors which in turn may cause a significant source of error in broad-scale conservation planning. Our results highlight the importance of preservation of the currently unprotected suitable habitats to ensure the long-term survival of these raptor populations.

SY41 Poot, H.*; Donners, M.A.H.; Marquenie, J.M.; Max Planck Institute for Ornithology, Philips Lighting, Shell EP Europe (NAM B.V.); *poot@orn.mpg.de*

Bird-friendly Light?

Millions of birds are affected by artificial light emitted from offshore installations they encounter during migration each year. Many are attracted and disoriented by the lights, causing collisions and exhaustion resulting in death. Because safety requirements or technical design rule out switching off these lights, new solutions are needed. Our idea was to investigate the effect of changing the spectral composition of the light on bird reactions. In 2003 we did a pilot study at the North Sea coast during autumn migration with colored filters in front of light sources, which showed that nocturnal migrants react stronger to white and red light, compared with blue and green light. Based on these results and a literature survey, we hypothesized that the red part of the spectrum (575-650 nm) causes most problems for migrating birds, and developed new light types containing less red, whilst still ensuring safe working conditions and good visibility for humans. We tested these light types in the field and found a positive correlation between the relative intensity of red in the spectrum and birds' reactions to the light sources, independent of total light intensity. The mechanisms underlying these results still need further investigation, but we already managed to develop a commercially available light type that may be defined as (more) bird-friendly.

SY42 Posewitz, James; Orion The Hunters' Instiute; *cinnabar@bresnan.net*

Embedding a Conservation Ethic in a Human Culture

When the Europeans settled the North American Continent there was little sign of a conservation ethic among the people. Following the American Revolution and formation of the United States, the unrestrained exploitation of natural resources produced environmental and human disasters of continental proportion. In 1871 the Peshtigo Fire in the Great Lakes Region claimed 1,500 human lives. In 1910, the Big Burn in the Northern Rockies took 3 million acres in two days sending ash and smoke as far as Greenland. The Dust Bowl of the 1930s sent the soil of North America s Great Plains eastward to the Atlantic and coated the decks of ships 300 miles off shore. In the wake of these disasters a conservation movement was born. Initially it came from a few enlightened East Coast patricians as the 19th Century closed and the 20th unfolded. Conservation was an idea brought by enlightened leaders and distributed from the top down in American society. Following the Great Depression of 1929, the idea and responsibility for conservation passed to the people where it prospered, grew strong and restored wildlife abundance to an entire continent.

SY14 Possingham, HP; Joseph, LN*; Tulloch, A; Tyre, AJ; Wilson, H; Wilson, KA; Wintle , BA; The University of Queensland, The University of Nebraska, The University of Melbourne; *h.possingham@uq.edu.au*

Optimal monitoring for conservation

As the impact of humans on biodiversity continues, and attempts to ameliorate those impacts mature, the ability to accurately and efficiently monitor the response of biodiversity to impacts and management interventions is assuming ever-greater importance. In this talk we call for a new approach to monitoring research: a systematic exploration of the ability of different kinds of monitoring to support decision-making in an effective and cost-efficient manner. To date optimization in the field of monitoring has been dominated by either delivering adequate statistical power for minimum cost, or maximizing statistical power for a fixed budget. This traditional approach is flawed because the objectives are inadequate. More recently there has been increasing interest in trading-off Type I and Type II errors. In this paper, we move beyond these approaches and argue that more real world issues: management objectives, the size of the management budget, and the costs and benefits of monitoring are fundamental to formulating the right optimal monitoring problems. We describe and review the essential components of a new research program in optimal monitoring that starts with the definition of a quantifiable objective. We illustrate our case with diverse examples ranging from monitoring iconic mammals, to optimal choice of indicator taxa, to optimal active adaptive management. We show how mistakes are made when objectives are trivial, wrong or unstated.

P1.202 Pouliot, D*; Masse, D; Samson, C; Paradis, S; Parc national du Canada La Mauricie, Agence Parcs Canada, Agence Parcs Canada; *Claude.Samson@pc.gc.ca*
Evaluation of survival and dispersal rates of translocated juvenille wood turtles in La Maurice National Park of Canada
One of the largest populations of Wood Turtle (Glyptemys insculpta), a threatened species in Canada, is located in the Shawinigan River Watershed (SRW), partially located within La Mauricie National Park (LMNP) borders. Despite the presence of suitable habitat, only a few observations of turtles had been reported within the park. A restocking program, involving the translocation of juveniles, has been developed in LMNP to increase the local population. Before implementing the program, a pilot study was conducted to evaluate the effects of translocation on survival and dispersal rates of turtles. In 2006, 16 juvenile turtles (3-10 years old) were captured from the SRW outside the park and translocated to LMNP. The turtles were radiotracked from May 2006 to October 2009. Survival rate during the active period (May-October) averaged 0.980 Â± 0.020 (Â± Std.Err.; n= 1870.0 Â± 309.4 days-contact per year), while dispersal rate averaged 0.928 Â± 0.072 (n= 1696.8 Â± 219.7 days-contact per year). Survival and dispersal rates of translocated turtles were not significantly different (p>0.05) from survival and dispersal rates of 47 juveniles radiotracked in the SRW outside the park from 2004-2007 (survival: 0.887 Â± 0.053, n= 1993.3 Â± 876.5 contact days per year; dispersal: 0.960 Â± 0.023, n= 1970.3 Â± 870.6 contact days per year). We conclude that, on a short term basis (4 years), the translocation did not negatively affect the survival and dispersal rates of juvenile Wood turtles in LMNP.

P2.136 Pratt, JD*; Mooney, KA; University of California, Irvine; *jessicadpratt@gmail.com*
Assessing The Need For Assisted Migration Of Artemisia californica In Coastal Sage Scrub Habitat
The use of assisted migration as a conservation strategy to mitigate species losses due to climate change has recently been debated in the literature. While much of this debate has focused on moving species outside of their current ranges, less well considered are the consequences of, or potential need to move locally adapted genotypes of species within their current ranges. We summarize the literature on "genotype assisted migration" and present results from an empirical study characterizing the need for such a strategy for Artemisia californica, a foundational species of coastal sage scrub habitats in California. We examined geographic variation in the response to predicted climate change in five populations of A. californica across a four-fold precipitation gradient along 700 km of this species range. In a common garden experiment where we manipulated precipitation, we found clinal variation in ecologically important traits of A. californica, including growth rate and resistance to herbivores. This provides evidence of strong local adaption to climate across this species' range, as well as extended consequences of this adaptation for A. californica's associates. Consequently, we suggest that assisted migration of A. californica genotypes from south to north should be considered in habitat restoration plans. Implementing assisted migration during habitat restoration provides a unique opportunity to increase adaptive genetic variation of a species within its current range, particularly for populations at range margins.

SP5.3 Pratt, RT; Main Author; *prattr@uci.edu*
The source of mycorrhizal inoculum affects forest restoration
The potential benefits of arbuscular mycorrhizal fungi (AMF) to forest restoration are widely recognized but the source of fungi used in restoration is rarely considered. I compared the growth and nutrition of tree seedlings (Inga spectabilis) planted into heavily and weakly degraded tropical pastures that were inoculated with AMF from either heavily or weakly degraded soils. Despite small geographic distances between heavily and weakly degraded soils in this study, I found that AMF communities from these different sources differed in both their taxonomic composition and in their impacts on host plant performance. One year after transplanting, Inga spectabilis originally inoculated with AMF from heavily degraded soils were significantly larger than controls and those given AMF from weakly degraded soil. Moreover, AMF from heavily and weakly degraded soils improved host plant growth more when combined with their resident soil type, providing evidence that AMF are adapted to their soil of origin. These findings suggest that efforts to restore native forest could be improved by using mycorrhizas from more heavily degraded soils and by nurturing mycorrhizal associations in their soil of origin.

SY24 Pressey, R.L.*; Ban, N.C.; James Cook University; *bob.pressey@jcu.edu.au*
A framework for incorporating patch dynamics into conservation planning
Patch dynamics, or spatio-temporal changes in physical and biological characteristics, have received most attention in terrestrial ecology but have also been studied by marine scientists. Ways of incorporating patch dynamics into conservation planning are, however, poorly explored, despite the important implications of these dynamics for the persistence of species. We present a two-part framework for building patch dynamics into conservation planning. First, data and analyses are needed to identify and understand patch phenomena: real-time data to which managers can respond at temporal scales of days or weeks; time-series data that allow planners to understand the key parameters of dynamics of interest; and simulations that project dynamics into the future and allow planners to explore uncertainty and the potential effects of climate change. The second part concerns planning responses. A vital step toward planning for patch dynamics is to identify explicit patch-related objectives for individual conservation areas or whole systems of conservation areas. From the manager's viewpoint, these can relate to either disturbance (e.g. fire, coral bleaching) or resources (e.g. rainfall, marine chlorophyll) and, ideally, to the organisms that respond to these changes. Objectives allow planners to review the effectiveness of existing systems of conservation areas and to apply theory and empirical testing to design expanded systems of conservation areas that achieve objectives.

SY13 Pressey, R.L.; Visconti, P.*; Rondinini, C.; Boitani, L.; James Cook University, University of Rome, University of Rome; *bob.pressey@jcu.edu.au*

Limitations of global prioritisations for conservation, and ways of minimizing them

Global prioritizations to guide conservation investments first became prominent in the scientific literature in the early 1980s. Since then, many different data sets and analytical methods have been applied to the problem of where in the world to spend limited funds and time to most effectively arrest the loss of biodiversity. All of these approaches have had limitations, some of which arise inevitably from the necessary extent and resolution of the analyses. These limitations have restricted the relevance of global prioritizations to conservation actions at regional and local scales. We review six limitations here and suggest ways of minimizing them in the future. The limitations are: 1. the very coarse spatial resolution of assessments that prioritize whole ecoregions or similar units; 2. the lack of explicit conservation objectives in studies that have analysed patterns of rarity, richness and threat; 3. the absence of testing of predictions about the best way to achieve objectives with limited resources; 4. the lack of socio-economic considerations in many prioritizations; 5. the tenuous relevance of many global-scale data sets to conservation activities on the ground or in the water; and 6. the lack of effective protocols for linking global, regional and local prioritizations by downscaling and upscaling information.

P2.99 Priatna, D*; Kurniawan, E; Maddox, T; ZSL Indonesia, Bogor Agriculture Institute; *dolly.priatna@zsl.org*

Assessing Tiger Translocation in Sumatra, Indonesia

Human-tiger conflict is one of the key problems in tiger conservation, leading to direct fatalities and reduced support for conservation. Translocating problem tigers to an area of forest far from the conflict zone has been tried to alleviate such conflict. This work aims to support the conservation of Sumatran tigers through providing recommendations to the Indonesian government on the suitability of tiger translocation as a means of conflict mitigation and conservation. Using a combination of GIS analysis and GPS collaring data to evaluate the establishment of home ranges of translocated tigers, camera trapping to determine the ecology of existing tigers and prey in the area and a questionnaire surveys This study investigates the ecology of translocation and its implications for local communities living around translocation site. Key words: translocation, Sumatran tiger, gps collar, home range, camera trapping, ecology, local communities

SY45 Price, J.T.*; Ramirez, J.; Jarvis, A.; Warren, R.; King, N.; Gaiji, S.; McDougall, A.; Ricketts, T.; World Wildlife Fund - US, International Center for Tropical Agriculture, University of East Anglia, Global Biodiversity Information Facility, World Wildlife Find - US; *jeff.price@wwfus.org*

Use of bioclimatic models to identify refugia and conservation prioritization in a changing climate

Current and past conservation strategies were largely developed under an assumption of a stationary climate. These strategies may fail with changing climates, especially when acting synergistically with existing anthropogenic pressures. The Wallace Initiative is a global effort to rapidly assess the potential impacts of climate change on nearly 100,000 plant and animal species using biodiversity data from the Global Biodiversity Information Facility (GBIF) and the maximum entropy (MaxENT) algorithm to develop models of their current distribution. Climate change data from the Community Integrated Assessment System (CIAS) is then used to look at different future scenarios from multiple General Circulation Models. Governments and conservation organisms have dedicated extensive time and resources to protect a substantial proportion of biodiversity. As the climate changes are these investments at risk? Should biodiversity conservation efforts and targets now be modified to take into account a dynamic climate? To assess this, we used models of more than 65,000 plant species to calculate projected changes in percent species richness. These data were then combined with data on current threats to develop a pilot technique for setting conservation priority areas in the Amazon region. These areas included potential refugia (based on habitat changes) as well as areas where adaptation efforts may have to be intensified.

15.6 Primack, Richard B. *; Abraham Miller-Rushing ; Boston University, USA National Phenology Network; *primack@bu.edu*

Citizen observations and other non-traditional data sources provide insight into the biological effects of climate change.

Phenological records can demonstrate the biological impacts of climate change. However, the United States has only recently developed a government-sponsored phenological network, such as many European and East Asian countries established over 50 years ago. Phenological data does exist in other forms, such as naturalist diaries, photograph collections, and records of bird watching groups. These records can cover decades, and when combined in sequence, can cover periods of a century or more. Such records need to be interpreted cautiously, as observation methods may not be standardized. Also, observations of dates of first flowering, bird arrival, and insect emergence are affected by sample size. A powerful approach is to combine non-traditional records with current observations and available government records. Using this approach, we have found a wealth of phenology data from Massachusetts, starting with the observations made in the 1850s by Henry David Thoreau in Concord. We have found that spring-flowering plants are more responsive to warming temperatures than are migratory birds. Responsiveness to climate variation has already affected which native and non-native plant species have increased or decreased in abundance over the past 100 years. Our work and the work of others have shown that non-traditional data can yield critical insights into our understanding of how climate change has impacted biological communities, and can lead to predictions of future impacts.

SY53 Prior, Kent; Parks Canada; *kent.prior@pc.gc.ca*
Toward Effective Critical Habitat Policy: Framing the Issues
Simple in theory but complicated in practice, critical habitat is (or is becoming under the Canadian Species at Risk Act (SARA)) the most contentious requirement of North American endangered species legislation. Though SARA requires that critical habitat be; identified within 1-2 years, in cooperation and consultation with others, to the extent possible, based on the best available information, and ultimately legally or effectively protected from destruction these provisions have been variably interpreted and inconsistently applied by different communities of practice. There is a clear need to do a better job at identifying and protecting critical habitat, lest the necessity become optional through legislative amendment or simply rendered ineffective through either extreme or insignificant application. Improvements may be had by appreciating different societal perspectives on the general problem Is there sufficient information? Which habitats are really critical? What are the best protection mechanisms? How can efficacy be evaluated? Systematic consideration of multiple viewpoints cultural, economic, legal, philosophical, and scientific may be necessary if critical habitat outcomes are to be both ecologically beneficial and workable on the ground.

SY71 Proctor, MF*; Paetkau, DH; McLellan BN; Stenhouse, G; Kendall K; Mace R; Servheen C; Boyce M; Transborder Grizzly Bear Project, Wildlfie Genetics International, BC Ministry of Forests and Range, Foothills Research Institute, US Geological Survey, Montana Fish Wildlife and Parks, US Fish and Wildlife Service, University of Alberta; *mproctor@netidea.com*
Population Fragmentation and Inter-area Movements of Grizzly Bears in Western North America and Creating Options to Adapt to Climate Change
Population fragmentation of grizzly bears in western North America has been reported on a small scale however, because grizzly bears range so extensively and are susceptible to excessive human-caused mortality, a multi-regional understanding of the extent of fragmentation is needed to fully understand the problem and its potential solutions. We carried out an extensive fragmentation assessment over ~1,000,000 km2 across their distribution in the northwest US, Alberta, and much of British Columbia, Canada. Our analyses used 3040 genetically sampled, and 639 radio collared bears. Clustering methods detected fragmentation and resulting sub-populations and individual migrant detection determined intensity of fragmentation using genetic assignment methods and radio and GPS telemetry. We found extensive fragmentation in southern BC, Alberta, and NW US and present a map depicting a female-fragmented metapopulation with abundance estimates of subpopulations. We identify small isolated, at risk subpopulations to large regional source subpopulations. This fragmentation related to patterns of settlement, traffic, and mortality. We discuss whether our results depict a functional anthropogenic metapopulation or a stage in the progression from panmixia to isolated populations to extirpation. This fragmentation will be exacerbated by climate change, and we conclude future metapopulation function will only result from appropriate management ultimately allowing ecological adaptation.

14.8 Proppe, DS*; Sturdy, CB; St. Clair, CC; Department of Biological Sciences, University of Alberta, Department of Psychology, University of Alberta; *proppe@ualberta.ca*
The effect of anthropogenic noise on the distribution and abundance of urban songbirds
Songbirds use vocal communication for mate attraction, territory defense, and reproduction. These functions are potentially perturbed in the presence of chronic anthropogenic noise. The noise produced by traffic, which spans the frequencies of many bird songs, is particularly prevalent in cities where many songbird species have exhibited marked population declines. Some songbird species are known to increase the pitch of their songs near roads, presumably to avoid masking by traffic noise. We hypothesized that variation in this ability among species is likely to correlate with their abundance in urban areas. We tested this idea by estimating the abundance of four species of song birds, two species that are prevalent and exhibit highly variable vocal patterns, and two species that have declined in urban areas across North America and exhibit less variable vocal patterns. We distributed sampling sites along a gradient of anthropogenic noise in Edmonton, Alberta. After accounting for variation in vegetative structure, our results indicate that the abundance of the two common species was unaffected by noise level, whereas the abundance of both declining urban species was lower in noisier areas. We suggest that anthropogenic noise exacerbates habitat loss to contribute to the decline of some songbird species in urban areas.

SP5.2 Pryke, JS*; Samways, MJ; Stellenbosch University; *JPryke@sun.ac.za*
Design and Management of Ecological Networks to Optimize Biodiversity within Agroforestry
Agroforestry production dominates many South African landscapes, with agroforestry companies controlling more than 1.5 million hectares. Mitigation measures are being sought to reduce the impacts of agroforestry on the local environment. Ecological networks of remnant natural ecosystems particularly grasslands, are such a mitigation measure. These networks aim to stem biodiversity loss and to maintain ecosystem processes. The South African forestry industry has already allocated 500 000 ha, one third of the plantation holdings, as ecological networks among and within timber plantations. However, little scientific research is available on the effectiveness of these huge ecological networks for biodiversity conservation and maintenance of natural ecosystem function, although initial findings are encouraging. Results show that although there was marginally greater diversity and greater habitat quality outside the ecological networks, many groups and species are using these ecological networks. Furthermore, 250 m corridor width appears to be a fairly robust figure for the minimum size of an effective corridor, provided high habitat quality is retained.

P2.108 Pujadas-Botey, Anna*; Garvin, Theresa; Department of earth and Atmospheric Sciences, University of Alberta; *pujadasb@ualberta.ca*

Interdisciplinary work in ecosystem management research

Ecosystem management (EM) is an interdisciplinary field within the broader area of ecology. It addresses environmental problems by supporting and promoting practices that cross disciplinary divides. The work presented here presents an evaluation of EM researchers' definitions of interdisciplinary work, as well as their understandings of interdisciplinary practices in order to better situate EM work in the broader context of interdisciplinarity in science. We identified key EM researchers using a modified systematic review process, resulting in a set of 119 on-line questionnaire responses followed by a targeted set of 15 key-informant, semi-structured telephone interviews. Results indicate that researchers differ on the terminology used for interdisciplinary research however, they share a common understanding of what interdisciplinary research is: both a "way to do research" and a "way of thinking about research". Differences between researchers suggest that there is a growing interest in developing deeper engagements with theoretical discussions of interdisciplinary taking place outside their own EM field. Results are discussed in the context of the contributions that the theories of interdisciplinary science can make to solving environmental problems.

P2.203 Pullin, A.*; Livoreil, B; Bangor University; *b.a.livoreil@bangor.ac.uk*

CEE and SCB: developing and promoting good science for sustainable biodiversity protection

Evidence-based conservation rely on systematic reviews (SR), a thorough standardized appraisal and compilation of existing literature and datasets on a given topic. SR can help decision-makers by providing a sound scientific synthesis of existing knowledge, they also highlight knowledge gaps, effect modifiers, and methodological strengths or flaws. The most complete SR depend on the production of good quality studies. With impact and mitigation measures, LIFE projects and sustainable development policies, the number of field studies tend to develop in Europe but their quality is often questioned. By working together on both end of the pyramid of scientific knowledge and skills, SCB-Europe and CEE should work at reshaping it to raise the quality of applied field studies. We present the details of the development of the Collaboration for Environmental Evidence and its possible links to SCB, to discuss how we strive at strengthening a few bridges between conservation scientists, practitioners and decision-makers.

SY79 Purdy, BG*; Richens, T; Alberta Environment; *brett.purdy@gov.ab.ca*

Conservation and reclamation in the mineable oil sands: adapting policy and regulations to emerging knowledge

This presentation will introduce the regulatory context in which oil sands mines operate, and discuss how new knowledge is affecting emerging policy, regulations and practices specific to reclamation. Extensive and intensive disturbance of the natural boreal landscape occurs during oilsands mining. Requirements for reclamation after disturbance are at times prescriptive such as those that govern soil salvage and placement criteria, whereas others are outcome-based, such as the condition that reclaimed lands be capable of supporting self-sustaining locally common boreal forest ecosystems. Mine operators are required to articulate long term plans through life of mine closure plans and related planning documents and to report annually the details of on the ground conservation and reclamation activities which reflect the particulars on how closure and reclamation plans are implemented. To assist in this process, several guides, manuals and frameworks for reclamation have been developed and are continually revised. Whereas the current process provides flexibility and adaptive management opportunities in developing acceptable reclamation and closure options throughout the life of a mine, it can result in challenges in defining measures of reclamation success at the time of certification.

SY53 Quinlan, Richard W.; Alberta Fish and Wildlife Division; *Richard.Quinlan@gov.ab.ca*

Is the Critical Habitat Beast Hamstringing Endangered Species?

Is the Critical Habitat Beast Hamstringing Endangered Species? Critical Habitat is perceived by the Canadian federal government and by some environmental groups as being a key component of recovery for Threatened and Endangered species. But the Species at Risk Act requirement to designate Critical Habitat has been met with suspicion and open resentment amongst rural communities, industry groups and provincial governments. This has interfered with progress on voluntary stewardship initiatives which, in the past, have been the most successful way to achieve conservation and recovery for species at risk in Alberta. Critical habitat designations and the expectations associated with "Effective Protection" of Critical Habitat, have led Canadians down a road to the use of litigation to guide decisions and policy. This represents a fundamental shift away from the stewardship approaches previously used for species at risk and for wildlife management in general. Critical Habitat may be best implemented when "Effective Protection" is clearly described upon designation.

P2.27 Raby, GD*; Donaldson, MR; Patterson, DA; Robichaud, D; Farrell, AP; Hinch, SG; Davis, MW; Cooke, SJ; Fish Ecology and Conservation Physiology Laboratory, Department of Biology, Carleton University, Ottawa, Canada, Pacific Salmon Ecology and Conservation Laboratory, Centre for Applied Conservation Research and Department of Forest Sciences, University of British Columbia, Vancouver, Canada, Fisheries and Oceans Canada, Science Branch, Pacific Region, Cooperative Resource Management Institute, School of Resource and Environmental Management, Simon Fraser University, Burnaby, BC, Canada, LGL Limited Environmental Research, Sidney, BC, Canada, Department of Zoology, and Faculty of Land and Food Systems, University of British Columbia, Vancouver, Canada, NOAA Fisheries, Alaska Fisheries Science Center, Fisheries Behavioral Ecology Program, Hatfield Marine Science Center, Newport, OR, USA, Fish Ecology and Conservation Physiology Laboratory, Department of Biology, and Institute of Environmental Science, Carleton University, Ottawa, Canada; *grahamraby@yahoo.com*

The fate of endangered interior Fraser coho salmon caught incidentally in a First Nations pink salmon beach seine fishery in the lower Fraser River.

We used radio telemetry to monitor migration success in endangered interior Fraser River coho salmon (Oncorhynchus kisutch) following incidental capture in a First Nations beach seine fishery for pink salmon in the lower Fraser River, British Columbia. We also evaluated the use of a novel reflex assessment technique (RAMP - Reflex Action Mortality Predictors) for measuring the condition of fish at release and for predicting migration success following a bycatch event. Fifty interior coho salmon were radio tagged and released following incidental capture. Their post-release movement was monitored by fixed-station radio receivers throughout the Fraser watershed (i.e. from tagging site to natal sub-watersheds). We also blood sampled an additional 50 coho in order to profile physiological condition at time of release. In total, 4.8% of coho caught died immediately, while 12% of tagged individuals were categorized as short-term mortalities (i.e., died within 72 hrs of release) and 26% were long-term mortalities, based on tracking data post-release. Time entangled in fishing gear was strongly predictive of immediate mortality, while reflex impairment effectively predicted long-term post-release mortality - individuals with greater reflex impairment at release exhibited higher rates of migration failure. Future studies are needed to quantify natural en route mortality in the absence of fisheries interactions and to develop strategies for reducing mortality of coho incidentally captured in seine nets.

18.4 Radeloff, VC*; Dubinin, MS; Pidgeon, AM; Butsic, V; Kuemmerle, T; UW-Madison; *radeloff@wisc.edu*

National growth of protected area systems over time - evidence for hot moments for conservation

Conservation biology has excelled in identifying conservation hotspots, and conservation planning has developed many tools to select protected areas in space. Much less is known about what constitutes hot moments for conservation, i.e., times when protected area networks grow rapidly. Our goal was to examine trends in the total area protected for each country across the globe to a) test if there are hot moments for conservation, and b) identify conditions favoring hot moments. We analyzed the World Database on Protected Areas, and calculated the cumulative area in IUCN categories I - IV for each country from 1872 to 2009. We found strong evidence for the existence of hot moments for conservation, i.e., short periods during which a large portion of a country's protected areas were created, often followed by decades of stagnancy. In many developing countries, an initial burst of conservation during the colonial era was followed by relatively few new protected areas until the 1980s, and then again rapid growth. In contrast, many developed countries showed little recent protected area growth (e.g., 97% of the protected area in the U.S. was already protected in 1980). Periods of rapid societal change (e.g., the reunification of Germany) often - but not always -coincided with rapid expansion of protected area networks. Conservation efforts must learn to identify hot moments for conservation, because missing these windows of opportunity can be costly.

P1.84 Rai, ND*; Mandal, S ; Madegowda, C; Ashoka Trust for Research in Ecology and the Environment ; *nitinrai@atree.org*

Conservation, History, and Local Knowledge in Biligiri Rangaswamy Temple Wildlife Sanctuary, India.

Conservation efforts rarely acknowledge the history of landscape transformation or incorporate local knowledge, resulting in limited inferences about forest function and adversely impacting the livelihoods of people who depend on and live in protected areas. We argue that an exploration that integrates socio-cultural, historic and ecological issues is essential for the management of conservation landscapes. Using ethnographic information on cultural ecology, counter mapping of sacred sites and cultural spaces, and an understanding of indigenous practice we show that the continued marginalization of Soligas, an indigenous community, has resulted in adverse ecological and political outcomes. Forest composition and structure has changed due to the invasion of weeds, as a result of altered fire regimes, curtailing of forest use, and displacement of Soligas after the establishment of the sanctuary. The mapping of Soliga sacred sites and traditional clan boundaries reveals the mosaic of management, cultivation and use prior to establishment of the wildlife sanctuary. The ecosystem, now valued for its biodiversity, was actively maintained by Soliga practice. A recent State policy that ensures rights to land, forest resources and conservation has opened up the possibility that indigenous communities might once again become stewards of their lands. This progressive legislation is being variably implemented on the ground due to resistance from forest administration and conservationists who fear the erosion of control over forests and conservation. Interdisciplinary studies in protected areas will strengthen claims for increased rights and greater conservation roles for indigenous communities.

SY77 Rainer Luick; University of Rottenburg; *luick@hs-rottenburg.de*

European world heritage of agricultural biodiversity and the high nature value farmland concept

European cultural landscapes have been shaped by farming activities for thousands of years and are thus also correlated with long-time co-evolutionary processes. Such ecosystems are major contribution to the world heritage of biodiversity. In the early 1990s the high nature value farming concept (HNV) was established with the intention to describe types of farming activities and farmland that, because of their characteristics, can be expected to support high levels of biodiversity or species and habitats of conservation concern. The dominant characteristic of HNV farming is its low-intensity, the according significant presence of semi-natural vegetation and high diversity of land cover. Often HNV farming includes low-intensity livestock keeping systems in impressive variations throughout Europe. But HNV systems are more and more exposed to pressures from modern intensives types of agriculture. In the European Unions (EU) Sustainable Development Strategy a commitment was made to halt the loss of biodiversity. But reflecting the actual situation and without major changes in policy and land-use it is regarded as being critical to achieving this. The HNV concept was the model for the development and implementation of the HNV indicator by the EU to assess the impact of the present rural development programmes. In this paper the HNV concept and the delineated impact indicator will be presented. Focus is also given to first practical experiences in various member states of the EU.

SY32 Rajaspera, Bruno*; Ravololonanahary, Hanta; Raik, Daniela; MacKinnon, James; Conservation International/Madagascar, Conservation International; *draik@conservation.org*

Developing Adaptability: The Promise and Pitfalls of Collaborative Conservation

In 2003 Madagascar made an unprecedented commitment to triple the surface area of protected areas throughout the country in an effort to conserve its unique biodiversity and essential ecosystem services. Implementing this commitment involved creating a new legal framework, selecting sites, establishing resource use rules, and developing governance arrangements. The Ankenihney-Zahemana Corridor (CAZ) is among the most advanced in its establishment as a protected area. Having received temporary protected status in 2005, CAZ is a functional Category VI protected area. Relying on key principles of good governance such as transparency, monitoring, and clear rules, multiple partners have worked to develop a co-management system that involves stakeholders at various levels. We describe the partners involved, as well as the co-management structure, its role and its adaptability to a changing context. Progress to date is promising but challenges such as low local capacity for protected area management, communication difficulties due to weak infrastructure and a vast geographic area, and the multitude of participating actors with varying roles remain. In addition, the recent political upheaval in Madagascar has had catastrophic effects on natural resources in much of the country, but the co-management arrangement at CAZ has proven to be resilient against outside interests.

SP11.3 Ramirez Bravo OE*; Bravo Carrete E; Hernandez Santin C; Kelly Vargas KG; Schinkel Brault S ; Avila M; Universidad de las Americas, Puebla, Universidad NAcional Autonoma de Mexico; *ermex02@yahoo.com*

Jaguar Presence in the Mexican State of Puebla, central Mexico

Despite the importance of jaguar existence in the state of Puebla in Central Mexico, its presence and distribution is unknown. We determined the presence and distribution of this felid within the state, as well as determine its relation with human populations in the area. Data was gathered by studying maps to determine places with topographical characteristics and towns that were named after predators; surveys among Government offices, non-governmental organizations, Ranchers Associations and local communities were made, also camera traps were set in order to determine jaguar presence. Six towns and 8 geographical aspects with reference to Tigers were found within the state. Twenty seven government and local ranchers associations were asked for information on big felids, 3 of them had information on jaguar. Out of 105 surveyed people, 60 answered; gathering 98 felid-mentions, from which 23% corresponded to jaguars, 19% to pumas, 12% to ocelots. Confident jaguar reports were gathered from northern Puebla. Camera trapping proved the existence of ocelots and other medium and small carnivores. There were different jaguar representations within the state especially when comparing northern Puebla to other areas. Despite the lack photographic evidence, reports from several years indicate the possibility of vagrant individuals. We conclude that Puebla has two important corridors for Jaguar and other species, one along the Sierra Madre Oriental and another one connecting the latter with the Sierras in Oaxaca. We expect that further development of this project will help to delimit the principal areas used.v

P2.31 RAMOS, R*; PERET, AC; RAMOS, S; MELO, JS; CEPTA/ICMBio-CENTRO NACIONAL DE PESQUISA E CONSERVAÃ Ã O DE PEIXES CONTINENTAIS, UNIVERSIDADE FEDERAL DE SÃ O CARLOS - UFSCar; *roseli.ramos@icmbio.gov.br*

Physical and Chemical Characteristics of Water in the Mogi-GuaÃ§u River, SP, Brazil

Seasonal characterization in surface water quality is important for evaluating inputs of anthropogenic or natural sources. The aim of this study was evaluate the seasonal influence in water quality between Cachoeira de Emas dam and Jaguari-Mirim mouth in the Mogi-GuaÃ§u river. Collections were carried out from April 2003 to September 2004 in two sites of Mogi-GuaÃ§u river. The measured variables were temperature, dissolved oxigen Secchi transparency, electrical conductivity, pH, alkalinity, hardness, nitrate, total phosphorus, inorganic phosphate, total phosphate, nitrite, silicate, amonium and pluviometric precipitation. Principal component analysis (PCA) point out the main indicators of water quality that allowed evaluating the situation of quality of the Mogi-GuaÃ§u river in the sampled sites. The results indicate seasonal influence between two sites due to pluviometric precipitation upon the limnological variables dynamic, especially as to inputs and dilution of nutrients in the system.

P2.29 Ramos, SM*; Ramos, RO; Milano, L; CEPTA/ICMBIO - CENTRO NACIONAL DE PESQUISA E CONSERVAÃ Ã O DE PEIXES CONTINENTAIS, CEPTA/ICMBIO - CENTRO NACIONAL DE PESQUISA E CONSERVAÃ Ã O DE PEIXES CONTINENTAIS ; *sergio.ramos@icmbio.gov.br*

Ocurrence of the African Cat Fish Clarias garipinus (Burchell, 1822) Exotic Fish in Turvo River, State of SÃ£o Paulo, Brazil

Introduction of exotic species represent one of the most serious problems to be solved in order to protect biodiversity and natural ecosystem. In the Turvo river, state of SÃ£o Paulo, southeastern Brazil, our interest in C. gariepinus was stimulated by fishermen who reported high catching African catfish and a decline in the catch of native fishes. The purpose of this study was evaluate the ocurrence and establishment of this species and also generate information to the development of action plans for minimizing possible impacts of this species. Fish collections were carried out at differents sites (lateral lakes) and located with GPS (Global Positioning System), using gillnets with different mesh sizes in May, August and December 2008. The observed parameters were: weight, length, sex ratio, condition factor (K) and gonado-somatic index (GSI). Fifty two specimens were sampled, 22 males and 30 females. Males varied in size from 59 to 95 cm, whilst females from 31 to 69 cm. Males varied in weight from 1300 to 5300 g and females from 410 to 3000 g. In December all fishes sampled were mature and all females presented GSI above 12%, suggesting potential for reproduction associated to the raining period. Based on our data we conclude that C. gariepinus is well dispersed and already established in this area and that the obtained information serve as tools to the development of action plans for control this species.

P1.159 Randall, LA*; Barclay, RMR; Reid, ML; Jung, TS; University of Calgary, Yukon Department of Environment; *learandall@gmail.com*

The Effects of Natural and Anthropogenic Forest Disturbance on Bats of the Southwestern Yukon

Natural and anthropogenic sources of forest disturbance affect the habitat use of bats. Using Anabat II bat detectors we investigated the effects a recent infestation of spruce beetles (Dendroctonous rufipennis), forest fire, and logging, on the habitat use of bats (Myotis lucifugus) in the southwestern Yukon. In general, bat activity was greater in beetle-affected forests, less in burned, and least in logged forests, but this depended on proximity to water and time of year. This pattern may be explained by increased predation risk in open areas near solstice or roost abundance, but could not be explained by temperature, wind speed, avoidance of clutter or insect abundance. In beetle-affected forests, bat activity was not significantly affected by density of dead trees, canopy closure, or time of year. However, bat activity was inversely related to tree density which may imply that the eventual thinning of trees caused by tree mortality may benefit bats.

P2.121 Randell, H.; Lewis, Keith P.*; Soulliere, C.E.; Department of Environment & Conservation, Government of Newfoundland & Labrador, St. John's, NL A1B 4J6, Canada; *colleensoulliere@gov.nl.ca*

The influence of predator control on North American ungulates: A meta-analytic review

The removal of predators from a system may provide a means of increasing prey populations but predator control in big-game systems is controversial, costly, and difficult to implement. Since predator control is often most efficiently accomplished through the killing of animals, assessing its effectiveness is important for ethical, scientific, and financial reasons. In 1997, the National Research Council (NRC) established guidelines for appropriately implementing predator control programs. Despite the invaluable review of the NRC, there remains little quantitative analysis of the effect of predator control as a means of managing ungulate prey or their predators, specifically on the duration of programs, the size of the area required, the methodology, and the number of animals that should be removed. Using a meta-analytic approach, we evaluated >30 North American predator control programs conducted for big-game management. Predator control programs were most likely to result in increased ungulate populations when multiple removal methods were employed over multiple years and when a high percentage of the predators were removed. In addition to the guidelines provided by the NRC, decisions respecting the use of predator control as a management or conservation tool should consider the likelihood of producing the desired result.

SY15 Rantala, SE; Vihemaki, HM*; University of Helsinki, World Agroforestry Centre; *salla.rantala@helsinki.fi*

Human impacts of compensated exclusion from protected areas: lessons from the establishment of the Derema Corridor, north-eastern Tanzania

The establishment of a conservation corridor between forest reserves in the East Usambara Mountains, Tanzania, involved excluding hundreds of small-holder farmers from the area and paying monetary compensation for their livelihood losses. Through a combination of qualitative and quantitative social research methods, the social impacts of the intervention and the livelihood responses of affected people were investigated. The results suggest that a failure to unambiguously identify rights-holders to resources in the area, inadequate commitment and follow up by the involved conservation agencies, and limits to the agency of local actors in the arenas of decision-making where the conditions of conservation and compensation were negotiated contributed to the unpredictability of the process and its outcomes, which were mostly experienced as negative. Many of the affected rights-holders, especially women, were not compensated for their lost assets. The poorest people were among the most affected whereas few wealthy people received the largest compensations and were able to invest in improved livelihoods. Clear definitions of local rights to resources coupled with fair and timely compensation, inclusive mechanisms for participation, and a sustained presence and commitment of the conservation agencies, are seen as pre-requisites for forest conservation interventions involving compensated human displacement that are to avoid negative social consequences to the affected people.

P2.102 Ratnayake,CP*; Kotagama,SW; Field Ornithology Group of Sri Lanka,Department of Zoology,University of Colombo,Sri Lanka.; *chamindapradeep1@gmail.com*

Conservation of tropical magpie (Urocissa ornata) in fragmented forests: Habitat-based management is not a proximate answer

Sri Lanka's endemic biota is largely restricted to tropical rainforests in south-western part where continuous fragmentation occurred. Sri Lanka Magpie is a cooperatively breeding, threatened endemic bird which confined to these wet zone forests. Habitat use and reproduction are important factors to evaluate population status of this declining bird species. We initially analyzed the geographic range size to infer the population distribution in fragmented forests. Subsequently, intensive nest-site selection study and nest-survival modeling performed to determine factors that affect Daily Nest Survival-DNS or predation rate. We used two sets of models to build relationship with DNS, by using programme MARK, and included a-priori selected covariates at two levels: habitat level- distance to water; DBH >5, DBH 30

SY31 Ray, Justina C.; Wildlife Conservation Society Canada; *jray@wcs.org*
Boreal Forest Caribou in Canada
Caribou are among the most challenging elements of boreal forest biodiversity to conserve, owing to factors such as the species' inherently low reproductive capacity, association with older coniferous forests, and naturally low densities. Listed as threatened across Canada and in most corresponding jurisdictions, caribou have become a symbol for the conservation of this biome. In spite of mounting scientific consensus regarding the relationship between anthropogenic disturbance and caribou population persistence, the progress on the recovery front has in most cases not extended beyond planning. The persistence of many boreal forest caribou populations appears incompatible with the ongoing pace of industrial development, as illustrated by the poor condition of those contending with resource extraction activities within their ranges. Maintaining the current stronghold of this wide-ranging species in the northern parts of its range will be an important test under scenarios of an expanding resource extraction mandate and a changing climate. This presentation will review the status of this ecotype in Canada, exploring its utility as a conservation tool to guide the management of cumulative effects in sensitive northern boreal forest environments.

23.1 Rayfield, B*; Fortin, M.-J.; Fall, A; Schmiegelow, F; McGill University, University of Toronto, Simon Fraser University, University of Alberta; *bronwyn.rayfield@mail.mcgill.ca*
Quantifying spatio-temporal connectivity of woodland caribou habitat
Woodland caribou (Rangifer tarandus caribou) populations are increasingly constrained by the spatio-temporal pattern of land-use. Conserving populations requires protection and restoration of habitat patches and movement pathways connecting them. Most studies that quantify habitat connectivity at spatial scales relevant for conservation have been applied to static snapshots of landscapes. We apply graph-based connectivity analyses to identify spatio-temporal links describing movement through time of a rapidly-declining caribou herd in an industrial landscape in west-central Alberta. We delineated areas of winter occupancy from 2000-2006 using telemetry data from collared individuals (n = 24). Spatio-temporal graphs were constructed for pairs of consecutive years, with graph nodes representing occupied areas. Links between nodes have a temporal length equal to one year and a spatial length equal to the distance between occupancy centroids. Areas of winter occupancy were dynamic, reflecting spatial overlap among consecutive years from 2% to 10%. Spatio-temporal links revealed changes in size, location, and extent of occupied areas. We observed a four-year decrease followed by a two-year increase in the proportion of occupied, anthropogenically-disturbed area which may be attributable to changes in landcover, animal behavior, or both. Spatio-temporal connectivity analysis can increase understanding of factors affecting species persistence and support conservation planning.

8.1 Real, R.*; indigenous communities of the municipalities of Atabapo, RÃ–o Negro, and Maroa; Ferri-YÃ¡Ã±ez, F.; Olivero, J.; Acevedo, P. ; Lobo, J.M.; Universidad de MÃ¡laga, Amazonas, MNCN-CSIC, MNCN-CSIC; *rrgimenez@uma.es*
Integrating Indigenous and Scientific Knowledge to Improve Amazonia's Management: NDVI, Traditional Activities and Bushmeat Species
A scientific expedition to the Venezuelan Amazonia was carried out in June 2009. It was focused on the integration of scientific technologies and methods with traditional and local knowledge held by indigenous communities, in order to implement an integrative approach to the conservation of Amazon rainforest. The scientific approach was based on generating a map of â vegetation types' using NDVI layers. To do this, we obtained 218 layers (03/2000-03/2009) from the MODIS sensor. The layers were aggregated in periods of two months to improve their quality. Unsupervised classification and subsequent similarity analysis were carried out on these maps and an optimal number of 16 classes of NDVI were obtained. Six indigenous communities were visited to check whether these NDVI classes have a meaning for indigenous people. They identified, on maps, those territories used for hunting, fishing, and agriculture activities, and also the location of some relevant wildlife species, mainly peccary, deer, agouti, curassow, and tapir. The human activities and peccary and deer were significantly linked to concrete NDVI classes. Finally, the NDVI maximum has been declining along the last 9 years, mostly in the upper classes. Results evidence that it is feasible to integrate indigenous and scientific knowledge in a common endeavor to manage and preserve biodiversity, and to enhance indigenous capability, in the Amazonia.

SY32 Reed, MG; Mendis-Millard, S; Henderson, A*; University of Saskatchewan, University of Waterloo; *maureen.reed@usask.ca*
Evaluating Collaborative Conservation: A Framework for Early Assessment
Not all collaborations are created equal. Nor should they be. In this paper, we define collaborative conservation as multi-party projects, programs, or decision-making processes that use a participatory approach to achieve conservation objectives. Research in collaborative conservation tends to establish generic evaluation criteria against which cases are assessed yielding mixed assessments. Given the variable conditions under which collaboration takes place, we suggest evaluations of collaborative conservation should be tailored to the local context and that a set of evaluation criteria be considered prior to parties engaging in collaboration. To this end, we propose a framework of factors that can shape the outcome of collaborative arrangements. These include: rationale for collaboration; goals and objectives; representativeness and inclusion; timing of engagement; type of engagement; support mechanisms; and benefits to participants. We demonstrate how the weighting of these factors varies according to differences in leadership or support for collaboration. We propose that sensitivity to differences in leadership and influential factors can improve chances of achieving desired conservation outcomes and encourage researchers and/or evaluators to become more directly involved in the collaboration process.

14.6 Reed, SE*; Hilty, JA; Theobald, DM; Department of Human Dimensions of Natural Resources, Colorado State University, North America Program, Wildlife Conservation Society; *sarah.reed@colostate.edu*

Building Conservation into Residential Development: Guidelines and Incentives for Conservation Design in County Development Regulations

Rural residential development is currently the fastest-growing land use in the U.S. Conservation development has emerged as a promising strategy for minimizing the ecological impacts of rural development and protecting biodiversity on private lands. Widespread adoption of this approach requires development regulations that allow flexibility in site design to achieve conservation objectives and encourage management activities to protect ecological resources over time. We examined county development codes in 11 western states, and of 414 counties, 32% had at least one ordinance that establishes guidelines or creates incentives for conservation development. Rates varied widely among states, ranging from two counties (6%) in New Mexico to more than half of counties in Washington and Colorado. We reviewed these regulations on the basis of their conservation objectives, breadth of applicability, and guidelines for ecological site analysis, protected area design, protected area management, and developed area design. In addition, we investigated various factors that might explain the adoption and rigor of conservation development regulations, including recent land use change, county demographic characteristics, planning capacity, and state enabling legislation or model ordinances. We demonstrate the development patterns likely to result from typical design guidelines and conclude with recommendations for how regulations could be improved to increase the conservation value gained from conservation design.

SY33 Reed, Thomas E*; Waples, Robin S; Schindler, Daniel E.; Meir, Eli; Mantua, N.; University of Washington, National Marine Fisheries Service, SimBiotic Software; *tomreed@uw.edu*

Adaptation and persistence of Pacific salmon facing climate change: an individual-based modeling analysis

Climate change impacts on Pacific salmon have far-reaching ecological and economic consequences given their pivotal role in freshwater, terrestrial and marine ecosystems and their importance to human communities. Predicting these impacts is complicated by obstacles to downscaling coarse-grained climate models to salmon watersheds, resolving uncertainties in climate change scenarios, and understanding mechanistic responses of salmon and their habitats. Timing traits are likely to face strong, potentially conflicting selection pressures as the optimal periods for migration, spawning, emergence and growth shift with abiotic and biotic changes in freshwater and marine environments. We developed an individual-based model to explore demographic consequences of plastic and evolutionary responses in timing traits for different salmon life histories, under a range of scenarios. We characterized climate-induced selection for a generalized coho (Oncorhynchus kisutch) life history, and applied this model to several US and Canadian watersheds, for which downscaled projections of changes in temperature and flow profiles under a range of climate scenarios were available. Preliminary results suggest that phenotypic responses might facilitate persistence in some populations and regions, whereas extinction is unavoidable for others. Our model provides a flexible tool to explore how evolutionary and ecological processes interactively affect salmon persistence in a changing climate, ultimately informing management actions.

16.6 Reid, DG*; Doyle, FI; Wildlife Conservation Society Canada, Wildlife Dynamics Inc.; *dreid@wcs.org*

Do different spatial scales of timber harvest disturbance affect dynamics of snowshoe hare population fluctuations?

Disturbance scale affects the disturbance's influence on ecosystem function. In sub-boreal British Columbia conventional timber harvesting typically leaves small clearcuts (40-200 ha), creating landscapes with spatial configurations different from those following fires (patches 500 ha). From 2001 through 2007 we monitored abundance of snowshoe hares (Lepus americanus; fecal pellets counts), a species selecting regenerating disturbances, and their obligate predator, lynx (Lynx canadensis; scat deposition rates and snow tracks), a species with home range similar in size to fire-created patches, in three landscape types (2,000 ha each): (i) conventional harvesting; (ii) extensively disturbed (> 80% burned or cut in last 40 years); (iii) no stand-replacing disturbance in last 70 years. Only in the extensively disturbed landscapes did hare density change significantly between years (0.6 to 2.3 hares/ha, similar to a cyclic increase, peak and decline), and exceed the apparent threshold for boreal lynx reproduction of 0.5-1.0 hares/ha. Hare abundance was consistently higher in the extensively disturbed landscape for all age classes of forest. Lynx were rare in conventionally harvested and undisturbed landscapes. At a landscape scale appropriate to lynx home ranges, patch size of disturbance affects hare population dynamics. Conventional timber harvesting seems to dampen the amplitude of population change, possibly by enhancing mortality by generalist predators.

SY68 Reid, FA; Ducks Unlimited, Inc; *freid@ducks.org*

Seeking Protection and Conservation for the World\'s Tiaga

Circumpolar coniferous forests of the Northern Hemisphere create the largest land biome, the Tiaga. Yet climate change and resource extraction industries place this biome at risk. This Pan-Boreal Forest contains over 40% of the globe\'s Frontier Forests and vast stores of carbon, twice the carbon density of tropical forests, and greater than any other terrestrial carbon sink. Recently glaciated, receeding ice left landscapes rich in wetlands, lakes, streams, and bog environments. These great stores of freshwater, combined with carbon sinks, provide one of the Earth\'s greatest shields for climate change. Multinational industries export products from the Tiaga for consumption and processing to Russia, Europe, United States and Canada. Several conservation campaigns are currently led by indigenous people, conservation oranizations, and progressive industries and governments. In Russia, the Tiaga Rescue effort seeks to protect all blocks of wilderness 50,000ha or greater. The Green Belt of Fennoscandia seeks to protect 100,000ha in the last blocks of forests on the Finnish-Russian border, while Alaska efforts seek greater protection for interior state, native, and Bureau of Land Management lands. The Boreal Framework in Canada seeks protection of 50% and conservation in the other half of the entire system. Bold leadership is manditory in all sectors.

P1.103 Reid, M.L.*; MÃ©thot, J.; University of Calgary; *mreid@ucalgary.ca*

Are Forest Edges Barriers to Bark Beetles?

Landscape heterogeneity and fragmentation may reduce the abundance and dispersal of animals. One mechanism may the reluctance of animals to cross areas of non-habitat. This idea has been implemented in management strategies to limit the spread of pests. We investigated the extent to which forest harvesting affects the local distribution of three species of bark beetles (Scolytinae) by trapping beetles near and far from harvest edges in both intact forests and harvested ones (clearcuts and thinned stands). Fewer beetles were caught in clearcut stands than in adjacent intact forests, but there was no effect for thinned stands. However, beetles captured in clearcuts had more fat than those in intact stands. Moreover, the number of beetles captured in harvested areas likely underestimated the local abundance because the likelihood of encountering traps is expected to be low because of movement paths and pheromone dispersion. We also did not detect a build-up of beetles at the forest edge. Thus, although our beetle captures generally supported the idea that dispersal is reduced through non-habitat, clearcuts were not an absolute barrier particularly to individuals with greater energy reserves. The same reduction in dispersal across non-habitat areas may have different implications for pest species and those at risk, and should be considered in forest management.

P1.169 Reinaldo Lourival*; Jerome Touval; Lucyana Barros; Leonardo Sotomayor; Marcelo Matsumoto; The Nature Conservancy ; *rlourival@tnc.org*

Viability, Management and Threats an approach to measure Effective conservation in the Amazon

Protected areas and indigenous lands already declared in the Amazon, are covering approximately 333 million hectares (Â± 53, 7% of the area evaluated), their level of implementation is extremely variable. We evaluated the hectarage of 204 different ecological systems (Natureserve, 2008) in regards to their viability, threat levels and coupled this information the efforts governments and communities are devoting to effective management (i.e. planning, governance and resources). We focused the analysis on both, the representation of terrestrial ecological systems that naturally occur in Amazon basin and how effectively managed they are, on these reserves and communal lands. We found that 40% (83) of ecosystems captured by reserves can be considered to reach a 10% threshold for effectively conserved area, using the VMT scoring system. The effectiveness is lower in areas considered under higher risk of climate change and human disturbance, mostly in eastern Amazon at the "Brazilian deforestation arch" and at the foothills of the Andes, the Tepuyes in Venezuela and Beni savannas in Bolivia.

SY32 Reid, Robin S.; Center for Collaborative Conservation, Colorado State University; *robin.reid@colostate.edu*

Challenges and Opportunities in Collaborative Rangeland Conservation

Herders and herder communities in rangelands around the world are experimenting with different models to manage and conserve large landscapes as a strategy to maintain herd movement, secure land access, increase profitability and improve rangeland health. There is considerable promise in these approaches, but also high complexity and significant challenges. Challenges to these efforts include increasingly unpredictable climate, the high mobility of some herding populations, fuzzy boundaries between families and groups, mixed communal-public-private land ownership, and families that are land / livestock-rich and cash-poor. Collaborative groups struggle to achieve a triple win-win-win of strong socio-economic returns, rangeland health and equity, many make significant progress in one or two of these goals (creating a â win-win-small loss'). Many models focus on building boundary-spanning institutions (or individuals) that are responsible to a diverse group of stakeholders to build common ground and trust, craft effective and lasting processes, share and foster responsibility, and create social safety nets. Researchers are also creating new models to nimbly respond to the needs of communities and allow herders to become researchers themselves. This presentation will use examples from case studies from Africa, Asia and the US West to build a synthesis of current challenges and future opportunities for these approaches.

SY72 Reining, Conrad; Wildlands Network; *conrad@wildlandsnetwork.org*

Eastern Wildway Megacorridor Design - Large Landscape Conservation in the backyard of 140 million people.

For years, conservationists have envisioned a network of lands in Eastern North America that would connect the Acadian forests of Maritime Canada with the Everglades in Florida. This network would link together some of North America's most treasured national parks, preserves, forests, scenic rivers and wild places - places as diverse as the Cape Bretton Highlands, Adirondacks, Catskills, Great Smoky Mountains, and Okefenokee Swamp. Yet these large habitat blocks are not enough; to facilitate the flow of life across the entire landscape, these nodes must be linked by corridors of habitat that allow the movement of wildlife and natural processes, while also supporting farming, forestry, and recreation. A well-connected landscape is likely also more resilient in the face of climate change. Many these habitat corridors fall on private land, and may require restoration to ensure their full ecological effectiveness; the restoration and land trust communities are a vital part of landscape-scale conservation. This conservation is also taking place in a landscape this is close to many of the largest urban areas of Eastern North America. This talk will explore large-scale conservation planning efforts, including efforts to identify critical connectivity and areas that are especially important in the face of climate change. It will also explore key challenges and next steps in building networks of conservation practitioners who can implement this large-scale conservation initiative.

SY24 Rempel, RS*; Baker, J; Gluck, MJ; Centre for Northern Forest Ecosystem Research, OMNR, Applied Research and Development Branch, OMNR, Forest Policy Division, OMNR; *rob.rempel@ontario.ca*

Treating Policy as Hypothesis: An evaluative framework for assessing success of biodiversity conservation strategies

In Ontario, the Crown Forest Sustainability Act (CFSA) requires forest managers to emulate natural disturbance as a mechanism for conserving biodiversity and ecological processes. The intent of the CFSA is implemented through landscape and stand level Forest Management Guides. In this presentation I will discuss stepwise development of an evaluative framework based on focal songbird species to test whether new forest management guidelines are successful in meeting these conservation objectives. We selected 13 focal species associated with the range of natural variability in forest structure as our "songbird community bioassay" for assessing success of conservation strategies, and then developed resource selection functions, forest harvest simulations, and natural disturbance simulations to project the effect of alternative management polices and practices on the focal songbird community. In this "virtual" assessment we found that some spatial harvest planning strategies that focus on conservation of moose and aquatic reserves performed poorly relative to planning strategies that reflect more natural disturbance processes. We then present a field-level monitoring strategy that treats policy as hypothesis, and is designed to test whether the management options now incorporated into the Forest Management Guides has been successful in conserving forest songbird biodiversity.

SY73 Reynolds, John D.; Simon Fraser University; *reynolds@sfu.ca*

Status and Trends of Biodiversity in the Pacific Maritime Ecozone of Canada

This review is presented in the context of Canada's commitments to the Biological Convention on Biodiversity. This Ecozone extends along the coast from southern British Columbia to the northwestern Yukon, including Vancouver Island and Haida Gwaii. Mountains cover most of the region, and their ecosystems are relatively intact due to inaccessibility. The Ecozone contains nearly all of Canada's old-growth temperate rainforests, and many of the richest carnivore-ungulate assemblages in North America. Most changes have occurred in the south, due to pressures of high human densities on land conversion. For example, southern Vancouver Island and adjacent Gulf Islands contain Garry Oak habitats which are unique to Canada and shrinking rapidly. Conversion of wetlands in the lower Fraser Valley, includes 80% of tidal salt marshes having been lost by the 1930s, and 86% of streams classified as lost, endangered, or threatened. Remaining wetlands have high international significance for migratory and wintering shorebirds and waterfowl, and host Canada's largest wintering populations of birds of prey. Recent and projected impacts of climate change pose an important threat to aquatic habitats and key species such as salmon, which provide a good index for changes in the rate of biodiversity loss. New threats include over 600 license applications for independent power projects, with associated roads and power line corridors. Thus, news since the Johannesburg Summit is mixed: most of the northern part of this EcoZone continues to support relatively intact ecosystems and nationally significant habitats and species, whereas species-rich southern areas face growing pressures.

P1.64 RESSURREICAO,A*; Gibbons, J; Kaiser, M; Dentinho, T; Gareth Edwards-Jones; University of the Azores, Bangor University; *aressurreicao@uac.pt*

Are WTP bids consistent over time?

Studies exploring the consistency of WTP bids for environmental goods over time are missing in the literature. Stated preference methods are usually undertaken once and provide a snapshot in time. A contingent study was repeated over three years (2007- 2009) to estimate marginal values for increase levels of marine biodiversity loss in the waters around the Azores archipelago amongst visitors and residents. A face to face survey was undertaken to obtain valuations for 10% and 25% decreases in the species richness of fish and all marine species from the current level. Values allocated to prevent a decrease in the species of fish increased for both scenarios. The WTP to prevent a loss in the number of all marine species varied differently: bids for the 10% of loss scenario decreased in 2008, though for the 25% of loss scenario no significant differences were found between surveys. Results suggest an increasing trend in the value of consumable goods (fish) that mirrors the trend for mean market value of fish and the global market projections for a growing demand for fish. Non market goods as marine biodiversity display a fairly high and regular value across time and a clear message towards conservation is given by the society.

P1.203 Richardson, K; Castro, I; Armstrong, D*; Brunton, D; Ecology Group, Institute of Natural Resources, Massey University, Ecology and Conservation Group, Institute of Natural Sciences, Massey University; *katerichardson@slingshot.co.nz*

Impact of differing release strategies on the long-term survival of a reintroduced population of an endangered New Zealand passerine.

Reintroduction is a commonly used tool in the recovery of endangered species, and has been an important component of the conservation of the endangered endemic passerine, the hihi or stitchbird (Notiomystis cincta) in New Zealand. Previous studies, in hihi and other species, have examined the impact of a variety of release techniques on short-term survival of individuals in the post-release phase. However the impact over longer term periods is rarely looked at, despite an increasing awareness of the impacts of chronic stress associated with reintroductions. This study examined the effect of two differing release strategies - immediate and delayed release - on the survival of reintroduced hihi over a six-month period at a mainland restoration site. Results indicated that while there was no difference in short-term survival, delayed-release birds had lower long-term survival probabilities than those released immediately. This suggests delayed-release strategies have a considerable adverse effect, and I recommend they not be used again with hihi.

3.2 Ricketts, Taylor H.*; Lonsdorf, Eric; WWF, Lincoln Park Zoo; *taylor.ricketts@wwfus.org*

Mapping the margin: Comparing marginal value of tropical forest remnants for ecosystem services

Nature supports human livelihoods and economies in countless ways. These ecosystem services powerfully link conservation and human well-being, with promise to expand the constituency, and funding, for conservation. Fulfilling this promise, however, requires scientific information that directly informs specific conservation and policy decisions. Which habitat patches, for example, provide the highest marginal value of services in a landscape? Such information can help target and optimize conservation investments to meet needs of people and biodiversity. Here we use a simple tool for modeling and mapping ecosystem services, InVEST, to predict the marginal value of different forest remnants in a Costa Rican agricultural landscape. We use crop pollination services as a model, and use InVEST to estimate the value of forest patches in supplying wild pollinators to surrounding coffee fields. We then simulate the destruction of each patch in turn, and calculate the resulting reduction in coffee production throughout the landscape. We find that forest remnants vary several-fold in marginal value. Valuable remnants are often, but not always, attractive also for biodiversity conservation. Conservation will therefeore involve both win-wins and tradeoffs, but understanding both can help optimize investments to improve biodiversity and human well-being.

P2.35 Rico, Y.*; Wagner, H.H; Univerisity of Toronto, University of Toronto; *yessica.rico@utoronto.ca*

Habitat Fragmentation on the Genetics of Two Typical Calcareous Grasslands

Calcareous grasslands in Central Europe are semi-natural communities with high species richness originated by sheepherding. Recent land use changes caused a decline in the number, extent, and connectivity of fragments. We selected two calcareous grasslands from the Southern Franconia Alb in Germany to investigate whether habitat fragmentation had an effect on the genetic diversity and structure on populations with contrasting population size and connectivity. Twenty-nine populations of Dianthus carthusianorum and nineteen populations of Anthyllis vulneraria distributed over the landscape were analyzed with seven and eight polymorphic microsatellites. For both species, population size was significantly correlated with allelic richness (r = 0.7 p

SY72 Ridgeway, R; Patagonia Inc.; *RICK_RIDGEWAY@patagonia.com*

Patagonia Inc and The Story of Freedom to Roam

The power of storytelling is an untapped asset in advancing conservation biology. The best science means little if it cannot be relayed as a story and used to inspire change. There is a growing disconnect between the scale of mounting conservation challenges and societal will to address them. We need to find new paths to achieve conservation success or the next great extinction crisis may be the story of our own demise. Sustainability is a core value Patagonia Inc and our founder Yvon Chouinard said it was our Sacred Trust with the planet. In 2008, Patagonia launched an innovative conservation effort known as Freedom to Roam to advance wildlife corridor conservation and ecological connectivity. Freedom to Roam represents a new model for corporate social responsibility and is comprised of a coalition of people, businesses, conservation and recreation groups whose goal is to bring awareness of connectivity conservation to the forefront of public understanding. Much knowledge has been generated by the conservation science community during the past two decades on connectivity. Yet, somehow this knowledge has had limited penetration into the din of public discourse. How can we move the conversation of connectivity to the person on the street and into the corridors of power? This is the story of Freedom to Roam.

P2.147 Righi, C.; FundaciÃ³n Temaiken; *pgonzalez@temaiken.org.ar*

Osununu Natural Reserve: an opportunnity for conservation and local development (Argentina, Misiones province)

In the San Ignacio region, southeast of Misiones, co exist great biodiversity, endemism and landscapes of extreme ecological value. The peculiar geological formations connect typical flora and fauna with the historic remains of Jesuit buildings. These characteristics make it a place of high priority for conservation considering it is greatly threatened by human activities. Although there is a protected area, the TeyÃº CuarÃ© Provincial Park (78 hectares), it requires a conservation buffer zone and many species need larger continuous habitat for their survival. In this context, in 2005, was created the "Osununu" Reserve (174 hta) which main objectives are: to conserve the ecosystem, protect the wildlife and flora, promote scientific research; and educate the residents. In order to theses, Osununu is declared Private Natural Reserve; there have been developed flora and fauna assessments and a community workshop to define strategies to conserve the region. Nowadays it is developing an "Experimental Biological Station", an ecotourism plan (encourage controlled recreation and provide opportunities for environmental education), and other activities to constitute conservation corridors, zone damping areas of public dominion, reinforce and educate the population in natural, historical and socio-cultural values of the area. With the implementation of suitable norms and guidelines for the conservation of the existing resources, the protection of the natural ecosystems is guaranteed.

P1.7 Rintoul, JLP*; Kotchea, KCC; University of Alberta; *rintoul@ualberta.ca*
Small trees worth protecting? Day roost selection by Noctilio bats in Costa Rica
In spite of greater bat species diversity in tropical forests, most work on forest and tree characteristics that are favorable to bats has been conducted in temperate forests. In February 2009, as part of a long-term study of roost selection that takes place during an undergraduate field course, we radio-tagged three Noctilio albiventris and two N. leporinus to locate their day roosts. We collected data in the same dry forest fragment as in 2005 and 2007, bringing the total radio-tagged Noctilio to 12. As in past years, all Noctilio roosts were located within 40 m of water and of the seven roost trees that were identified since 2005, four were occupied by bats tagged in 2009, indicating long-term roost occupancy in those species. Four of the roosts were in Terminalia oblonga which grow near water and form extensive cavities within their relatively small trunk (dbh < 0.8 m compared to 1.2 - 2 m for the other tree roost species). Because tropical forest composition is characterized by high tree species richness and low population densities, we expected that bats would select large trees without preference for species. Our results suggest that â large size' of trees is not a sufficient indicator of the conservation potential of tropical forest fragments.

P1.148 Robards, M.D.*; Reeves, R.R.; U.S. Marine Mammal Commission, Okapi Wildlife Associates; *mrobards@mmc.gov*
The Global Patterns and Governance Issues Associated with Human Consumption of Marine Mammal Products
The consumption of marine mammal products drives tense global struggles over conservation, rights, and values. Since 1990, people in at least 106 countries have consumed the products of approximately 80 species of marine mammals. Most such consumption is poorly regulated, if regulated at all. Geographic remoteness and the migratory behavior and highly mobile character of most exploited marine mammals present both theoretical and practical challenges to ensuring that any use is sustainable. In seeking insights to inform governance institutions that better accomplish conservation goals, we first describe three broad categories of marine mammal procurement - Targeted, Non-Targeted, and Opportunistic. After assigning consumption patterns to these three categories, we focus on regions where consumption is related to food or economic security. Here, the transition from opportunistic or non-targeted to targeted procurement is contributing to what Read (2008) called a "looming crisis," a crisis requiring approaches to conservation that transcend a marine mammal-centric view of governance. Our results reinforce lessons learned for terrestrial harvests of wild meats, i.e. both the ecological needs of marine mammals and the local socio-cultural needs of people must be incorporated into governance institutions. This requires closer attention to why people might cooperate to both meet local human needs and accomplish global conservation goals, despite differences in worldviews.

SP6.7 Roberge, J-M*; Mikusinski, G; Angelstam, P; Dept. of Wildlife, Fish, and Environmental Studies, Swedish University of Agricultural Sciences (SLU), Dept. of Ecology, Swedish University of Agricultural Sciences (SLU), School for Forest Engineers, Swedish University of Agricultural Sciences (SLU); *Jean-Michel.Roberge@vfm.slu.se*
Woodpeckers as Focal Species for Forest Conservation Planning
Due to incomplete knowledge about the myriads of species, structures and processes in forest ecosystems, conservation planning must involve the use of shortcuts. One possibility is to use the requirements of focal species as a guide for setting conservation and restoration targets. Woodpeckers (Aves: Picidae) have been proposed as potential focal species because of their dependence on attributes that are negatively affected by forest management. Based on large-scale field studies, we evaluated the usefulness of woodpeckers as focal species for forest biodiversity conservation across regions in northern Europe. Woodpecker species richness was positively related to forest bird diversity, as was the occurrence of specialized woodpecker species such as the three-toed (Picoides tridactylus), middle spotted (Dendrocopos medius) and white-backed woodpeckers (D. leucotos). Presence of the white-backed woodpecker was also related positively to the species richness of red-listed deciduous-forest cryptogams. The occurrence of specialized woodpeckers was positively related to forest naturalness and conservation value. Based on the woodpeckers' requirements for different types of dead wood and large trees, we suggest tentative targets for management which are expected to benefit threatened species sharing the same forest types. Our studies, together with similar findings from North American forests, suggest that woodpeckers may be a useful focal group for forest biodiversity conservation.

17.6 Robert, A; MusÃ©um National d'Histoire Naturelle; *arobert@mnhn.fr*
Is FST a good predictor of extinction?
The organization of neutral genetic variation has long been used as a diagnostic tool to infer important demographic properties of populations. Recently, it has been shown that this information can also be used to estimate the magnitude of genetic problems in fragmented populations. A promising further step of this research is to assess whether neutral genetic indicators can serve to predict and compare the viabilities of endangered species. I use modeling to explore how ecological metapopulation settings (habitat configuration, dispersal, stochasticity) are related with equilibrium and transitory neutral genetic indicators (such as FST), changes in genetic load and metapopulation viability. Results indicate that genetic indicators are poor predictors of species viability, for two main reasons. First, while neutral genetic variation accurately reflects fitness loss, it does not provide enough information to predict viability in the presence of environmental perturbations. Second, the use of indicators to compare different species is limited if species have heterogeneous demographic histories. Many species are threatened by recent human induced habitat changes. In most cases, genetic indicators may not have reached their equilibrium value in the altered habitat, which make them poorly representative of the current demography and future viability of the species.

P2.7 Roberts, David*; Hamann, Andreas; University of Alberta; *d-ro@shaw.ca*

Reconstructing Tree Species Habitat, Migration, and Genetic Diversity in Western North America Since the Last Ice Age.

Knowledge of how tree populations have responded to past climate fluctuations through migration, adaptation, and extirpation is key to properly understanding and managing species responses to current and future climate change, from both an ecologic and genetic perspective (1). My research involves simulating potential habitat of key tree species of western North America for several time steps since the last ice age. Also, subsequently comparing the modelling results with fossil and pollen data in will identify potential locations of species' glacial refugia, providing insight into migration patterns and genetic development of modern species-key responses to changing climates (2). To estimate past climate to 18,000 years ago (the Last Glacial Maximum), I have used back-predictions from several global-scale general circulation. Modern climate niches of species were characterized and this information was used to predict past species distributions. By comparing model outputs for the Last Glacial Maximum with the published genetic reconstructions based on field data, potential areas of geographic refugia have been isolated and reconstructions of the distinct genetic populations have be attempted.

P1.38 Robinson, HS; DeCesare, NJ*; Hebblewhite, M; Musiani, M; University of Montana, University of Calgary; *nick.decesare@umontana.edu*

Predator-mediated indirect effects of fire on caribou habitat in Banff and Jasper National Parks

Fire management is an important tool in the conservation of ecosystems in Canada's national parks. Both natural and human-induced fires can benefit certain species, while other species may be negatively impacted. We used GPS collar data for wolves (N=34), primary prey species (elk, N=11; moose, N=28) and a threatened secondary prey (caribou, N=40) and resource selection analysis to model the effects of fire on these species' habitat and interactions. Wolf distribution in the study area was driven by elk and moose densities, with spatially variable overlap among wolves and caribou. Our models demonstrated that fire may reduce caribou forage (a direct effect). Fire may also reduce caribou habitat quality by altering wolf predation patterns (an indirect effect). Overall, models showed positive effects of fire on habitat for both predator and primary prey, but a potentially negative effect on caribou. We therefore integrated wolf and caribou spatial models to delineate a spatial index of caribou "safe zones" (areas selected by caribou and not by wolves). While currently planned prescribed fires in Banff and Jasper were shown to reduce the area of favorable caribou habitat by 2%, they reduced the area of "safe zones" by 10%. Thus, conservation managers should account for the indirect, predator-mediated impacts of fire on caribou habitat in addition to direct effects of habitat loss.

P1.181 Rock, J. C.; Goodbrand, L.; Austin, D. A.*; Parks Canada; *deborah.austin@pc.gc.ca*

Nest exclosure use at Piping Plover nests in National Parks: evidence of a potential trade-off between enhanced productivity and nest abandonment.

Nest exclosures are widely used to protect ground nesting birds from predators. However, little information exists on their effectiveness as a means of protecting species at risk. Although exclosure use can improve hatch success, it is known to have resulted in adult depredation. We examined whether exclosure use affected nest fate (success, depredation or abandonment) of endangered Piping Plover within Kejimkujik, Kouchibouguac and Prince Edward Island National Parks from 1988 to 2007. Exclosure use improved hatch and fledge success by 26.7Â± 8.3% and 21.0 Â± 6.4%, respectively and increased the number of chicks fledged per egg laid by 12 Â± 4.5%. Exclosure use decreased egg depredation by 37.0 Â± 5.2 % but increased nest abandonment by 10.3 Â± 5.0 %. Thus overall, while improving productivity, exclosure use also increased nest abandonment. Circumstances surrounding nest abandonment were mostly unknown but in 10 of 152 cases, nests were abandoned because adults from exclosed nests were depredated. Predators are clearly the most important factor limiting productivity at these sites however the extent to which they influence adult survival and apparent abandonment requires investigation. During the study, egg loss to predators increased across years suggesting that predators will likely continue to be a key management issue for Piping Plover in Atlantic Canada. Before any new management strategies are adopted, they should be tested carefully for potential impacts and once in place, their efficacy should be assessed regularly.

SY41 RodrÃ–guez, A*; RodrÃ–guez, B; EstaciÃ³n BiolÃ³gica de DoÃ±ana CSIC, SEO/BirdLife; *airamrguez@ebd.csic.es*

Attraction of petrels to artificial lights in the Canary Islands

The extent and intensity of artificial night lighting has increased with urban development worldwide. The resulting light pollution is responsible for mortality among many petrel species that are active at night on their breeding grounds. We report light-induced mortality of petrels during a 9-year study on Tenerife, Canary Islands. A total of 9880 birds from nine species were found grounded, the majority of which were Cory's Shearwaters. Most grounded birds were fledglings (96%), which fall apparently while leaving their nesting colony for the first time. For almost all species, grounding showed a seasonal pattern linked with their breeding cycle. Certain phases of the moon influenced grounding of shearwaters, with the extent of grounding being reduced during phases of full moon. The ratio of fledglings attracted to lights to fledglings produced annually varied between species and years. Mean rates of adult mortality also varied between species. These light-induced mortality rates are of concern for petrels and small shearwaters. Thanks to efforts involving cooperation with human residents, 95% of grounded birds returned to the wild. To minimize this impact we recommend several conservation measures: continuing rescue campaigns, shielding upward radiation and reduction of light emissions during the fledging peaks. Furthermore, a monitoring program for petrel populations must be implemented, as well as further studies to assess the fate of released fledglings and continued research to address why petrels are attracted to lights.

SY13 Rodrigues, Ana S.L.*; Baillie, Jonathan; Bininda-Emonds, Olaf R.P.; Gittlemann, John L.; Grenyer, Richard; Jones, Kate; Safi, Kamran; Stuart, Simon N.; Centre d'Ecologie Fonctionnelle et Evolutive, CNRS, France, Zoologial Society of London, UK, Carl von Ossietzky University Oldenburg, Germany, University of Georgia at Athens, USA, Imperial College London, UK, Institute of Zoology London, UK, IUCN Species Survival Commission, UK; *ana.rodrigues@cefe.cnrs.fr*

Global priorities for conserving mammalian evolutionary history

Species are the most frequently used currency of biological diversity but they are not equivalent in terms of the amount of unique evolutionary history they represent, and that would be irreversibly lost if they became extinct. Phylogenetic diversity is a biodiversity measure that takes account of phylogenetic relationships (and hence evolutionary history) between taxa. The phylogenetic diversity contained in the species that exist today is part of the raw material on which future evolutionary processes will operate. Keeping these pieces is fundamental to leaving the options open for future evolution. Previous studies indicate that phylogenetic diversity is being lost at a faster rate than expected from species loss, suggesting that conservation action may need to target evolutionary history directly. Here we present the first global assessment of the priority regions for the conservation of mammalian evolutionary history. The priority areas identified are driven by mammalian clades that are both highly restricted in space and are highly threatened as a group, such as the lemurs (Infraorder Lemuriformes) in Madagascar, the gibbons (Family Hylobatidae) in Southeast Asia and the golden moles (Family Chrysochloridae) in southern Africa.

7.3 Rodriguez, S.L.*; Peterson, M.N; Cubbage, F.; Sills, E.; Bondell, H.; North Carolina State University; *cityzoo@hotmail.com*

Assessing landowner interests in contracts and easement for endangered species conservation

Global privatization and land tenure trends are making private lands more critical for endangered species (ES) conservation. Over 90% of ES in the U.S. rely on private lands for habitat, yet tools available for balancing ES conservation and development pressures remain limited (e.g., mitigation banking). Short-term ES conservation contract programs are being applied in the U.S., but little is known about landowner interest in such contracts or how landowner interest varies between contracts and easements of set lengths. We addressed this need with a survey of North Carolina Farm Bureau members (n = 735). We compared competing models for predicting landowner interest in ES conservation contracts, and found a 6 variable model including social responsibility orientation (SRO), acres owned and past enrollment in conservation programs best (wi = 0.66). Analysis of $\hat{I}^2$ coefficients suggested landowners with stronger SRO were less interested in ES contracts, while those with past enrollment in a conservation program were more interested. Landowners ranked ES conservation significantly lower in importance than other conservation activities. Contracts were preferred over easements for short durations (20 years.

P1.160 Rohacek, Alex*; Buchanan, Bryant; Wise, Sharon; Utica College; *arohace27@utice.edu*

The Effects of Artificial Night Lighting on the Nocturnal Activity of the Terrestrial Red-backed Salamander, Plethodon cinereus

As human development encroaches into natural habitats, artificial night lighting increasingly becomes an additional stressor for wildlife. Nocturnal animals are especially vulnerable to artificial night lighting (ANL), as physiology and behavior of these species has evolved in dark nocturnal environments. Studies exposing amphibians to constant bright light provide evidence for changes to normal metabolism, growth, and behavior, but few of these studies have used treatments of ANL comparable to that found in affected habitats. We examined the effect of ANL on the nocturnal activity of the terrestrial Red-backed salamander, Plethodon cinereus. Previous work using transects in a forested habitat found that salamanders emerged from under cover objects later when exposed to ANL than under natural dark conditions. In a controlled laboratory setting, we exposed salamanders (N = 16) to nocturnal illuminations of 1 lx, 10-2lx, or 10-4lx in a repeated-measures design: each salamander was exposed to each illumination for 10 d, and then the behavior of the salamander was observed using infrared cameras for one night. We predicted that salamanders would delay emergence and exhibit less activity under higher nocturnal light levels than under lower light levels. Based on the results of this study and previous research, salamanders delay emergence when subjected to ANL, suggesting a negative impact of ANL on time available for foraging and breeding.

SP8.4 Rolfe, JT*; Summerville, T; Green, S; University of Northern British Columbia ; *tsrolfe@aol.com*

Anticipating a Socio-ecological Transformation

Together human geography, ecological economics and conservation biology contribute to an improved understanding of rural sustainability. A "socio-ecological transformation" could occur with a paradigmatic and operational reconfiguration of socio-economic dynamics, structure and cycle, repositioning human economic activity and community well-being within an intimately connected, constrained global ecosystem. In the north, we must anticipate increasing vulnerability of Canadian rural towns, many facing continuing resource-extraction dependency, accelerated climate change impacts and shifting trade patterns; this circumstance necessitates innovative, broadly cooperative remedies and a meshing of the small-scale sustainable approach with intensified risk management strategies still reliant in part upon industrial capacity and expertise. These challenges force us to consider the provocative alternative: that it will be necessary to "conserve" industrial capacity and expertise to deal with wider-scale impacts and abrupt trade policy response.

SP5.1 Roll, U.*; Stone, L.; Meiri, S.; Department of Zoology, Tel-Aviv University; *uroll@post.tau.ac.il*

Hotspots and predictors of biological diversity

Identifying regions of the world that hold high biological diversity is one of the main goals of conservation biology. Much debate and research focuses on how best such hotspots should be assigned. We study the species richness of seven taxa (amphibians, birds, mammals, reptiles, flowering plants, ferns, and conifers + cycads) of all World countries, to identify those with the highest species richness relative to expectations. We remove country area effects using linear regression and check for outliers based on prediction limits and residuals. We then add latitude, altitude, insularity and number of ecoregions in a country to the model and test their effects using a stepwise multiple regression procedure. We show that the hotspots identified may depend on the taxon used to identify them. Different predicting factors of richness likewise vary between taxa. Nevertheless, it is important to properly correct for area as it is usually the key explaining factor of species richness. We also found a significant positive relationship between countries' average species richness and percentage of its protected areas. Overall we use a novel modeling approach in order to correctly identify regions which are species-rich and therefore of conservation concern. We also demonstrate the importance of using a multi- taxa approach for hotspot identification.

P1.29 Rollins, R*; Hunter, A; Canessa, R; Vancouver Island University, University of Victoria; *rick.rollins@viu.ca*

Who Volunteers to Work for the Environment: Towards a Typology of Conservation Volunteers

The work of environmental conservation often requires the use of volunteers. Volunteers are an essential part of many conservation organizations, and often work on projects where paid staffs are not available. However, high volunteer turnover can increase recruiting and training costs and disrupt programs. In order to help improve retention rates and the effectiveness of volunteers, this study aims to better understand motivations to volunteer, and what factors contribute to satisfaction. A random sample of 148 past and present conservation volunteers selected from ten conservation organizations located in Victoria, British Columbia were surveyed to explore their motives for volunteering with a conservation organization (response rate was 90%). Factor analysis of responses to 35 motivation statements generated nine meaningful motivational factors, labelled as: career; environmental values, personal growth, protective, social norms, social interests, intrinsic satisfaction, efficacy, and independence. These factors were used in a cluster analysis to generate a typology of six volunteer groupings, labelled as follows: practical environmentalists; concerned environmentalists; career environmentalists; budding idealists; social environmentalists; and, other helpers. Understanding this variability in volunteer motivations allows conservation organizations to recruit volunteers that will be more satisfied with the roles offered, and improve retention rates.

SY67 Rollins, R*; Poirier, S; Canessa, R; Vamcouver Island University, University of Victoria; *rick.rollins@viu.ca*

The Effectiveness of Interpretation in Altering Attitudes and Behavioral Intentions of Wildlife Watching Visitors in Tofino, British Columbia

Threats to the marine environment are considerable, yet marine conservation efforts in Canada and elsewhere languish, in part through the lack of public support. Marine tourism focussing on wild life viewing provides an opportunity to build public support for marine conservation, but theory suggests that the likelihood of influencing public opinion is higher if the wildlife viewing experience is directed toward influencing attitudes and behaviours toward marine conservation. This study focuses on whale watching tours in British Columbia. Questionnaire interviews with a random sample of 492 whale watchers provided data on interpretive information provided on tours, and visitor responses in terms of changes in conservation attitudes and behaviours. Just observing wildlife produced no significant changes in attitudes or behaviours; however, if interpretation was provided when wildlife was observed, significant changes did occur. Further, visitors indicated a desire to receive wildlife interpretation, but were not always satisfied with the level of interpretation provided by tour guides. These results suggest that there is a demand for interpretation in wildlife tours, and that interpretation can provide support for marine conservation. The study contributes to the emerging ecotourism literature, and provides suggestions for the training of tour guides and licensing requirements for tour guiding companies.

P1.175 Romsdahl, Rebecca J.; University of North Dakota; *rebecca.romsdahl@und.edu*

Mixed Concerns about Global Climate Change are Building Barriers to Natural Resources Conservation in the US Great Plains

Despite reports of overwhelming scientific consensus that global climate change is real and we are already observing impacts, there remains a lack of government action across the United States, especially in the Great Plains (GP) region. To examine what this means for natural resources conservation, we conducted a survey of government officials in twelve GP states. Responses from over 900 decision-makers represent state, tribal, and local governments. Results show barriers to government action include a lack of funding and leadership, and no sense of urgency; 52 percent of respondents indicate they are not concerned about climate change in general. However, respondents indicate they are concerned about possible effects of climate change on natural resources. For example, 64 percent believe climate change will have impacts on rainfall patterns for their jurisdiction; but 63 percent indicate they do not foresee any solution options to address climate change. These results highlight a need to reframe the discussion of climate change. By integrating climate change into relevant conservation issues that are already a priority for GP decision-makers, such as management of invasive species and water resources, decision-makers might overcome some of these barriers to government action.

SY13 Rondinini, C*; Chiozza, F; Di Marco, M; Visconti, P; Baisero, D; Boitani, L; Sapienza University of Rome, James Cook University; *carlo.rondinini@uniroma1.it*

The Global Distribution of Mammals

The habitat suitability models developed on the basis of the 2009 IUCN Red List of Threatened Species represent an unprecedented opportunity to extend and deepen our current knowledge on the distribution of the world\'s mammals. These habitat suitability models, developed inside each species\' geographic range and based on land cover, human impact, elevation, and hydrological features, provide both an ecological characterisation and a fine-resolution estimate of the potential distribution of each mammal. Based on this dataset we conducted a global analysis of all terrestrial mammals to determine patterns of species richness, threat, endemism, and distribution of specialist vs. generalist species worldwide. We investigated the ecological and geographic patterns that underlie the observed difference between the area of geographic ranges and the area of suitable habitat for each, which can bias the perception of the conservation status of mammals and misdirect conservation efforts. Our results highlight the importance of an ecological perspective on species distribution in a world increasingly dominated by human-modified habitats.

P2.163 ROSSON, JR., JAMES F. *; Rose, Anita K.; Forest Inventory and Analysis, Southern Research Station, US Forest Service; 4700 Old Kingston Pike; Knoxville, TN 37919; *jrosson@fs.fed.us*

Partitioning stand-structure attributes in landscape-scale inventory and monitoring surveys to characterize the status of forest sustainability

Characteristics and thresholds defining forest sustainability have been studied and debated for many years. Tangible indicators that provide an objective picture of the status of forest ecosystems are needed for practical applications. While some consensus has been reached in defining key elements of sustainable forest management, practical methods and metrics for assessing sustainability are few or lacking. We used landscape-level inventory and monitoring data from the Forest Inventory and Analysis (FIA) program of the US Forest Service to examine some of the possible metrics to characterize sustainability. Using data from the State of Arkansas, USA as a case study we partitioned stand structure across this probability-based sample to determine amounts of forest land by arbitrarily defined stand attributes. For example, one key element in defining sustainability is the amount of forest land retained in large dimensioned, older stands. Less than 52,000 hectares (Â± 21,700 at 0.95 C.I.) of Arkansas' 7,284,600 hectares of timberland were in stands with a quadratic mean diameter (QMD) â ¥45 cm d.b.h., mostly as a result of past and continuing logging practices. The amount of large dimensioned older stands across the landscape needed to satisfy ecosystem sustainability goals is a difficult threshold to establish, especially given the conflicting social, political, and economic factors that need be considered.

P2.198 Rout, T. M.*; Heinze, D.; McCarthy, M. A.; University of Melbourne, Department of Primary Industries, Parks, Water and Environment, Tasmania; *tmrout@unimelb.edu.au*

Optimal allocation of conservation resources to species that may be extinct

Statements of extinction will always be uncertain because of imperfect detection of species in the wild. Two errors can be made when declaring a species extinct. Extinction can be declared prematurely, with a resulting loss of protection and management intervention. Alternatively, limited conservation resources can be wasted attempting to protect a species that no longer exists. Rather than setting an arbitrary level of certainty at which to declare extinction, we argue that the decision must trade off the expected costs of both errors. Optimal decisions depend on the cost of continued intervention, the probability the species is extant, and the estimated value of management (the benefit of management times the value of the species). We illustrated our approach with three examples: the Dodo (Raphus cucullatus), the Ivory-billed Woodpecker (U.S. subspecies Campephilus principalis principalis), and the mountain pygmy-possum (Burramys parvus). The dodo was extremely unlikely to be extant, so managing and monitoring for it today would not be cost-effective unless the value of management was extremely high. The probability the Ivory-billed woodpecker is extant depended on whether recent controversial sightings were accepted. Without the recent controversial sightings, it was optimal to declare extinction of the species in 1965 at the latest. Accepting the recent controversial sightings, it was optimal to continue monitoring and managing until 2032 at the latest. The mountain pygmy-possum is currently extant, with a rapidly declining sighting rate. It was optimal to conduct as many as 66 surveys without sighting before declaring the species extinct. The probability of persistence remained high even after many surveys without sighting because it was difficult to determine whether the species was extinct or undetected. If the value of management is high enough, continued intervention can be cost-effective even if the species is likely to be extinct.

P1.119 Roy, C.*; Cumming, S.G.; Darveau, M.; UniversitÃ© Laval and Ducks Unlimited Canada, UniversitÃ© Laval, Ducks Unlimited Canada and UniversitÃ© Laval; *christian.roy.22@ulaval.ca*

Spatio-temporal dynamics in abundance of cavity-nesting Bufflehead and Goldeneye

The boreal forest, which provides key breeding habitat for waterfowl, is experiencing unprecedented expansion of industrial activities. Among waterfowl, cavity nesting ducks are the most vulnerable to human activities because of their specific habitat requirements. Our objective was therefore to examine how the spatial structure of Bufflehead (Bucephala albeola) and both Goldeneye (B. clangula and B. islandica) populations has changed over the last decades in the boreal forest, while accounting for both spatial and temporal autocorrelation in density estimates. To this end, we developed a hierachical Bayesian state-space model using the USFWS' annual Waterfowl Breeding Population and Habitat Survey, which has taken place across western and eastern Canada since 1955 and 1990, respectively. We observed both spatial and temporal dependencies for the Bufflehead populations. While the population has increased in the last 50 years, most of this increase has occurred in northern Manitoba and Saskatchewan outside of the region recognized as the core breeding zone for this species. We also detected a possible range expansion in the East. In contrast, the Goldeneye species populations remained stable overall. At first glance, one could conclude that current habitat alteration levels are not detrimental to cavity-nesters, but the increase in bufflehead suggests that other factors may outweigh the negative effects of industrial activities.

P2.94 Rubidge, E.M*; Monahan, W.B.; Parra, J.L.; Cameron, S.E.; Brashares, J.S.; Department of Environmental Science, Policy and Management, University of California, Berkeley, Audobon California, Department of Ecology and Evolution, State University of New York, Stony Brook, Department of Organismic and Evolutionary Biology, Harvard University; *erubidge@berkeley.edu*

The role of climate, vegetation, and species co-occurrence in explaining changes in small mammal distributions over the past century.

Species distribution models are commonly used to predict species responses to future climate change. However, their usefulness in conservation planning and policy is controversial because they are difficult to validate across time and space. Here we capitalize on small mammal surveys repeated over a century of climate change in Yosemite National Park, USA, to assess model predictions. Historical (1900-1940) climate, vegetation and species co-occurrence data were used to develop multivariate adaptive regression spline (MARS) models for three species of chipmunk. Models were projected onto the current (1980-2007) environmental surface and tested with contemporary resurveys of each species. Even with the inclusion of vegetation and species co-occurrence, we found that climate alone was the dominant predictor explaining chipmunk distribution within an era, but climate was not consistently an adequate predictor of all species' responses over time. We conclude that caution should be used when using predictive distribution models for conservation planning under future climate change, unless the physiological and biological range limits of the species of interest are well understood.

SY4 Rudd, MA*; Boxall, ABA; Emberson, LD; Fleishman, E; Redeker, K; Sutherland, WJ; University of York, University of California, University of Cambridge; *mr642@york.ac.uk*

Emerging global risks and themes highlighted by international "big question" exercises

A number of exercises have recently identified key policy-relevant research questions in the conservation science field. These include "100 Question"' efforts on ecological issues in the UK, conservation of global biological diversity, UK nature conservation opportunities, and global agriculture. Similar exercises have also taken place for global plant science, and in regionally focused exercises in the USA and Canada (both of which focused on the "Top 40" questions for effective management of species, ecosystems, and ecological processes), and in Australia. Further issues have been identified as part of horizon scanning efforts for global conservation. A "100 Question" sectoral review for fisheries and aquatic conservation has also been completed. In this sectoral review, we focus specifically on agriculture and examine cross-cutting risks and conservation themes arising from various exercises. From each of the exercises generating questions, we used a modified Institutional Analysis and Development (IAD) framework to group those questions in broad themes: agriculture's productive resource base; direct and indirect ecological impacts of agriculture; food trade and supply chain issues; external driving forces affecting agricultural potential; institutions; and societal values regarding agriculture. Our review highlights issues of global salience as well as divergences in themes of regional importance.

SY4 Rudd, MA*; Beazley, K; Carter, AV; Cooke, SJ; Fleishman, E.; Lane, DE; Mascia, MB; Roth, R.; University of York, Dalhousie University, Memorial University of Newfoundland, Carleton University, University of California, University of Ottawa, World Wildlife Fund, York University; *mr642@york.ac.uk*

Canada's "Top 40" conservation research priorities

In Canada, biological diversity is increasingly at risk due to habitat degradation, unsustainable harvesting, pollution, invasions of non-native species, and climate change. To address these challenges, there is a pressing need to identify high-priority issues, define a research agenda, and stimulate new interdisciplinary research programs that have high policy salience. The goal of our work was to identify and prioritize the "Top 40" of greatest relevance to policy that affects conservation of biological diversity in Canada. We have (1) solicited candidate research questions from Federal and Provincial civil servants, Aboriginal peoples, academics, donors, industry representatives, and NGO employees, and (2) conducted a high-level workshop with academics and senior government officials. At the workshop we refined and culled the candidate questions to reach Canada's "Top 40." A follow-up national survey of academics, government employees, and the general public is taking place. The results of that survey-the prioritization of the Top 40 by academics, policy analysts and decision-makers, and the public-should stimulate broad interest in, and deliberation over, the relative merits of various conservation strategies and help identify divergences in interests between the sectors. Public deliberation is an important step in establishing a strong conservation science community and building science-policy linkages in Canada.

SP3.1 Ruesch, AS*; Lawler, JJ; Torgersen, CE; Olden, JD; Volk, CJ; Lawrence, DJ; University of Washington, School of Forest Resources, United States Geological Survey, Cascadia Field Station, University of Washington, School of Aquatic and Fishery Sciences, National Oceanic and Atmospheric Administration, Northwest Fisheries Science Center; *asruesch@u.washington.edu*

Projecting Stream Temperature for a Warming Climate: Consequences for Salmonid Freshwater Rearing Habitat

Global climate change will result in increasing air temperature in many locales. Although such increases will affect stream temperatures, air and stream temperatures will not increase in parallel. Stream temperature varies as a function of climate and landscape at various scales from the width of a stream to the watershed. Therefore, modeling stream temperature can be complex and costly; the ability to model stream temperature accurately using low-cost equipment and techniques would greatly enhance our ability to understand stream ecosystems now and into the future. Here, we outline a statistical framework for assessing rearing anadromous salmonid (Oncorhynchus tshawytscha and O. mykiss) thermal habitat distribution across the semi-arid John Day River system based on modeled results for present and future stream temperature scenarios. As endotherms, stream fishes distribute deterministically according to their thermal tolerance. Therefore, it is possible to infer their distributions, or at a minimum, predict where fish are likely to be thermally stressed. Overlaying current and future distributions, we assessed the length of potential habitat for rearing fish that will be lost as a result of climate change. These maps can be used by managers, decision-makers, and stake-holders for compiling climate-change adaptation strategies for promoting future population viability.

SY60 Running, S.; University of Montana; *swr@ntsg.umt.edu*

A Future Role for Earth Scientists: The Carbon Cops

As the global change politics morphs from "is it real" to "what do we do about it", the global carbon cycle takes center stage. Many political solutions, such as carbon caps and trading carbon credits will require very rigorous global, consistent monitoring of components of the carbon cycle if society expects these policies to be fair and to work. Will we leave this carbon monitoring to Wall Street? Not a chance! Earth science better get ready for a new role.

P1.117 Ruslan Urazaliyev*; Maxim Koshkin; Johannes Kamp; L.N. Gumilev Eurasian National University, Association for the Conservation of Biodiversity of Kazakhstan, The Royal Society for the Protection of Birds; *uruslankamenka@inbox.ru*

Threats for Globally Threatened bird species at Zhumai-Maishukyr lake system, Kazakhstan

Bird monitoring within Tengiz-Korgalzhyn Region (except Nature Reserve) has been carried out to greater or lesser extend only during last 8-9 years. Collected data helped to show the importance of the region for breeding and migrating birds, it was recognized internationally and, within the established network of Central Asian IBAs, 8 sites have been identified by researchers of the national NGO ACBK. However, only one of these IBAs has a protection status. One the example of one IBA - \"Zhumay-Mayshukyr Lake System\" we want to show what is threatening such rare and threatened bird species, as White-headed Duck or Black-winged Pratincole, as well as great number of other waterbirds using this site. We will show what can be done to minimize these threats and recommend activities to be included into the IBA management plan, which we hope will further act as an example for other similar IBAs in the region.

SY15 Russell, D.*; Asare, R. A.; US Agency for International Development, Forest Trends; *dirussell@usaid.gov*

REDDy or not: Toward research and action on institutional arrangements for REDD in West and Central Africa

There are an ever-growing number of initiatives in West and Central Africa designed to position countries and localities to benefit from proposed programs to Reduce Emissions from Deforestation and Forest Degradation/in Developing Countries (REDD). Our paper lays out an urgent research and action agenda for the institutional dimensions of REDD. We first examine structural constraints that will inhibit many rural dwellers in the regions from benefiting from these international initiatives, including weak tenure and property rights, corruption and a history of disinvestment in rural areas. We then discuss how initiatives often fail as a result of outsider ignorance of social realities, through elite capture and other factors. Institutional arrangements must be addressed at every scale. Decisions to reforest, deforest or retain forest have important gender implications. The appropriate scales and units for managing forests need to be debated widely. Linking institutions across boundaries and vertically needs to be addressed for transparency, monitoring and achieving scale. We present examples of cocoa agroforestry and community forestry and discuss what is needed to improve these efforts. There is a foundation of knowledge and practice in the regions to draw on and we describe ways to access and disseminate that knowledge.

P1.112 Saavedra, C.A.*; RÃ–os, C.A.; Velasco, J.A.; Universidad del Valle - WCS, Colombia, WCS, Colombia; *casaavedrar@yahoo.com*

Human impact on the survival of Pacarana populations (Dinomys branickii) in Colombia: coupling habitat and population viability models

The pacarana (Dinomys branickii) is an endangered species threatened mainly by habitat loss and hunting. We analyzed the survivorship probabilities for hypothetical populations of Pacarana in Colombia under different habitat loss and hunting scenarios. We generated a habitat suitability model (HSM) based on habitat preferences of the species and human footprint. We conducted the population viability analysis (PVA) based on a compilation of captivity and field data using the program Vortex. The PVA's showed populations are sensible to changes in reproduction rates, extraction rates and habitat fragmentation. We classified the results of the interactions between the HSM model and the different hunting and habitat loss scenarios in four categories: a) Populations where no action is required to guarantee their survival, b) Populations where educational and legal actions are required to guarantee survival, c) Populations where habitat management actions are required to guarantee survival, and d) Populations actions will never guarantee their survival. Results advocate the implementation of conservation actions beyond protected areas, specially habitat management and mitigation strategies

SY19 Sadowsky, Brooke; Rare; *bsadowsky@rareconservation.org*
Changing the Way People Relate to Nature
All across the developing world, farmers, fishermen, community leaders, and families are struggling to meet basic life needs in the face of dwindling natural resources. Simultaneously, conservationists are lamenting the ineffectiveness of protected areas and the lack of public support for environmental change. One thing is clear: while conservation has long been science-driven, success will ultimately come down to changing the way people relate to nature. In the face of a global extinction crisis, climate change, dwindling fish stocks, and disappearing forests, conservationists find themselves in dire need of a new set of tools-tools for changing behaviors and inspiring civic action. Rare and its partners have been testing and refining an innovative method for social change that is helping fill this need. It's called a "Pride" campaign, so named because it inspires people to take pride in the species and habitats that make their communities unique, while also giving them real alternatives and incentives to change environmentally destructive behaviors. Rare has launched more than 150 Pride campaigns in 50 countries. These have reduced overfishing and illegal logging, improved management of protected areas, increased adoption of more sustainable agriculture, and saved multiple species on the brink of extinction.

SY14 Salafsky, N*; Fleishman, E; Foundations of Success, University of California, Santa Barbara; *fleishman@bren.ucsb.edu*
Monitoring to inform policy decisions and management actions for large, complex systems
Conservation projects and programs have been growing in scale and complexity as they increasingly consider dynamic and interacting ecological, economic, social, and political systems. More than ever, the conservation community must focus scarce resources for monitoring on collecting only highly relevant information. Before collecting data, it is essential to build a clear conceptual model that includes known and hypothesized relationships among conservation targets and direct and indirect factors affecting these targets. It also is critical to articulate theories of change that link alternative actions to desired outcomes, and to specify both measures of success and thresholds for management change. These models guide identification of variables to monitor to enable iterative refinement of both models and variables. Examples from the San Francisco Estuary, Puget Sound, State Wildlife Agencies in the United States, and efforts to change global commodity markets illustrate how monitoring can transition from ad hoc tracking of myriad variables to directed recording of managerially relevant information. In particular, approximate measures of precisely articulated management questions are more useful then precise measures of variables with little practical relevance.

SP1.1 Salvesen, D; Kihslinger, R*; University of North Carolina - Chapel Hill, Environmental Law Institute; *salvesen@unc.edu*
Identifying Opportunities for Conservation Where Wildlife Habitat and Natural Hazard Areas Overlap
A recent study conducted by the University of North Carolina and the Environmental Law Institute found that areas vulnerable to natural hazards in coastal and riverine communities often overlap with priority habitat areas identified in State Wildlife Action Plans. However, the research showed that local land use planners and hazard mitigation specialists, whose plans play a crucial role in conserving priority habitat, overwhelmingly lack knowledge of SWAPs at best, and at worst viewed wetland conservation as antithetical to their objectives. Habitat restoration in these areas can provide multiple benefits, including wildlife conservation as well as natural flood protection. Using GIS mapping, an evaluation of state and local land use and hazard mitigation plans, and case studies, the joint study found reason for optimism, as diverse options exist for optimizing synergies and facilitating collaboration among land use planners, hazard mitigation planners and conservationists. The study's recommendations include facilitating increased cooperation among interested parties, revamping aspects of existing planning frameworks at the federal, state, and local level, and identifying innovative funding sources as well as existing federal programs that would support the conservation of flood prone areas that provide high-quality wildlife habitat.

P1.201 Samson, C*; Trudel, OC; Roy, R; Agence Parcs Canada, UniversitÃ© de Moncton; *Claude.Samson@pc.gc.ca*
Influence of Highway 197 on Habitat Occupancy Rate of Marten in Forillon National Park of Canada
Forillon National Park of Canada (FNPC) is facing an isolation issue, caused in large part by Highway 197 which separates the park from the remaining GaspÃ©sie Peninsula. American Marten (Martes americana) is rare in the park, despite the availability of a relatively suitable habitat. We suspect that this scarcity is caused by a reluctance of martens to cross Highway 197, therefore reducing immigration and preventing the population from reaching a density representative of the park ecosystem. The objective of this study was to compare the species occupancy rate within the park to the occupancy rate on the other side of Highway 197. Marten occurrence was measured in late fall and early winter on 67 sites in 2008 and 108 sites in 2009. Each site was baited and lured, and marten presence was detected by tracks on the snow, hair collection, and surveillance cameras. Occupancy rates within the park (0% in 2008 and 2% in 2009) was significantly lower (p

21.6 Samuel K. Wasser; Jonah L. Keim*; Mark L.Taper; Subhash R. Lele; University of Washington , Matrix Solutions Inc., Montana State University, University of Alberta; *jkeim@matrix-solutions.com*

Impacts of Human Activity on Caribou Resource Selection and Physiological Health in the Alberta Oil Sands

Human development is a growing threat to caribou populations globally. Threatened caribou in Alberta's oil sands are thought to have been in decline for the past 14 years and extirpation is anticipated. We developed novel monitoring methods to guide resource management and mitigate environmental threats to this system. Detection dogs were used to non-invasively sample caribou, moose and wolf scat during three winters of oil exploration. Scats were then used to assess resource selection, diet, DNA-based measures of population abundance and hormone-based measures of psychological and nutritional stress. Resource selection by these species was related to their physiological health and the intensity of human land use. High intensities of human use constrained resource use by caribou and reduced their physiological health, providing a more serious threat to caribou than previously thought. Moose, on the other hand, were able to nutritionally compensate for increased human exposure because they did not alter their selection of forage rich resources. Our study suggests better ways to manage human landscape use in the oil sands and provides an innovative method to effectively monitor the complex interactions between humans and wildlife.

P1.114 Sandanov Denis; Alymbaeva Zhargalma*; Batotsyrenov Eduard; Institute of General and Experimental Biology of SB RAS, Buryat State University, Baikal Institute of Nature Management of SB RAS; *denis.sandanov@gmail.com*

Monitoring of populations of endemic plant on the eastern part of Lake Baikal

Botanical survey and further monitoring of rare plant's populations is the one of the main methods of their conservation. Usually, rare and endangered species have small isolated populations and dynamic of their demography can be influenced by human activity. We studied populations of rare endemic species Craniospermum subvillosum on the eastern part of Lake Baikal in 2007-2009. Experimental plots were situated on the sandy dunes which are popular places for recreation during summer period. Three points of our study has different level of human impact. The biggest recreation was observed near village Bezymyannaya, middle - near village Turka, and the lowest - near village Goryachinsk. Each year we estimated quantity of each population and analyzed their demographic structure. Our results showed that the lowest density of population observed near Bezymyannaya (0.05 individuals per square meter). Age structure characterized by small part of juvenile plants and was mostly presented by old and generative individuals. On the contrary population near village Goryachinsk characterized by big density (0.13 individuals per square meter) and has the high quantity of juvenile plants (43.17% of total individuals). All studied populations have relatively stable age structure, but further increasing of human impact can lead to rapid decreasing of their quantity.

P2.149 SANTANGELI, A*; Lehtoranta, H; Laaksonen, TK; Helsinki University, Department of Biosciences, Faculty of Biological and Environmental Sciences, North Karelia Forest Centre, Finnish Museum of Natural History, Helsinki University; *andrea.santangeli@helsinki.fi*

Woodland Resource Use and Raptors: A Cost-effective Strategy for Nest Site Conservation

The conflict between woodland resource use and wildlife has complex socio-economic and ecological implications. As resources committed to nature conservation are often limited, inexpensive participatory programmes may represent a powerful tool for conservation. Such tools have however seldom been considered and applied. We present results from a participatory conservation project run in North Karelia (Finland) between early 1990s and 2004. The aim was to preserve nest sites of raptors (common buzzard, goshawk and honey buzzard) on private lands subject to intensive forest management. After preliminary surveys to locate raptor nests in the area, landowners were approached and proposed to voluntarily set aside the forest stand with an occupied nest. Participation was exclusively based on self-motivation and self-induced values, with no incentives involved. The project was extremely successful, as almost all the approached landowners showed a positive response. The consequences of this conservation intervention on the local raptor population are currently being analysed. Although limited to a local area, these results clearly demonstrate that an inexpensive participatory model can work, at least in some socio-economic and environmental conditions. Given its potential as a tool for cost-effective conservation, we urge to test and evaluate this approach on a wider scale.

SP2.7 Santidrian Tomillo, Pilar*; Blanco, Gabriela; Paladino, Frank; Spotila, Jim; Drexel University, Indiana Purdue University, Fort Wayne; *ms454@drexel.edu*

Climate driven egg mortality threatens recovery of Eastern Pacific leatherback turtles (Dermochelys coriacea)

El NiÃ±o is a climatic event that originates in the tropical Pacific Ocean, which has received considerably attention in conservation because of its effects on reproduction and survival of animal species. The population of leatherback turtles (Dermochelys coriacea) that nest in Northwest Costa Rica constitutes ~50% of the Eastern Pacific leatherback turtles and has declined by ~90-95% due to past egg poaching and incidental capture by fisheries. We measured emergence success of leatherback turtle hatchlings on Playa Grande Costa Rica from 2004-2009 and formulated a mathematical model to calculate emergence success related to climate from 1976 to 2009. Droughts induced by low precipitation levels during El NiÃ±o events, resulted in high mortality of leatherback eggs, reaching the highest levels during the strong El NiÃ±o event in 1987. More frequent or stronger El NiÃ±o events as a result of climate change may prevent population recoveries of depleted Eastern Pacific leatherback turtles.

P2.122 Sare, K*; Boughen, G; Lane, C; Nielsen, D; Gilchrist, IG; Cody, M; Golder Associates Ltd., Cenovus FCCL Ltd.; *kristine_sare@golder.com*

Monitoring the Effect of Sulphur Emissions on Lichens in North-Central Alberta

Lichens are an important component of boreal ecosystems and a well tested indicator of sulphur dioxide (SO2) emissions. Cenovus FCCL Ltd. participated in a biomonitoring program to assess changes in sulphur content in lichens near one of their facilities from 2007 to 2009. Fourteen experimental plots were established between 0 and 10 km along two transects aligned with prevailing wind directions. Five control plots were established 95 km west of the facility in an area free of intensive SO2 emission sources. Lichen samples were collected annually for bioassay analysis and ambient SO2 levels were recorded. Results showed that ambient SO2 levels were below thresholds at which lichen abundance has been reported to decline. Sulphur content in lichen tissue increased over time and fell within the range of values reported from similar research in the area. The effect of distance and direction from the facility was not consistent, but there was evidence that sulphur content was higher proximate to and southeast of the facility. In 2009, lichens at control plots had higher sulphur content than those at experimental plots, highlighting the difficulty associated with locating appropriate control sites in a landscape characterized by increasing oil and gas development. To conclude, sulphur emissions from the facility are not high enough to cause short term lichen injury and follow up work is required to determine whether this conclusion holds in the long term.

SY4 Saterson, KA*; Scott, JM; US Environmental Protection Agency, University of Idaho; *saterson.kathryn@epa.gov*

America's "Top 40"conservation research priorities

We summarize the content of America's "Top 40" conservation research questions and how they can inform policy and management needs that emerged from informal interviews with senior policymakers and other decision makers. Policymakers identified energy development alternatives and impacts of climate change on current policies for management of species, their habitats, land, and water as among the critical issues related to policy and management of natural resources that they confront now and expect to face in 10 years. They noted that knowledge of local climate change impacts, ways to translate scientific data into information on tradeoffs that society values and responds to, large-scale land-use change, and impacts of emerging stressors such as chemicals on natural resources were among the major gaps in the social, biological, and physical sciences that hinder effective policy development. Finally, policy makers spoke to the need for scientists to improve their ability to communicate how their findings can inform specific policy and management options and tradeoffs. The top 40 questions were well aligned with policymaker needs, including many questions related to the social, economic, and ecological impacts of human activity on species, their habitats, and ecosystems in the United States. This abstract does not necessarily reflect U.S. EPA policy.

18.8 Savy, CE*; Semroc, B; Conservation International; *csavy@conservation.org*

Making sense of decision-support tools and exposing gaps for applying conservation science to decision-making

A bewildering diversity of tools has been developed to assist industry and development decision-makers in identifying and managing their biodiversity and ecosystem risks. To make sense of this landscape, various typologies of tools, often complimentary and informed by varying objectives, have been suggested. The majority of these have however been aimed at promoting understanding and uptake by users based on existing tools, rather than systematic evaluation of critical gaps in the depth and sustainability of scientific information that make many of these tools difficult to apply in practice. This may result in a false sense of security for decision-makers who rely on such tools while suppressing the support of data collection that could improve implementation. In this presentation, we present a novel but complimentary typology that highlights these alternative gaps. This assessment examines 3 broad types of tools: Standards, frameworks and method tools; data exposure and interpretation tools; and model or scenario-based tools. We illustrate the typology with examples in practice or currently in development and highlight recommendations for improved decision-support to industry and development decision-makers.

SP5.11 SÃ LYMOS, PÃ TER*; Erin Bayne; Subhash Lele; Alberta Biodiversity Monitoring Institute, Department of Biological Sciences, University of Alberta, Department of Biological Sciences, University of Alberta, Department of Mathematical and Statistical Sciences, University of Alberta; *solymos@ualberta.ca*

Correcting Biodiversity Intactness Indices for Imperfect Detection of Species

Biodiversity Intactness Indices (BII) are important for effective communication of the state and trend of biodiversity. BIIs are often composed of Species Intactness Indices (SII) that combine information from multiple species into a composite index (e.g. the ratio of the current occupancy of a species to some reference value). One way of deriving reference condition is to statistically remove the effect of human disturbance (HD) on species' occupancy. Imperfect detection of species (i.e. organism is present but not detected) is a key problem for modeling occupancy, but is commonly thought to cancel out in ratio-like indices and thus is ignored in many types of indices. We studied to what degree this preconception is true, especially when HD affects both occupancy and detectability of a species. We have developed a general methodology to correct for detection error in intactness indices based on single visits per sites. We used data of 43 bird species in the Boreal region of Alberta to calculate naÃ¯ve SIIs and SIIs corrected for detection error. We found that HD affected occupancy in 31, it affected detectability in 22, and it affected both occupancy and detectability in 16 species. The signs of deviation from an overall biodiversity intactness index (increasing, decreasing) were congruent among the naÃ¯ve and corrected SIIs. However, naÃ¯ve BII was less intact (86%) than the corrected BII (92%). Correcting intactness indices for detection error can be important, because human disturbance often influences detectability, hence confounding its effect on occupancy.

P2.139 SÃ©fraoui Maia*; Cumming Steve; Laval University ; *maia.sefraoui.1@ulaval.ca*
Modeling lichen availability for caribou after fire and grazing in the Northwest Territories
The barren-ground caribou (Rangifer tarandus groenlandicus) is the most abundant sub-species of caribou in the Northwest Territories of Canada. However, the Bathurst herd has been decreasing at mean annual rate of about 5% since 1986. In recent years declines have become dramatic, at more than 20% per year. One of the most important factors restricting survival of caribou is winter food availability. Lichen is the most important winter forage, and its abundance is sensitive to the history of wildfire and of foraging by caribou. We used a simple non-spatial simulation model to estimate the carrying capacity of the winter range, taking into account the stochastic fire regime and foraging intensity. We included the potential area of lichen-bearing forest, demographics (fecundity, survival), and movement dynamics to explore possible mechanisms that were responsible for this decline. Our results found that study region cannot support the herd sizes characteristic of the 1990s, which suggests that overgrazing of winter habitat may be one factor contributing to the recent population declines. The effects of fire on food supply are minor compared to grazing at high population levels.

P1.6 Scheibel, RJ*; Zimbler-DeLorenzo, HS; Alfred University; *rjs6@alfred.edu*
Incorporation of Human Impacts on the Extinctions and Threat of Extinctions of Avifauna on Oceanic Islands
Islands are an increasingly important area of focus for conservation of avifauna because many factors that have been shown to contribute to decreases in species richness are amplified. Geographical factors, such island area and isolation, have been found to have the greatest effect on the threat of extinction of avifauna on oceanic islands. These geographical factors impact the threat of extinction more than biological variables, such as size of avifauna and mammalian predators, because of their direct influences on the number of extinct and threatened avifauna as well as the indirect influences through the biological factors. The purpose of this study is to incorporate potential human causal factors that, in conjunction with the geographical variables, also influence the biological factors on the extinction and threat of extinction of avifauna on oceanic islands. The percentage of human population in agriculture per capita, human population, population density, growth rate, and gross national product (GNP) were all incorporated in the causal modeling approach using path analysis. The human population of the oceanic islands is strongly related to the area of the island but not significantly to the extinction of oceanic avifauna. Although human causal factors impact the avifauna on the islands, it is not as important as an indicator of extinction or threat of extinction of avifauna as geographical factors of the islands.

P2.166 Schieck, Jim*; Huggard, Dave; Haugland, Diane ; Boutin, Stan; Herbers, Jim; Alberta Biodiversity Monitoring Institute, University of Alberta, University of Alberta; *jims@arc.ab.ca*
Measuring ecosystem health at regional and local scales: the value of integrated monitoring
Human land uses usually alter native biodiversity and degrade ecosystem health. We use information from the Alberta Biodiversity Monitoring Institute (ABMI) to highlight how an integrated monitoring program can be used to assess ecosystem health at both regional and local scales. The ABMI surveys terrestrial and aquatic biota (thousands of species), terrestrial and aquatic habitats (hundreds of elements), and landscape composition and pattern at 1656 sites spaced in a grid pattern throughout Alberta. At the regional scale, intactness is determined separately for each species and for each habitat element by comparing observed abundance to the abundance expected if no human development had been present. Intactness measures for individual species and habitat elements are then integrated to determine a single measure of ecological health for the region. To assess ecological health at a local scale, a modified reference condition approach is used; maximum likelihood models are used to assess intactness of the species and habitat structures. This information is then integrated into a single measure of ecological health. Since information on species and habitats in natural and human disturbed areas are required for both spatial scales, integrated data collection increases cost efficiencies. In addition, by collecting similar data at both scales, it is possible to evaluate whether management actions at local scales are effective at maintaining regional ecosystem health.

SY68 Schindler, DW*; Kelly, E; Hodson, P; Short, J; University of Alberta; *d.schindler@ualberta.ca*
Why Boreal Water Conservation at the Catchment Scale Matters: Industrial Development Impacts to the Athabasca River
Canada contains more surface freshwater than any country on Earth. Industrial development can disrupt freshwater resources across large areas. Oil sands extraction not only denudes Boreal forest and wetland landscapes during extraction, but also continues to affect freshwater integrity during processing and after extraction has occurred. The oilsands industry reports increasing emissions of several toxic chemicals to Environment Canada's National Pollutant Release Inventory (NPRI). But the oilsands industry and Alberta government have continued to claim to the public that all of the toxins in the Athabasca River are from natural bitumen seeps and that the industrial contribution is insignificant. To test this claim, in 2008 we did a comprehensive sampling and analysis of water from the Athabasca River and several of its tributaries, snowpack, vegetation and fish in the lower Athabasca watershed. Sampling sites were chosen in both developed and undeveloped reaches of the rivers within the bitumen-rich McMurray Geological Formation. We found that industry contributed substantially to concentrations of polycyclic aromatic hydrocarbons, mercury, lead, arsenic, and many other toxic chemicals. Releases were both via airborne pathways and runoff from developed industrial sites. We conclude that oilsands development is contributing substantially to the pollutant burden of the Athabasca River, and have the potential for increasing concentrations of contaminants in fish and other organisms, and potentially disrupting key ecosystems and traditional lifestyles downstream within the World Heritage Peace-Athabasca Delta. To protect these globally important resources, conservation and sustainable development at the catchment or watershed scale must be implemented across Canada's Boreal region.

SP4.7 Schleupner, C*; Schneider, UA; Research Unit Sustainability and Global Change; *christine.schleupner@zmaw.de*

Scenarios on Impacts and Responses of Climate Change on European Freshwater Wetland Conservation

In Europe wetlands have been drained and converted for centuries leaving the remaining wetlands fragmented and often in a degraded state. During the last decades efforts have been made to restore and preserve wetlands for various purposes. However, climate change issues have often been neglected in regional wetland planning. But with relatively high European political ambitions for climate change mitigation; biodiversity protection; energy, water, food, and civil security, the question arises how to optimally govern wetland conservation and restoration sites in order to maximize market and non-market benefits. The study that is introduced here tries to evaluate these preservation potentials of freshwater wetlands in Europe under consideration of changing climatic conditions. Scenarios are developed within an interdisciplinary framework by developing consistent links between suitable modeling systems from the fields of meteorology, hydrology, geography, biology, and economics. The resulting GIS-integrated multi-objective modeling of wetlands is able to assess impacts and responses of wetlands under implementation of systematic conservation planning methods.

21.7 Schmelzer, I*; Jones, C; Rasiulis, A; Wildlife Division, Government of Newfoundland and Labrador, LGL Limited, Goose Bay, Labrador, University of Ottawa (student); *isabelleschmelzer@gov.nl.ca*

Ecology of Forest-Dwelling Woodland Caribou (R.t. caribou) in Labrador: Long-term Monitoring in an Undistrubed Landscape

Understanding the ecology of Woodland caribou requires extensive observations in space and time. Scientific interpretation is often confounded by the interaction of natural and anthropogenic landscape change. It is rarely possible to determine baselines for vital rates or patterns of range use in the absence of significant landscape disturbance. Because caribou occur at low densities over vast areas, studies are often constrained financially and temporally relative to the lifespan of a caribou. We report on two forest-dwelling populations of Woodland caribou that have been monitored for at least 10 years. These populations occupy ranges with less than 10% anthropogenic disturbance. Individual caribou were followed for 1-13 years (n=150). The size and stability of annual ranges was evaluated over time and we calculated annual adult female survival and calf recruitment. Results indicated that range size was variable and contingent on the length of the monitoring period. Calf recruitment averaged 20% (CV = 0.26) and was higher than for populations in more disturbed landscapes. Adult female survival was high (x = 0.88) though variable (CV = 0.25) due to mortality associated with hunting. Results provide baseline data to address the proximate and cumulative impacts of development on woodland caribou ranges in Labrador.

SY72 SCHMIEGELOW, FKA*; Cumming, SG; Anderson, LG; Krawchuk, MA; Leroux, SJ; Lisgo, KA; Department of Renewable Resources, University of Alberta, Sciences du Bois et de la ForÃªt, UniversitÃ© Laval, College of Natural Resources, University of California, Berkeley, Department of Biology, McGill University; *fiona.schmiegelow@ualberta.ca*

Conservation Beyond Crisis Management: Pro-Active Planning for Boreal Regions Across Canada

Boreal regions in Canada contain a significant proportion of the world's remaining intact forests, and represent some of the last opportunities to avert the conservation crises plaguing most other ecosystems. However, they are also experiencing significant land-use pressures, and northern reaches are already showing effects of climate change. Current conservation paradigms reflect a history of reactive post-hoc efforts, and have led to constraint-based management strategies and the mistaken impression that conservation is a cost to resource development, rather than a fundamental component of sustainability. Planning proactively for conservation requires a precautionary approach that acknowledges the uncertainty inherent in all management decisions, and more sophisticated strategies that maintain or enhance resilience at very broad spatial scales. We describe a scientific framework for large-scale conservation: the conservation-matrix model (CMM), which exploits the strengths of systematic and dynamic conservation planning and adaptive resource management. Related land-use planning involves identification of a comprehensive protected areas network, including system-level ecological benchmarks, and management regimes that systematically enhance learning by treating management activities as carefully designed, incremental, and rigorously monitored experiments. We highlight the potential of the CMM to maintain the full range of natural and cultural values that boreal regions currently support, in conjunction with enhanced resource development, and provide criteria for, and their application to, the design of system-level benchmarks across boreal regions of Canada.

SY73 SCHMIEGELOW, FKA; Dept Renewable Resources, University of Alberta; *fiona.schmiegelow@ualberta.ca*

Taking the Pulse of Ecosystems in Canada: The Boreal Plains in Perspective

The boreal plains represents the fourth largest ecozone in Canada, and includes some of the most productive boreal mixedwood forests, with a diverse fauna reflecting the central position between western cordilleran and eastern shield systems, and the great plains to the south. Historically, forest clearing for agriculture resulted in the most extensive landscape changes, and rates of conversion along the southern edge of the ecozone continue to be high. However, more recent, widespread and rapid change has occurred in conjunction with the spread of industrial forestry throughout the region, and extensive energy exploration and development in the western portion. This ecozone boasts the largest forest tenures in Canada, and hosts the globally-significant oil sands developments, along with significant conventional oil and natural gas activity. The human footprint is heavy and growing. Not surprisingly, the boreal plains are a hotbed of controversy, as conservation is pitted against development, and climate change looms heavily on the horizon as both a product of current activities, and a major driver of future ecosystem change. If the current trajectory continues, the stress of anthropogenic landscape change coupled with a changing climate is likely to result in profound alteration of natural landscapes and associated processes. More so than perhaps any other region in Canada, future management of the boreal plains is an acid test of Canada's national and international commitments to biodiversity and environmental sustainability.

SY63 SCHMIEGELOW, FKA; Dept Renewable Resources, University of Alberta; *fiona.schmiegelow@ualberta.ca*

Critical habitat for boreal caribou in Canada: concepts and conservation challenges

The boreal population of woodland caribou, distributed across a vast area of Canada, was assessed as threatened under the Species at Risk Act (SARA) in May 2002. In June 2007, a draft National Recovery Strategy(NRS) was completed. However, although earlier versions of the NRS included extensive deliberations on the concept of critical habitat for boreal caribou, critical habitat was not identified in the draft NRS. In August 2007, largely in response to threats of legal action, Environment Canada (EC), the lead federal agency responsible for recovery planning for boreal caribou, launched a scientific review to apply the best available science to support identification of critical habitat. The undertaking was framed as an exercise in decision analysis and adaptive management, was guided by an 18-member science advisory group, and involved analysis and synthesis of data across the entire distribution of boreal caribou in Canada. The resultant report recommended that critical habitat for boreal caribou be identified at the scale of local population ranges, and expressed the current conditions on each range relative to its probability of supporting a self-sustaining local population (the recovery objective specified in the draft NRS). EC concluded that the information provided was insufficient to support identification of critical habitat for boreal caribou, and subsequently launched a second phase of science work, which is ongoing. A revised NRS is now scheduled for 2011. Here I review the scientific underpinnings of the concept of critical habitat for boreal caribou, the process of identifying it, and the institutional challenges in implementing conservation and management actions to protect it.

SY12 SCHMIEGELOW, FKA; Dept Renewable Resources, University of Alberta; *fiona.schmiegelow@ualberta.ca*

The promise and peril of applying conservation science to policies for woodland caribou conservation in Canada

Woodland caribou (Rangifer tarandus caribou) have been heralded as a conservation icon by environmental organizations, a flagship, umbrella and indicator species by conservation scientists, and they have the dubious distinction of being the most widely distributed Species at Risk (SAR) in Canada. One of three subspecies of caribou in Canada, woodland caribou belong to two, distinct ecotypes - boreal and mountain. While some details of their life history vary, they share a common requirement for large areas of older, intact forest, and high sensitivity to human activities that alter the composition and configuration of their ranges, and resultant predator-prey dynamics. Their status as a SAR has had a significant influence on the development of best management practices in forestry, energy exploration and development, and access management, and affords them special consideration in land-use planning. Legal listing of the southern mountain and boreal populations under the federal Species at Risk Act also demands that critical habitat be identified and protected, which functionally requires that ecologically-constrained resource management be applied over very large extents of land. While these conditions hold considerable promise for promoting the development of far-reaching policies based on system-level conservation science, the resource conflicts and opportunity costs associated with recovery and conservation of woodland caribou at current or increased population levels across its current distribution pose a risk that crisis-oriented conservation science will be applied to determining minimum levels for persistence. A "purveyor beware" approach is warranted.

SY63 SCHMIEGELOW, FKA*; Hebblewhite, M; Aldridge, C; Dept Renewable Resources, University of Alberta, College of Forestry and Conservation, University of Montana, NREL, Colorado State University and US Geological Survey; *fiona.schmiegelow@ualberta.ca*

Understanding the Science-Policy Gap in Implementation of Critical Habitat under the ESA and SARA

Conservation of endangered species is a cornerstone of the science of conservation biology, and arguably the most publicly prominent pursuit of the discipline. One of the main vehicles for endangered species recovery in the US has been the Endangered Species Act (ESA), and in Canada, the relatively new Species-at-Risk Act (SARA). Dspite the high profile afforded conservation successes under the ESA and fledgling SARA, reviews of the ESA almost a decade ago revealed systematic problems with the implementation of the ESA at the critical habitat identification stage. Despite the intention of SARA to avoid these problems, recent challenges in Canada suggest that similar problems of translating science into policy are hampering the implementation of critical habitat provisions. Here we review the impetus for, and evolution of, the ESA and SARA, and respective considerations for critical habitat. We use this to frame the various contributions to this symposium, with a particular emphasis on understanding the source of potential barriers to implementation of critical habitat provisions at the science-policy interface. We also explore perceptions of the role of conservation science in public policy, recognizing that endangered species conservation is ultimately an interdisciplinary undertaking, and that impediments to implementation of legislative provisions may be rooted in different value systems.

SY31 Schneider,R.; University of Alberta; *contact@borealcentre.ca*

Managing Woodland Caribou in Alberta, Canada: the Case for Triage

The objective of our study was to document the status of woodland caribou (Rangifer tarandus) herds in Alberta, Canada, and to contrast the current recovery strategy with the triage approach. To do this we modeled three types of recovery effort - protection, habitat restoration, and wolf control - and estimated the opportunity cost of recovery for each herd. We also assessed herds with respect to a suite of factors linked to long-term viability. We found that all but three herds will decline to critical levels (< 10 animals) within approximately 30 years if current population trends continue. The opportunity cost of protecting all ranges by excluding new development, in terms of the net present value of petroleum and forestry resources, was estimated to be in excess of 100 billion dollars (assuming no substitution of activity outside of the ranges). A habitat restoration program applied to all ranges would cost several hundred million dollars, and a provincial-scale wolf control program would cost tens of millions of dollars. Recovery costs among herds varied by an order of magnitude. Herds also varied substantially in terms of their potential viability. These findings suggest that woodland caribou in Alberta meet the conditions whereby triage should be considered as an appropriate conservation strategy.

SY79 Schneider,R.; University of Alberta; *contact@borealcentre.ca*

Effects of oilsands exploration and development on biodiversity

In this presentation I will review specific differences between natural disturbances and disturbances associated with oilsands exploration and development and I will discuss how these differences affect biodiversity using various species as examples. The oilsands deposits all lie within Alberta's boreal natural region. Multi-scale natural disturbances, such as wildfire and insect outbreaks, are typical of the boreal forest, and the species that inhabit this ecosystem are adapted to these disturbances. Disturbance and renewal is in fact necessary for the continued existence of the full suite of boreal species. The negative effects on biodiversity associated with oilsands exploration and development can be traced to differences between anthropogenic and natural disturbances. Two of the key differences relate to the large spatial extent and long duration of disturbances associated with oilsands development. A third important difference relates to form - linear features, such as roads, pipelines, and seismic lines, have no real natural correlate. They cause habitat fragmentation and provide human access to a much greater proportion of the forest than would otherwise be the case, leading to various secondary effects including an increase in disturbance, hunting and poaching, and collision mortality. Some species are able to tolerate anthropogenic disturbances well, but others are not. The result is a decline in the abundance of so-called sensitive species.

24.4 Schoennagel, T*; Nelson, CR; University of Colorado, University of Montana; *tschoe@colorado.edu*

Restoration relevance of recent National Fire Plan treatments in forests of the Western US

The US National Fire Plan is among the largest forest restoration and fire mitigation initiatives, treating more than 11 million hectares at a cost of over $6 billion. We evaluated the extent to which treatments under this plan targeted western US forest ecosystems in need of restoration due to disruption of frequent low-severity fire regimes and subsequent increases in fuels and potential fire severity. We found that 43% of the forested area treated from 2004 to 2008 outside the wildland-urban interface (WUI) occurred in ecosystems predicted to have high need for structural restoration -almost twice as much as expected given distribution of these forests. However, over half of the area treated was in forests of ambiguous or low structural restoration need, suggesting that further prioritization of restoration activities is needed. Proportion treated in high- and low-restoration-need classes varied by state: Arizona and California each had over 70% of total area treated in high-need forests, but Nevada and Wyoming each had nearly 50% in low-need forests. Overall, only about a quarter of the forested area of the West is expected to have high departure from historic fire regimes and uncharacteristic accumulation of fuels, suggesting that fuels-buildup has been overemphasized as the primary cause of the current wildfire problem.

SP9.7 Schulte, BA*; Esposito, RMM; Karimi, RR; Western Kentucky University, Georgia Southern University; *bruce.schulte@wku.edu*

Elephant Behavior, Human Perception and Human-Elephant Conflict

Improving the relationship between humans and elephants can further the conservation of elephants and provide economic benefits to humans. Such improvement can be facilitated by studies that provide information on the behavior of elephants and on the perception of humans regarding elephants. Using a conservation behavior, we are gathering data that serves both purposes. At Addo Elephant National Park, South Africa, we studied the influence of matriarchs during interactions between elephant family groups. We also examined the relationship between matriarch age and a measure of fitness. In northern Tanzania, we examined the relationship between perceived and actual causes of crop damage by wildlife. Farmers answered questions and we compared their responses to our quantification of damage to their corn crop. Our results support the hypothesis that older matriarchs secure higher fitness for group members through inter-group competition over resources. Human perception of crop damage appears to be influenced by the extent more than the frequency of damage. Because matriarchs influence group movements, altering their actions may reduce HEC. If this helps curtail the extent of damage, this could improve the human perception of elephants by farmers. Coupling our understanding of elephant behavior with human perception is an important next step in the reduction of HEC and thereby the conservation of elephants and their habitat.

13.2 Schulte-HerbrÃ¼ggen, BjÃ¶rn*; Kurpiers, Laura; Institute of Zoology, Zoological Society of London & Department of Anthropology, University College London, Institute of Zoology, Zoological Society of London; *bjorn.schulte-herbruggen@zsl.org*

Seasonality of bushmeat hunting by cocoa farmers in a forest-farm mosaic in SW Ghana

Bushmeat is considered an important source of income and protein for the rural poor. However, most studies have focused on forest areas with abundant wildlife and few alternative livelihood options. We assessed the livelihood role of bushmeat within a West African forest-farm mosaic with depleted wildlife populations and cocoa farming as the main livelihood activity. We conducted 800 repeated socio-economic interviews with 65 cocoa farming households using 24hr recall. Data collection covered twelve months comprising three agricultural seasons (before, during and after cocoa harvest) with distinct household income pattern. Data were analysed using GLMM. Hunters\' bags comprised small to medium sized animals, suggesting the landscape-wide depletion of large bodied animals. Bushmeat harvest was lowest during the cocoa season for all wealth groups but its importance increased with poverty within seasons. Whilst bushmeat was sold by all wealth groups before the cocoa season, only the poorest households continued selling bushmeat during the cocoa season. Despite the importance of bushmeat sales, the majority of bushmeat harvest value was consumed by hunters. This resulted in a substantial reduction of otherwise incurred household meat expenditures. The results highlight the connection between bushmeat harvest/utilisation patterns and the seasonality of farm income. Diversification of farm income could reduce seasonal income shortages and facilitate conservation objectives.

7.8 Schultz, Cheryl B*; Franco, Aldina; Crone, Elizabeth E; Washington State University, University of East Anglia, University of Montana; *schultzc@vancouver.wsu.edu*

Do forests act as barriers to butterfly movement? An experimental study to quantify the influence of boundaries and habitat types on Fender's blue dispersal

Understanding movement across the landscape is a critical challenge in an age of rapidly changing landscapes due to pressure from fragmentation and climate change. Fundamental to this is how organisms move across multiple boundary and habitat types. We investigate dispersal behavior of an endangered blue butterfly (Icaricia icarioides fenderi) to quantify movement across woodland boundaries and through meadows, open woodlands and closed forest which comprise the butterfly's landscape. In 2007 and 2008 in Oregon, USA, we conducted experimental releases at 9 ecotones and mapped 657 butterfly flight paths. Contrary to previous expectation, woods are not an absolute barrier to butterfly movement, but rather butterflies have a detectable per move probability of crossing this boundary (0.02 - 0.17 depending on sex and ecotone). Once butterflies have crossed the boundary, habitat-specific diffusion rates based on a correlated random walk are comparable in prairies and opens woods and depend on presence of lupine/breeding habitat (0.9 - 5.6 m2/sec depending on sex and habitat). Findings are significant for understanding the mechanisms of animal dispersal in complex landscapes as well as predictions for large-scale movement in the context of novel landscapes due to fragmentation, climate change and habitat restoration.

6.5 Scobie, CA*; Wellicome, TI; Bayne, EM; Department of Biological Sciences, University of Alberta; *cscobie@ualberta.ca*

Roads as Potential Sinks for Burrowing Owls on Canadian Prairies

The Burrowing owl is a federally listed endangered species that continues to decline throughout its Canadian range. The prairies have seen a steady increase in petroleum development, raising concerns about potential impacts to species at risk, such as the burrowing owl. Roads are the most abundant petroleum-related disturbance in the prairie landscape, with the greatest potential to affect burrowing owl nest success and nest site selection. We examined whether roads acted as sinks and/or ecological traps for burrowing owls. From 2003 to 2009 in Alberta, Canada, we monitored 322 burrowing owls to fledging. Our analysis shows that density of the most common road type (gravel) has a negative effect on burrowing owl nest success. Resource selection analysis shows that owls select nest sites closer to gravel roads and in areas with higher densities of gravel and paved roads. The presence of an ecological trap was examined by using arrival date as an indicator of preference. We found that earlier arriving owls select nest sites surrounded by higher densities of paved and gravel roads, but did not select nest sites closer to roads of any type. Roads are one of the most prominent features in the grasslands and they may be attracting owls to nest in areas where they are at higher risk of road mortality. In the future, we will explore how additional road characteristics may influence owl survival, nest success and fledging rate.

P1.24 SEILER, DL*; Dunwoody, S; Shaw, BR; Potter, KW; University of Wisconsin Madison; *dlseiler@ucdavis.edu*

The Role of Online Social Networks in Grassroots Conservation Outreach

Use of online social media has soared amongst both private individuals and conservation groups, but very little is known about the impact or potential of Social Networking Sites (SNS) as a public outreach tool. We studied the campaigns of three Wisconsin non-government organizations (NGO) conservation groups and their use of Facebook, which is currently the largest SNS in the world at more than 350 million active users. Specifically, we examined whether conservation outreach on Facebook is changing (1) member demographics, (2) communication methods and preferences, (3) public involvement levels in conservation, or (4) member relationships and their influence (social network theory). Our preliminary findings suggest that Facebook is not a preferred communication method for conservation group members, but that Facebook groups may provide increased visibility of an organization within member networks, peer influence, and stronger social ties amongst members. The findings of this study suggest there is potential for conservation groups and educators to increase their public visibility and internal cohesion with a Facebook campaign.

20.1 Sekercioglu, CH; KuzeyDoga Society; *cagan@kuzeydoga.org*

Conservation of bird functional diversity and ecosystem services in tropical forest, agroforest, and agricultural ecosystems

Although most bird species avoid agricultural areas, nearly a third of all birds occasionally use such habitats, often providing important ecosystem services like pest control, pollination, and seed dispersal. Combining literature review with a meta-analysis of world's birds, I compared tropical bird species that prefer forests, agricultural areas or both, with respect to body mass, diet, habitat and resource specialization. Compared to primary forests, in agro-forests species numbers of large frugivorous and insectivorous birds (especially terrestrial and understory species) often decline. In contrast, nectarivores, small-to-medium insectivores (especially migrants and canopy species), omnivores, and sometimes granivores and small frugivores do better, frequently by tracking seasonal resources. However, changes in guild species numbers do not necessarily translate to changes in relative abundance, biomass or function, and more studies are needed to quantify these important measures. The findings suggest that the replacement of forests and agro-forests with simplified agricultural systems can result in shifts towards less specialized bird communities with altered proportions of functional groups. These shifts can reduce avian ecosystem function, affect the ecosystem services provided by birds, and create further conservation problems in agricultural landscapes.

SY79 Semenchuk, G; Cumulative Environmental Management Association (CEMA); *glen.semenchuk@cemaonline.ca*

Creation of Management Frameworks Contributes to Effective Land use Planning

The creation of a management framework allows cumulative impacts to be considered, analyzed and acted upon in a way that optimizes the mitigation of impacts to the environment. In the oilsands region of Alberta a number of these management frameworks have been developed and forwarded to the appropriate regulatory agencies. These documents have made a significant contribution to the efforts to develop a land-use plan that strikes a new balance between development and the environment. The guidance provided by the frameworks is acknowledged as forming a significant portion of the management of air, water, land and biodiversity in the region. The creation of these environmental management frameworks is very challenging. Doing this in the context of a multi-stakeholder organization with consensus as an objective presents an even more difficult task. The effort is deemed worthy as it is recognized by regulators that multi-stakeholder groups contribute meaningfully to the overall responsible development of the region.

P2.157 Serapion N. Tanduyan*; Ponciano C. Bontia; Rachel Luz Vivas-Rica; Ricardo B. Gonzaga; Virginia D. Bensig ; Hemres M. Alburo; Cebu Technological University; *standuyan@yahoo.com*

Faunal and Floral Diversity of Mangrove Wetlands of Camotes Islands , Central Philippines

FAUNAL AND FLORAL DIVERSITY OF MANGROVE WETLANDS OF CAMOTES ISLANDS, CENTRAL PHILIPPINES Serapion N. Tanduyan, Ponciano C. Bontia, Rosalyn Pascual-Opiniano, Rachel Luz Vivas-Rica, Ricardo B. Gonzaga, Virginia D. Bensig and Hemres M. Alburo Cebu Technological University, San Francisco, Cebu Campus Tel: (032) 497-0318; e-mail: standuyan@yahoo.com The animal and plant components of mangroves in Camotes Islands were assessed due to the declining condition felt by the fishermen basis for drawing conservation options. Transect and barrier nets were used to assess the flora and fauna respectively. It shows that there are 30 species of mangroves found belonging to 13 families and 35 fish families with 74 species and 18 families of invertebrates with 25 species.

SY28 Serrouya, Robert*; Boutin, Stan; McLellan, Bruce; Wittmer, Heiko; University of Alberta, Research Branch, British Columbia Ministry of Forests, Victoria University of Wellington; *serrouya@ualberta.ca*

Politically Correct Predator Control: Reducing Moose To Lessen Apparent Competition With Endangered Caribou

Predator-prey systems across western North America are changing as a result of broad-scale changes to vegetation resulting from forestry and warming climates. In some cases, these changes have resulted in the range expansion of ungulates such as moose and white-tailed deer, which prefer early seral vegetation. Increases in moose and deer have been most pronounced in deep snow, rainforest ecosystems that typically contained few "early seral" ungulates and their predators. With the expansion of these ungulates and their predators, other ungulates such as mule deer but especially woodland caribou have declined dramatically. Recovery strategies for woodland caribou include: reducing forest harvesting, reducing moose and deer, or reducing predators directly. Because reducing forestry is a long-term solution that won't stop the imminent extinction of most herds, and long-term predator control is not politically acceptable, a broad-scale (3500km2) experimental moose reduction is underway. We report on the functional and numerical response of wolves, and caribou abundance, to this moose-reduction treatment. Managing predators and their primary prey (moose and deer) to conserve endangered caribou is highly unpopular with many people but necessary if caribou, and hundreds of thousands of hectares of old and ancient forests on which caribou depend, are to be conserved.

SY71 Servheen, C.; USFWS/Univ. Montana; *grizz@umontana.edu*

Grizzlies: Linking the parts for a healthy grizzly future

Assuring the future of healthy grizzly populations in the transboundary Rockies of the US and Canada will require providing wildlife movement opportunities between the large blocks of public land in this area. This will allow animals to disperse; avoid inbreeding; access important seasonal habitats like winter range; access water; and seek food and shelter across the landscape. Population connectivity will also increase the resiliency of grizzly populations to climate change effects that may change the distribution and availability of important foods. Enhancing connectivity will require building local knowledge, support, and understanding among land managers, private landowners, local political officials and key agencies like transportation departments about why maintaining and enhancing the ability for bears to move is important. Resources will be focused on the following strategies: 1) Improving the opportunity for grizzly movement within and between the large blocks of public and provincial lands in the transboundary Rockies of the US and Canada between the Yellowstone ecosystem and ecosystems to the north in southern British Columbia and Alberta; 2) Identifying specific movement opportunity areas and improving the permeability of highways at these locations with highway crossing structures and associated wildlife fencing to guide animals to these structures; 3) Private land conservation involving easements and acquisitions, and assistance in sanitation and ways to live with bears in key linkage areas; and 4) Building public support and understanding among the residents of mountain valleys about the benefits of healthy, interconnected populations of grizzlies.

P2.54 Setiasih, N*; Sartin, J; Reef Check Foundation Indonesia; *nsetiasih@reefcheck.or.id*

Marine Manage Area as Reef Guardian to Mass Coral Bleaching in the North Bali

Coral Reef at the North Bali was hit by mass coral bleaching in May-June 2009, spans over 120 km shoreline. The water temperature recorded up to 30oC. During the time, up to 40% coral bleaching was noted. The non-resistance coral colonies had a high degree of bleaching, up to 100%. The old massive resistance colonies were also encountered in some area. There were 3 marine manage areas along the surveyed shoreline. Interestingly, in general, reefs at marine manage areas were relatively less affected. This has bought urgency for a more detail research for coral reef resilience, as well as higher effort for protection for coral reef.

P2.100 Setiawan, A*; Nugroho, TS.; Wibisono, Y; Ikawati, V; Djuwantoko; Wildlife Lab,Forest Resource Conservation Dept,Faculty of Forestry, Gadjah Mada University, Yogyakarta, Indonesia; *wawan5361@yahoo.com*

Population Status and Conservation of Javan Gibbon (Hylobates moloch), in Central Java, Indonesia

A survey of distribution and population satus of Javan gibbon (Hylobates moloch) was conducted during August 2009 - February 2010 in Central Java, Indonesia. We survey 10 localities and found 56 groups of gibbon, total 132 individuals. The data were obtain using line transect methods. Javan gibbon found in fragmented unprotected forest, altitudinal distribution from 250 1900 meters asl. Sokokembang forest in Western part of Dieng Mountain and Mt.Slamet probably two largest habitat for gibbon population in Central Java, where occupied by 4.49 gibbons/km2 and 1.7 gibbons/km2. For survival of the gibbon in their eastern most range distribution, it's important to secure the remaining forested habitat in Central Java.

P2.204 Sewald, Jessica; Root, Karen*; Bowling Green State University; *jsewald@bgsu.edu*

Assessing Bat Species Composition and Relative Foraging in a Mixed Disturbance Environment

Summer Foraging requirements for bats are poorly understand, especially in areas highly fragmented, located in an urban/suburban matrix, and in critically endangered oak savanna habitats. The Oak Openings Region of Northwest Ohio includes all three conditions and collecting bat species assemblage and relative foraging activity information for species in this region will increase our understanding of habitat requirements for foraging. I hypothesize that species assemblage will include those found at high abundance throughout the state, that predictors of relative foraging activity will be structural rather than compositional characteristics, and that relative flight activity will be greater in oak savanna areas. A total of 16 points were sampled within two metroparks in the Oak Openings region five times from June 1st to September 2nd, 2009. Established methods of echolocation monitoring using an Anabat SD1 monitor were employed and data at the microhabitat, local and landscape scale were collected. Preliminary Results indicate that structural configuration of habitat (ie canopy cover) is more critical to relative activity than composition at local or landscape level. Species composition includes myotis spp, perimyotis subflavus, Eptesicus fuscus/Lasionycteris moctivagans, Lasiurus borealis, L. cinereus, and Nycticeius humeralis. However, further monitoring is necessary at Oak savanna sites to determine its relative importance for foraging.

SP4.11 Shannon R. White*; Dr. Edward W. Bork; Dr. James F. Cahill Jr; University of Alberta; *shannonrwhite@gmail.com*

Three years of climate change and herbivory in native grassland: Effects of precipitation, defoliation and warming on community composition and productivity

Climate change is predicted to both increase temperature and change precipitation patterns in northern grasslands. Furthermore, grazing from wild and domestic ungulates will act synergistically with climate change to impact grasslands. This may have ramifications for conservation of the rough fescue prairie, as already only five percent of the original extent remains, and what does remain is often overgrazed. We conducted a manipulative experiment in native rough fescue prairie to determine the impacts of warming, altered precipitation, and grazing on primary productivity and community composition. The study used a factorial design of warming, precipitation, and defoliation (simulated grazing) treatments. The abiotic and biotic conditions of the plots were surveyed, including plant cover estimates and the harvest of a subplot for vegetation biomass data. Ordinations indicated changes in community composition due to precipitation and defoliation treatments, but community composition was robust to warming. Total productivity declined with increasing defoliation and decreasing precipitation. Temperature did not affect total productivity, but it did affect forb productivity. Under drought conditions, warmed plots had higher forb biomass than unwarmed plots. These results suggest that community composition and productivity in rough fescue prairie will be affected by grazing and precipitation, with potential for interactions with climate warming.

SY15 Shapiro, E.N.; University of California, Berkeley; *elizabethshapiro@aya.yale.edu*
Keeping it in the REDD? Accounting for the social and environmental costs and benefits of Mexico's national payments for ecosystem services program
As international climate change negotiators define the degree to which market-mechanisms will play a role in the design and governance of Reduced Deforestation and Degradation (REDD) policy, it is crucial to understand both the environmental and social impacts of previous iterations of these types of initiatives. Mexico's federal payments for ecosystem services (PES) program is one of the world's largest and most elaborate avoided deforestation schemes. My study of program impacts was based on multidisciplinary methods: semi-structured interviews with program participants, intermediary organizations and administrators combined with analysis of satellite images to determine impacts to deforestation rates. Interview data that found participants entered land at low risk of deforestation was corroborated by GIS analysis that indicated only a small decrease on enrolled properties. Socioeconomic impacts varied greatly but in general were likely not to be long term. The type and strength of both environmental and social impacts were largely dependent on the strength and structure of pre-existing institutions. Lastly, I found that true commoditization of ecosystem services rarely occurred and the program has been reinterpreted by program participants and intermediaries as a federal subsidy in recognition of the value of rural environmental stewardship.

P2.125 Shepherd, B; Parks Canada; *Brenda.Shepherd@pc.gc.ca*
Wildlife Mortality in Jasper National Park: An Examination of Train Spilled Grain
Train collisions with animals are an important source of wildlife mortality in Jasper National Park, and monitoring the quantity of grain spilled by railcars signals if this contribution to mortality is being addressed. Grain products leak from trains as they travel due to improper loading or faulty gate mechanisms on railcars, especially in areas where trains stop and wait. In Jasper National Park, large carnivores and ungulates are struck by trains as they feed on spilled grains or rail-killed carcasses. Rail companies have improved maintenance for some grain cars and use vacuum-mounted railcars to clean up large spills in an attempt to reduce these attractants. We measured the quantity of grain spilled on the railway over the first two years of a three-year national program to repair malfunctioning grain cars. Grain was sampled in 2 ft2 collection boxes located between the rails at 26 sites in an area of the park with historically persistent grain spills. We dried and sifted samples to remove debris and obtained a weight/day. We tested the effect of time and grain car traffic on grain spill rate using a generalized mixed effects model. The quantity of grain spilled did not decline during the period of the repair program; however our analysis identified seasonal peaks in grain spill rate. Our study reveals that current efforts in railcar maintenance and on-site clean-up have not yet resulted in a change in grain spill rate in the park.

P1.58 Shepston, DK; Texas State University-San Marcos; *ds1133@txstate.edu*
The Northwest Forest Plan: A Pathway to Resilient Riparian Systems?
A majority of public forests in the Pacific Northwest have historically been commodified landscapes, managed primarily for timber resources. Timber extraction is the biggest threat to the health of the regions\' riparian ecosystems. In 1994, the Clinton administration enacted the Northwest Forest Plan (NWFP). Using Fischer, Lindenmayer, and Manning\'s (2006) ten guiding principles for commodity production landscapes, I assessed the potential for the Aquatic Conservation Strategy (ACS) of the NWFP to encourage resilient riparian ecosystems. I found that though there are challenges to meeting the criteria, the ACS does have the potential to increase the resilience of the northwest\'s riparian systems. As implementation of the ASC moves into its second decade, it is expected that managers will continue to strive towards meeting the goals of the ASC and thus, in the process, increase the resilience of the riparian ecosystems in the Pacific Northwest.

19.1 Shokri, MR*; Gladstone, W; Faculty of Biological Sciences, Shahid Beheshti University, School of Environmental and Life Sciences, University of Newcastle, Australia; *shokri.mr@gmail.com*
Limitations of habitats as biodiversity surrogates for conservation planning in estuaries
The increasing pressures on global biodiversity and the lack of data on the number and abundance of species has motivated conservation planners and researchers to use more readily available information as proxies or surrogates for biodiversity. â Habitat' is one of the most frequently used surrogates but its assumed value in marine conservation planning is not often tested. The present study developed and tested three alternative habitat classification schemes of increasing complexity for a large estuary in south-east Australia and tested their effectiveness in predicting spatial variation in macroinvertebrate biodiversity and selecting estuarine protected areas (EPAs) to represent species. The three habitat classification schemes were: (1) broad-scale habitats (e.g. mangroves, seagrass), (2) sub-division of each broad-scale habitat by a suite of environmental variables that varied significantly throughout the estuary, and (3) sub-division of each broad-scale habitat by the subset of environmental variables that best explained spatial variation in macroinvertebrate biodiversity. Macroinvertebrate assemblages differed significantly among the habitats in each classification scheme. For each classification scheme, habitat richness was significantly correlated with species richness, total density of macroinvertebrates, assemblage dissimilarity, and summed irreplaceability. However, in a reserve selection process designed to represent examples of each habitat, no habitat classification scheme represented species significantly better than a random site selection. Habitat classification schemes may represent variation in estuarine biodiversity, however, the results of this study suggest they are inefficient in designing representative networks of estuarine protected areas.

SY35 Shury, TK; Parks Canada Agency; *todd.shury@pc.gc.ca*

Confronting disease as a barrier to large scale bison restoration in North America

Infectious diseases have historically and continue to present enormous challenges to the recovery of wild bison populations in North America. Federally reportable diseases such as tuberculosis, brucellosis and anthrax which impact international trade in cattle pose the most serious challenges currently, but other diseases such as malignant catarrhal fever and paratuberculosis have potential to limit the distribution and abundance of bison in future reintroduction sites. Properly conducted, rigorous disease risk assessments must be completed prior to reintroduction or translocation into new habitats, or we risk leaving a legacy of disease management issues for future generations. These diseases often create artificial boundaries that will not allow bison to resume their ecological niche as a keystone herbivore in North American ecosystems (TB and brucellosis in particular). Managing diseases in which bison are the reservoir will require particularly creative long-term investment and conciliatory efforts by land management, regulatory agencies and stakeholder groups in a multi-jurisdictional landscape where success will likely be expensive and measured in decades rather than years. These long-standing issues must be successfully resolved if future success is to be achieved at a landscape scale. Funding for basic research into immunodiagnostics, vaccines and bison containment strategies will be necessary to achieve the vision outlined by the Vermejo Statement.

15.4 Sibanda, M*; Shumba, E; WWF Zimbabwe; *msibanda@wwfsarpo.org*

Climate Change and Carbon Financing under Reduced Emmissions from Degradation and Deforestation in Miombo of southern Africa

An investigation of the policy environment and potential for national and community benefits of carbon finance through reduced emissions from degradation and deforestation (REDD)was done in 5 Miombo countries in southern Africa. These were Botswana, Malawi, Mozambique, Zambia, and Zimbabwe. The policy environment in most countries is favourable to the introduction of REDD due to the basis that community based natural resources management (CBNRM) programmes that have matured in most of the sub region. CBNRM projects have encouraged good natural resources stewardship benefiting nature and the poor communities in the region.Therefore income from REDD would be additional to what CBNRM projects already generate for national and local economies. Institutions at national level must be put in place for purposes of measuring, reporting and verification. Debate rages on how the funds accruing from REDD would be distributed from national to local level although several models from CBNRM are available for improvement. Forest areas for carbon stocks are proposed based on a preliminary analysis using GIS. There is a need to develop in southern Africa national communication strategies in order to exploit the opportunities available with the emergence of REDD in the global Climate Change discourse.

P2.112 Sierra-Corona, R; Solis-Gracia, V*; List, L; Paz, F; Ceballos, G; Instituto de Ecologia, UNAM, Centro Regional de Investigaciones Multidisciplinarias, UNAM; *lomogrande@hotmail.com*

Janos Biosphere Reserve: A socio-environmental perspective.

The Janos Biosphere Reserve located in Chihuahua, Mexico, covers more than half a million hectares of native grasslands and forests, and it is one of the most biological diverse reserves in North America. Janos is one of the last extensive grasslands in northwestern Mexico, where this ecosystem has expirienced severe degradation processes due to anthropogenic activities. Large regions have lost their capacity to provide environemental services and sustain local inhabitants. This, linked to lack of economic alternatives has forced peasants to sell their rangelands to industrialized agricultural producers. Land owners are becoming employees, poverty and migration to cities in Mexico and in the US is growing and new environmental and social problems are arising. In this study we evaluate in detail the root causes of biodiversity loss in the Janos reserve, to to find solutions for these complex problems. We used a historical analysis that focused in the identification of the environmental problems, stakeholders, and socio-environmental conflicts. We identified two environmental conflicts fueled by authority's corruption; land use change due to grassland plowing, and the competition for the water supply, where the irrigation of expanding crops is reducing the available water for human settlements and ranching. Next steps include a socio-economic evaluation in the whole region to direct our efforts to the issues whose solution will have the greatest impact in conservation.

3.4 Sikes, Benjamin A.*; Hawkes, Christine V.; Section of Integrative Biology, University of Texas, Austin; *bensikes@gmail.com*

Utilizing natural soil biotic communities to enhance ecosystem resilience and recovery

Terrestrial ecosystem conservation and restoration often attempt to manipulate plant assemblages to achieve a desired community. Plant interactions with soil biota have emerged as major factors determining the structure and long-term stability of plant communities. Moreover, soil microbial communities underpin many ecosystem responses to global climate change, habitat modification and atmospheric deposition. Yet the vast diversity of soil biota remains a largely untapped resource in ecosystem conservation and restoration. Specific groups of soil biota can play different roles in ecosystem functioning and resilience to disturbances such as climate change and invasions. Manipulations of soil biota thus provide a novel pathway to achieving aboveground results, and have the potential to substantially broaden our conservation and restoration toolkit. We will describe our prototype project designed to help develop microbial manipulation strategies. Specifically, we will ask how manipulation of four major soil microbial groups (Ascomycetes, Arbuscular Mycorrhizal Fungi, Eukaryotic Algae and Cyanobacteria) can improve recovery of endangered plants and prevent reinvasion of non-native pasture grasses in a disturbed Florida scrub ecosystem. The microbial treatments will be compared to conventional restoration treatments. Ultimately, our goal is to directly increase the effectiveness and efficiency of land management by integrating soil community ecology into conservation and restoration science.

P1.50 Silva, SM*; Voirin, B; Ferrand, N; Morgante, JS; Moraes-Barros, N; LABEC-IB-USP and CIBIO-UP, Max Planck Institute, CIBIO-UP and FCUP, LABEC-IB-USP; *sofiamarques1@gmail.com*

The Common And The Endangered Bradypus Sloths - Is There A Correlation Between Genetic Diversity And Endangered Species?

This study presents the first genetic analysis on the critically endangered pygmy-sloth, Bradypus pygmaeus. We compared four distinct populations of the common three-toed sloth (B. variegatus) and one pygmy-sloth population using the four microsatellites currently available for sloths. The populations analyzed were from the Brazilian Atlantic Forest (AFNorth, n=16; AFSouth, n=7), Western Amazon Forest (WA, n=6) and Northeast Panama (P, n=8). The pygmy three-toed sloth only occurs on one island, Escucdo de Veraguas, in Panama (I, n=11). Through this distinct sampling effort some alerting results were obtained. I) The mean number of alleles is less than two, with one to three monomorphic loci, in all populations except WA (MNA=3.750). II) This population shows the higher genetic diversity (average gene diversity=0.68; Ho=0.50 to 0.83; He=0.63 to 0.75), with more private alleles. III) Assignment tests failed to attribute individuals to the AF populations. IV) Finally, differentiation indexes are higher among intraspecies populations (FstAF-S/WA=0.87) than among Panama populations (FstP/I=0.007). This pygmy-sloth genetic characterization is certainly influenced by the common demographic history between mainland and island sloths. Nevertheless, it also highlights the need for closer attention for other non-endangered sloth populations occurring in threatened habitats. The population inhabiting the longest stable region, WA, has higher diversity than the AF populations, which has the same low genetic diversity seen in the critically endangered sloth.

SY13 Simon Stuart; Ana Rodrigues; Janice Chanson; Michael Hoffmann*; John Lamoreux; Jan Schipper; IUCN SSC, CNRS-CEFE, IUCN Species Programme, IUCN Species Programme, Big Island Invasive Species Committee; *mike.hoffmann@iucn.org*

The Devil and the Blue - The Changing Fates of the World's Mammals

Class Mammalia includes many of the world's most charismatic species. Mammals play key roles in ecosystems and provide important benefits to humans (such as food, recreation, and income). Despite this, our knowledge of mammalian diversity is still surprisingly disparate, both regionally and taxonomically. A recent comprehensive assessment of the conservation status and distribution of the world's mammals - including data compiled by >1700 experts, covering ~5,500 species, and including marine mammals - has demonstrated that at least one-fifth of the world's mammals are at risk of extinction in the wild. Compared with land species, threat levels are higher among marine mammals, driven by different processes (accidental mortality and pollution, rather than habitat loss in the terrestrial realm), and are spatially distinct. Here, we build on these analyses by determining the changing status of species over time for the period 1996 to 2008 to ask what have been the major factors driving both deteriorations and improvements in mammalian biodiversity, and where have these changes been most evident. Our results unequivocally demonstrate that hunting is the single biggest driver of declines, and that the current and future war-ground for mammal conservation is in South-east Asia. We conclude by proposing a bold, last-ditch initiative to thwart widespread impoverishment of South-east Asian biodiversity.

20.5 Simons, Erin ; Harrison, Daniel*; Whitman, Andrew; Wilson, Jeremy; Department of Wildlife Ecology, University of Maine, 5755 Nutting Hall, Orono, ME 04469, Manomet Center for Conservation Sciences, Brunswick, ME 04011, School of Forest Resources, University of Maine, 5755 Nutting Hall, Orono, ME 04469; *harrison@maine.edu*

Present and Future Status of Biodiversity on Managed Forest Landscapes in Maine, U.S.A. as Determined Using Multi-Scale Condition Indicators

Commercial forest owners are expected to maintain biodiversity; however, few tools are available to quantify success. Indicators are useful for assessing the condition of representative elements of biodiversity, but require research and testing. We evaluated status and scale sensitivity, and predicted future trends (2007-2032) for 9 stand- and landscape-scale condition indicators across 139,225 ha of managed forestland. Early-successional habitat for shrubland birds, and late-successional deciduous and coniferous stands were particularly rare across the entire study area and our results indicate that those conditions are at high risk now and in the future. At the landscape-scale, predicted habitat for lynx represented only 25% of forestland area. Further, requirements for an aggregated configuration of suitable habitat required by American martens may be especially difficult to achieve without directed conservation planning. Increasing scale had relatively little effect on stand-scale indicators; however, scale greatly influenced landscape-scale indicators. Our data suggest that landscapes should be at least 400 km2 in area to effectively conserve area-sensitive indicators. Our projections indicate that all condition indicators will decline an average of 52% from 2007 to 2032 if current forest harvesting trends continue. Thus, enhanced planning and directed management for selected biodiversity conditions will be required to avoid future loss of forest biodiversity.

16.1 Singh, GG*; Markel, R; Martone, RG; Harley, CDG; Chan, KMA; University of British Columbia; *geraldsingh@gmail.com*

Coastal Ecosystem Services Amongst Trophic Cascades

The reintroduction of sea otters (Enhydra lutris) off of the west coast of Vancouver Island have been heralded as a conservation success story: their populations are rebounding and their range is expanding. However, sea otters can cause considerable change to nearshore ecosystems, which can cause conflict with invertebrate fisheries. Research conducted off of the west coast of Vancouver Island demonstrates the changes associated with otter reintroduction and issues faced by coastal communities. Marine invertebrate populations are smaller, as are average sizes of invertebrates, but kelp beds flourish through a well establish trophic cascade. Kelp beds alter the nutrient flow through nearshore systems, which can lead to increased productivity of nearshore ecosystems. Additionally, kelp beds add structural complexity to the nearshore, which can lead to more productive and diverse fish communities. This research provides insight into management for human-predator coexistence by accounting for ecosystem services associated with otter present ecosystems.

P2.13 Sinha, Samir Kumar*; Sinha, R. K.; Wildlife Trust of India, B-13, Second Floor, Sector 16, Noida (U.P.), India -201301, Environmental Biology Lab., Department of Zoology, Patna University, Patna, Bihar, India - 800 006; *samir.wild@gmail.com*

Conservation Attitude of Forest Dependent Communities around Valmiki Tiger Reserve in the Himalayan Foothills, India

Assessment of locals' attitude is crucial to improve relationship between Protected Area (PA) and people by guiding for policy and management decisions. Locals tend to be alienated from conservation when not allowed to use the sustenance resources due to stringent legal protection of the PAs. Conservation attitude of communities in the vicinity of Valmiki Tiger Reserve in the Himalayan foothills in India was assessed. The study area is a Priority Level 1 Tiger Conservation Unit in contiguity with Chitwan National Park and Parsa Wildlife Reserve in Nepal. Locals are dependent on the Reserve for various resources, extraction of which is an offence as per the current legal provisions. Questionnaire survey and focused group discussions were conducted in four sample villages close to the â core area' of the Reserve. Conservation attitude, assessed on the basis of five specific questions, was categorized into no, low, moderate and high conservation attitudes, and analyzed as a function of socio-economic, forest dependence, awareness and human-wildlife conflict factors. Ordinal Logistic Regression was used to explore the influence of explanatory variables on conservation attitude. Conservation attitude was found to be low to moderate. The model reflected that better affluence and increased forest dependence of locals tend to improve their conservation attitude.

P2.38 Sitar-Gonzales, A.; Parsons, E.C.M.*; George Mason University; *ecm-parsons@earthlink.net*

Low public awareness of the conservation status of high profile polar species: polar bears and penguins

In the spring of 2007 a survey was conducted evaluate the awareness of the conservation status of two groups of polar animals which have received much attention in the media (primarily due to risks to their populations posed by global warming): polar bears and penguins. A total of 243 people participated in the survey, conducted at George Mason University, Virginia. Respondents included students, faculty and staff. A high number of surveyed participants (75%) had taken an environmental class at the university. However, knowledge of protection issues regarding polar bears and penguins was exceptionally low. When asked if polar bears (Ursus maritimus) are considered to be endangered under U.S. law, 65% said yes. At the time of the study polar bears were being considered for listing as "threatened" under the US Endangered Species Act, a lower category than "endangered", but were not listed until May 15, 2008. Moreover, 43% of those surveyed believed that penguins were considered to be endangered under U.S. law, despite having no status or listing under US law at all. More than fifty percent of the participants considered polar bears (69%) and penguins (53%) endangered internationally; the IUCN listing polar bear was changed from "least concern" to "vulnerable" in 2006, but the species as a whole was not considered to be "endangered", as yet. Of the 18 listed species of penguin, the Galapagos penguin (Spheniscus mendiculus), yellow-eyed penguin (Megadyptes antipodes), northern rockhopper (Eudyptes moseleyi) and erect-crested penguin (E. s sclateri) are considered to be endangered, although seven species are considered to be "vulnerable" e.g. the southern rockhopper (E. chrysocome) and Macaroni (E. chrysolophus) penguins. The most well known penguin species, the emperor penguin, Aptenodytes forsteri, is listed as "least concern". Thus despite their high media profile, awareness of the actual conservation status of these animals is low. The study suggests greater public outreach is required to make the pubic aware of the conservation status of even high profile species.

SY65 SjÃ¶berg, JC*; Allan, N; Andersen, ME; Boyer, K; Blasius, H; Cantrell, C; Carman, S; Wilson, K; Nevada Department of Wildlife, US Fish and Wildlife Service, US Geological Survey, Natural Resources Conservation Service, Bureau of Land Management, Arizona Game and Fish Department, New Mexico Department of Game and Fish, Utah Division of Wildlife Resources; *sjoberg@ndow.org*

Setting conservation priorities for arid land rare fishes; the Desert Fish Habitat Partnership regional aquatic habitat conservation planning process

Freshwater species extinction rates are substantially higher than those for marine and terrestrial systems, making freshwater aquatic species and ecosystems among the most endangered in North America. Arid land aquatic systems in the western and southwestern United States reflect this global trend with 50 percent of the freshwater fish species listed under the US Endangered Species Act. Although individual US states have developed Wildlife Action Plans which identify species and habitat conservation priorities within their borders, no comprehensive regional strategy has existed to support the allocation of scarce resources to prevent the decline and potential extinction of the 179 endemic non-salmonid fishes occurring across the American west in the face of increasing anthropogenic impacts and climate change. The Desert Fish Habitat Partnership's Strategic Framework, developed in 2008, incorporates endemism, conservation status, Heritage rank, existing and projected threats, inter-jurisdictional conservation needs, and other factors to identify regional priorities and direct efforts to reverse declines of these habitats and species. Imperiled desert fish species which are underserved by existing conservation programs are given additional weight in the prioritization matrix. Application of this process provides targeted support for on-the-ground projects to address desert fish conservation priorities through the National Fish Habitat Action Plan and other funding sources.

P2.113 SLOCOMBE, D SCOTT; Geography & ES, Wilfrid Laurier University, Waterloo, ON, Canada, N2L 3C5; *sslocomb@wlu.ca*

Effective Use of Simulation and Information Tools in Integrated Land Use Planning, Environmental Management, and Conservation

Problems with institutional, disciplinary, and habitat fragmentation have long been drivers of more spatially, informationally, and institutionally integrated approaches to land use planning and environmental management. Several past and current planning initiatives in BC, Alberta, and Yukon have sought to address these challenges in contexts of strong interest in species and habitat conservation. In this context, an emerging approach involves the linked tools of simulation models, geographic information systems (GIS), and definition of disturbance limits and thresholds, in order to integrate a range of information into a more scientific basis for land use planning. Review of several initiatives in western and northern Canada identifies several key issues for the effectiveness of this approach: adequacy of input data, transparency of technical components and results, ongoing data and monitoring needs, and effectively linking the technical products with planning implementation processes.

5.6 Smallwood, Peter D. *; Lawson, David; Zahler, Peter; University of Richmond, Wildlife Conservation Society (WCS); *psmallwo@richmond.edu*

Afghanistan: Conservation in a Country in Conflict

Afghanistan lies at the juncture between Paleoarctic, IndoMalayan, and African biotic realms, and therefore has a rich biodiversity. For example, there are at least 9 species of cat extant in Afghanistan now, with two others only recently extirpated from the country. It is home to such iconic species as snow leopards (Uncia uncia), Marco Polo sheep (Ovis ammon polii), and Markor goat (Capra falconeri). From deserts to mixed deciduous forests to high alpine grasslands, there are wildlands and wildlife worthy of conservation. The Wildlife Conservation Society began its current project on Biodiversity Conservation in Afghanistan in 2006. The project involves local communities in three regions of Afghanistan, and with the central government to help them develop the legal framework and policies for protected areas, protected species, and conservation. There was very little in the way of a legal framework for conservation in Afghanistan when we began, and very little expertise in conservation in the Afghan government or academia. Security declined significantly over most of the life of the project thus far, but may improve in 2010. Despite these challenges, we have made significant progress. Here, we report on our accomplishments to date, our plans for continued work, and the challenges of working for conservation within a country in conflict.

SY26 Smith, Andrew T.; Arizona State University; *a.smith@asu.edu*

Rabbits, hares and pikas (Lagomorphs): endangered, keystones, and sustainably used - Models for effective conservation action

The approximately 90 species of lagomorph (rabbits, hares and pikas) run the gamut of roles in natural ecosystems. Some species are among the rarest of animals on earth, while others serve important roles as keystone species and ecosystem engineers. Some species have value in commerce and for sport hunting. Others represent a scourge as alien invasive species. Several lagomorph species are heavily impacted by disease, making them a model for how disease can impact native (and non-native) species. Several lagomorphs appear to be important indicator species for the effects of global warming. One species, the European rabbit (Oryctolagus cuniculus) is most of these wrapped into one! I will highlight activities of the IUCN/SSC Lagomorph Specialist Group to engage in activities that lead to positive conservation action utilizing cutting edge approaches to identify and recover threatened species (Tehuantepec jackrabbit, Lepus flavigularis; Zacatuche Romerolagus diazi; Amami island rabbit Pentalagus furnessi), preserve ecosystems utilizing the positive ecosystem role played by some lagomorphs (Plateau pika Ochotona curzoniae); European rabbit O. cuniculus); and the sustainable use of others (Sylvilagus species in North America). LSG activities demonstrate how a species approach can be used broadly to effect positive conservation action with wide-scale application.

2.5 Smith, DHV*; Jones, B; Centre for Conservation Research, Calgary Zoo; *dess@calgaryzoo.ab.ca*

Improving the accuracy of surveys for an â at risk' amphibian on Alberta's Great Plains

Management of at risk species requires accurate estimation of population size and distribution, but for species that occur at low abundance across a large area this is often complicated by imperfect detection. Northern leopard frogs (Lithobates pipiens) are classified as Threatened under Alberta's Wildlife Act and their effective management is impeded by a poor understanding of their demographics. In 2009 we undertook eight repeat surveys (four in spring and four in late-summer) of 69 sites across 90 000 km2 of Alberta and measured several covariates which may influence the probability of detecting northern leopard frogs. Probability of detection was lower in spring compared with late-summer but so was site occupancy. Because northern leopard frogs breed in spring and migrate in late-summer, surveys in spring will be more useful in determining permanent occupancy since some late-summer occupancy may be temporary. During spring wind chill, wind speed and water temperature were important predictors of probability of detection. Survey accuracy for northern leopard frogs can be greatly improved by avoiding strong, cold winds and by surveying when water temperature exceeds 17 degrees Celsius.

SY28 Smith, DW*; Stahler, DR; MacNulty, DR; Raymond, R; Kira Cassidy; Erin Albers; Yellowstone National Park, University of Minnesota, University of Minnesota; *doug_smith@nps.gov*

Wolf Pack Stability Promotes Dispersal and Recovery Area Connectivity

Wolf Pack Stability Promotes Dispersal and Recovery Area Connectivity Douglas W. Smith, Daniel R. Stahler, Daniel R. MacNulty, Rebecca Raymond, Kira Cassidy,and Erin Albers An important goal for recovery and delisting of wolves under the Endangered Species Act (ESA) in the Rocky Mountains of the USA is genetically effective dispersal to maintain metapopulation structure. Other than habitat corridors or linkages allowing movement and survival, little is known about wolf biology or management that promotes dispersal that enhances connectivity. With recent wolf delisting and hunting, consideration of various management strategies will be necessary to achieve the multiple objectives of a recovered wolf population, recreational harvest, reductions in livestock depredation, and genetic connectivity. Harvest will be used to reduce density and distribution to control conflicts, but it is unknown what affects removal has on social behavior like dispersal. Two hypotheses have been considered: 1) low breeder overturn or pack stability leads to annual reproduction and dispersal of older offspring, or 2) breeder loss (natural or harvest) disrupts pack stability producing independent individuals that disperse to reassemble breeding units. We contrasted dispersal patterns between wolf packs differing in breeder retention year-to-year in Yellowstone National Park (YNP). Packs that had stable breeders were more likely to have a subordinate wolf disperse the following year, although dispersal was affected by several factors. Our results suggest that harvest strategies should consider lightly harvesting or protection of some wolf packs enhancing dispersal between recovery areas. These results contribute to the growing body of evidence from other studies on wolf survival and mortality and gene flow that harvest should not occur uniformly throughout any recovery area, especially when considering control of problem wolves occurs irrespective of location. We note, however, that our assessment was in a park setting.

P2.133 SMITH, I*; Barrett-Lennard, L; Birdsall, C; Sandilands, D; Phillips, A; Vancouver Aquarium, Cetus Research and Conservation Society; *iain.smith@vanaqua.org*

Quantifying observer effort for opportunistically-collected wildlife sightings records

Opportunistic sightings networks can be a useful and practical method for identifying the geographical and temporal distribution of species in areas where systematic surveys are unrealistic. However, without records of when and where observers travelled, it is impossible to determine whether geographic or temporal variation in sightings reflects variation in effort or variation in the species of interest. We created a GIS model to reconstruct a plausible distribution of effort of the main categories of voluntary observers reporting whale, dolphin and sea turtle sightings. Observers were grouped into categories such as commercial whale watchers and ferry crew. Effort for each observer was estimated using patterns typical of his or her category, including trip distances, proximity to home port, standard ferry routes and maximum sighting distances. We also estimated the relative effectiveness of each category at sighting, identifying and reporting cetaceans, and used both types of estimates to create an effort layer for each observer category. The layers were combined to give a spatially explicit overall estimate of sightings effort. We then applied the effort model to our sightings database to calculate an index of sightings density per unit effort for use in estimating species densities. The method provides a practical approach to estimating observer effort applicable to a range of studies making use of opportunistically-collected data.

P2.135 Smith, J.E.*; Horn, M.H.; California State University, Fullerton; *justinearlsmith@gmail.com*

A mapping-based niche comparison of California endangered and threatened species and their closest relatives

Niche conservatism in endangered and threatened taxa has been largely ignored in the literature. Using Environmental Niche Modeling (ENM), we modeled the ecological niches and evaluated niche conservatism in 23 California endangered and threatened taxa and their closest relatives. Species persist within a limited set of biotic and abiotic conditions defined as the niche. Although little empirical evidence exists, theory suggests that closely related taxa should exhibit low niche differentiation and share similar threats of extinction. This concept of niche conservatism proposes that rates of adaptation outside of the fundamental niche are often slower than the extinction rate. ENM is a powerful explorative tool that has been used increasingly to answer fundamental questions about niche theory. We used extensive museum collection databases, accessed through Global Biodiversity Information Facility (GBIF), and the Genetic Algorithm for Rule-Set Prediction (GARP) package to model the fundamental niches of each of the 46 taxa. Our study aimed to compare a diverse set of endangered and threatened taxa to elucidate potential patterns of niche conservatism across a broad group of clades. Understanding niche dynamics and the underlying mechanisms driving speciation is important, especially for endangered taxa. Moreover, identifying patterns and commonalities among such a wide array of endangered taxa could benefit species management decisions.

SY73 Smith, R.B.; Environment Canada; *risa.smith@ec.gc.ca*

Preliminary findings on the Status and Trends of Canada's Ecosystems

The Ecosystem Status and Trends Report for Canada is a joint federal/provincial/territorial initiative to assess the health of Canada's ecosystems from a biodiversity perspective. The focus of the report is on ecosystem condition, drivers and stressors. The report is a science-based assessment which draws on peer-reviewed literature, government reports and monitoring results. It is intended to inform the national biodiversity agenda, complement the historic focus on species with ecosystem information and deliver in part on Canada's international obligations under the United Nations Convention on Biological Diversity to assess progress towards the 2010 biodiversity target ""to achieve by 2010 a significant reduction of the current rate of biodiversity loss at the global, regional and national level as a contribution to poverty alleviation and to the benefit of all life on Earth." Canada's National Ecological Classification System (NECS) provides the main reporting units. The NECS been adjusted to reflect improvements resulting from ground-truthing exercises by provinces and territories, the addition of 9 marine ecozones and the addition of an urban ecozone and the Great Lakes as separate units. Key findings are organized in 5 theme areas: biome trends, human/ecosystem interactions, habitats and wildlife, ecosystem processes and the science/policy interface. Assessments on status and trends, rate of change and confidence in the results are made for each key finding.

P1.10 Sodhi, NS*; Ehrlich, PR; National University of Singapore, Stanford University; *dbsns@nus.edu.sg*

Conservation Biology for All

The global biodiversity crisis must be dealt with rapidly; what can be saved in the developing world will require an educated constituency both in the developing and developed world. Sadly, developing world conservation scientists have found it difficult to access an authoritative textbook, which is ironic since it is these countries where the potential benefits of knowledge application are greatest. We will present on a project that will provide free and open access to cutting-edge but basic conservation science textbook to developing as well as developed country inhabitants. The book contains authoritative chapters written by top names in conservation biology. Important topics are covered such as balancing habitat conversion and human needs, climate change, conservation planning, designing and analyzing conservation research, ecosystem services, endangered species management, extinctions, fire, habitat loss, and invasive species. The project represents an effort that the conservation community has deemed worthy of support by donations of time and effort.

P1.86 Soewu, Durojaye A*; Akinleye, Bolanle T; Department of Plant Science and Applied Zoology,Olabisi Onabanjo University,Ago-Iwoye,Ogun State,Nigeria; *durosoewu@hotmail.com*

Habitat Preference and Time-Budget Analysis of Civettictis civetta in Nigeria Conservation Foundation Reserve, Lekki, Lagos State, Nigeria.

Habitat preference and activity budget of Civettictis civetta, recently re-introduced into the reserve was studied using direct and indirect observations. Footprints, feeding spots, faecal spots, and civetone were employed as signs in indirect estimation. Temporal and spatial distribution of these signs in the three vegetations of the reserve was investigated. Fifty-eight percent of the signs were made between 7pm-12am, 40% between 1am and 6am, 1.4% between 7am and 12pm. No signs were made between 1pm and 6pm. On nights when the moon is full, this activity rhythm is altered as no signs were recorded throughout such nights. Fifty-one percent of the signs were located in savannah grassland, 26% in swamp forest and 21% in mangrove forest. This species was found largely nocturnal, with a preference for savannah grassland for its daily activities. Though largely omnivorous, palm seeds were the predominant fruits in the faecal droppings. Traces of illegal poaching activities were recorded within the reserve. There is a need for specialised studies to determine the population dynamics of this species especially in this reserve. Further analysis of the faecal droppings is also required to determine the animal-species preference of this species so as to develop an effective conservation programme for the animal

P1.131 Solis-Gracia, V*; List, R.; Instituto de Ecologia-Universidad Nacional AutÃ³noma de MÃ©xico; *verruga@hotmail.com*

IDENTIFICATION OF SUITABLE AREAS FOR REINTRODUCTION OF BISON (Bison bison) IN CHIHUAHUA, MEXICO

North American grasslands have suffered large transformations and species losses, including that of keystone species like bison (Bison bison), whose population was reduced to about 1000 individuals between 1830 and 1880. Today there are ca. 600,000 bison in segregated groups. However, 95% of them are managed as cattle for meat production and do not exert an ecological role similar that believed to have occurred prior to recent European impacts on North America's grasslands. With this work we seek to contribute to the ecological recovery of bison in North America, specifically in Mexico, by identifying areas at the southern end of bison's historic range where the species could be reintroduced as part of grassland restoration efforts. We are using data from aerial surveys of the only free ranging bison herd in Mexico, which roams in the border area between Janos, Chihuahua, Mexico and Hidalgo county, New Mexico, USA, and predictive models such as GARP and MAXENT to identify the most suitable sites for reintroduction in northwestern Mexico. Using WorldClim and slope and aspect layers we detected an area suitable for bison within the Janos Biosphere Reserve in Chihuahua. In November, a breeding group of genetically pure bison from Wind Cave National Park in South Dakota was translocated to this area. We are analyzing more areas to identify suitable places where other bison populations can be established.

SY26 Somers, MJ*; van der Westhuizen, R; University of Pretoria, Ezemvelo KZN Wildife; *michael.somers@up.ac.za*

The black and white of rhino conservation: why has the conservation of rhino in South Africa been so effective, and can it continue?

Contrary to the general downward trend in conservation status of many large mammals, especially mega-herbivores, the two species of rhinoceros (the white rhino (Ceratotherium simum) and black rhino (Diceros bicornis)) in South Africa have been steadily increasing. We ask why South Africa has been so effective at not only conserving them but how they have improved their status. For this paper we compare the effectiveness of rhino conservation in south Africa with other areas. We suggest the effectiveness stems from a number of factors which we describe. These are: 1) the use of a managed metapopulation approach to preserving and increase numbers, 2) the use of expert opinion and an increasing use of evidence based conservation, 3) effective use of fences and other forms of security to protect them, 4) a combined effort by many organisations, sharing costs and reducing individual effort and 5) a group of highly motivated and dedicated individuals driving the process. The combination of these factors, along with financial and political stability have all contributed towards success. I therefore make suggestions that, in some other selected situations, that this is the way to go for conserving some other species. For instance another successful conservation program in South Africa having some of the above conservation factors running is the South African wild dog (Lycaon pictus) conservation effort. I suggest the recent widespread increase in rhino poaching, including in South Africa, is a threat to rhino conservation, but not so much in south Africa as elsewhere, owing to the effective conservation measures in place and the ability to react to this adversity.

P1.110 Songer, Melissa*; Forrest, Jessica; Williams, Christy; Sampson, Christie; Gopala, Areendran; Budiman, Arif; Yulianto, Kokok; Leimgruber, Peter; Smithsonian National Zoological Park, World Wildlife Fund, US, World Wildlife Fund AREAS Programme, World Wildlife Fund India, World Wildlife Fund Indonesia; *songerm@si.edu*

Mapping Habitat Loss and Human Elephant Conflict in Priority Landscapes

Habitat loss and resulting human elephant conflict (HEC) are leading threats to wild Asian elephants. Yet, baseline data for evaluating habitat loss has not been compiled for most of the range and little information land cover, change and HEC is available for systematic assessments, monitoring, and conservation planning. The World Wildlife Fund's Asian Rhino and Elephant Action Strategy (AREAS) Programme and the Smithsonian National Zoo integrated existing WWF habitat, land cover change, and HEC data into a spatial database for assessing status, condition of and threats in elephant priority landscapes. By synthesizing the best available land cover data from regional experts we found that 75% of priority landscapes are natural areas covered by forests or grasslands, with agriculture and plantations covering 18% of the areas. Though over one-third have protected status, land cover change data shows annual forest loss rates in a majority of landscapes were higher than the 0.2% global average. Analysis of HEC points showed most conflict areas overlap agricultural or plantations. Results show a need for immediate action in landscapes with high deforestation. As key elephant areas come under increasing pressure, it is critical to collect consistent information on habitat, change, and HEC for all priority landscapes.

1.7 Sophie Taddeo*; Sylvie de Blois; Department of Plant Science and McGill School of Environment, McGill University; *sophie.taddeo@mail.mcgill.ca*

Assessing the risk of invasion by common reed (Phragmites australis) in a protected wetland

Common reed is a growing concern in North America, as its rapid progression is associated with a degradation of local plant diversity and ecosystem functions. Few control methods of the species have proven to be cost-effective. In vulnerable sites such as protected areas, an assessment of invasion risk allows managers to choose the best method of intervention (e.g prevention, early control). We aim to develop an approach to help predict the risk of invasion by common reed, focusing on a protected wetland in Southern Quebec for which we have mapped all colonies of common reed. Based on data acquired through remote sensing and field studies, we are studying the incidence of various environmental factors (e.g. land cover/land use, distance to various perturbations) on the current distribution of the species. A model based on maximum entropy approach is then used to map the potential distribution. Results show that invasion risks are higher in areas located closed to roads and ditches and in certain land cover such as high marshes, fallow land and built-up area. These predictions will be used by managers as a tool to target the best management approach and sites to prioritize, and will improve our current knowledge of reed ecology.

SP11.6 Sponarski, Carly*; Bath, Alistair; Musiani, Marco; University of Calgary, Memorial University Newfoundland; *ccsponar@ucalgary.ca*

Effects of social trust in government on attitudes towards wolves and wolf management in Alberta, Canada

Wolf depredation on domestic livestock continues regardless of the number of wolves culled. In addition, perception of conflict may by high regardless of the level of livestock losses. Under these circumstances, managing agencies could reduce conflicts by fostering participation. People (including residents and, ideally, all interest groups) feel included and heard, and this produces positive attitudes towards wolf management practices. In general, social trust in the agency has been identified as an important driver of attitudes towards environmental issues. This research examines the variables affecting social trust in relation to wolf management issues. Data collected through a mail survey of residents in Southwestern Alberta was used to examine the mediation role, social trust plays between a person's values and attitudes toward wolf issues. A structural model was used to examine 571 responses over 27 questions. Our findings show that social trust in the managing agency does play a crucial role linking a person's values to positive attitudes towards wolves. Our results illustrate the important role played by agencies in determining their constituents' attitudes towards wolf issues. From a broader perspective, this study suggests that communication, education and participation by local residents are key to manage environmental management conflicts, which inevitably have conservation implications for wolves in this area.

P2.86 Sproat, Denyse J.; University of Central Lancashire, Preston, UK; *DSproat@bell.net*

The Devil is in the Details - Requirement for Recognition of Values in Conservation Management with specific example of the Tasmanian Devil

Introduction: In conservation management many activities occur with little assessment of values and associated ethical questions. Not recognising these values, and their effect on our choices, can create blindspots in reasoning and severely compromise the decision-making process - resulting in actions not always in the best interests of environments or species. Discussion: Tasmanian Devils have low genetic diversity, reduced variability in Major Histocompatibility Complex genes, lack of resistance to neoplasmic infection, and may be a genetically doomed species. DFTD does not have obvious human causes; it can be argued humans have no duty to save the species. Due to expected effects of DFTD and management actions, attempts to save devils to prevent ecosystem impacts, or avoid introduced species incursion, are futile. Therefore, we need to examine why we want to save the species. We will discover it is due to our human values and desires. Conclusion: It is imperative to recognise species conservation may be driven by human desires - not by ecosystem need. Science and conservation professionals must be aware of values in situation assessment and management decisions. Otherwise, programs may not result in benefits for either environments or species. We need to ask the hard question in regards to conservation management - "why are we doing this?". More importantly, we need to know - are we prepared to accept the answer?

SY63 Squires, John R.*; Sartorius, Shawn; DeCesare, Nick ; Rocky Mountain Research Station, U.S. Fish and Wildlife Service, Ecological Services, University of Montana; *jsquires@fs.fed.us*

Does Defining Critical Habitat Facilitate Canada Lynx Conservation in the Contiguous U.S.?

After many legal challenges, lynx was federally listed as an endangered species throughout the contiguous U.S. in 2000. In 2006, the US Fish and Wildlife Service (USFWS) narrowly defined critical habitat based on the assumption that sanctioned management plans could exempt broad landscapes from critical habitat designations. Critical habitat was remanded in 2008 due to the undue influence of agency administrators over current science in identifying important landscapes for lynx. In 2009, critical habitat was defined a second time by the USFWS based on current best science. The lynx example illustrates many of the strengths and weaknesses of assigning critical habitat under ESA. Recent studies clearly define important habitat-use associations for lynx in the contiguous U.S., yet defining critical habitat remains contentious. We review the strengths and weaknesses of defining critical habitat under ESA from biological and management perspectives. Specifically, we consider the following: 1) compare the costs associated with defining critical habitat to the biological benefits to lynx conservation; 2) how should critical habitat be defined for highly mobile species; 3) do consultation requirements under Section 7 of the ESA make regulation of critical habitat impacts redundant; 4) what factors should be considered in determining critical areas for species conservation?

P1.155 Squires, S.E.*; Hermanutz, L.; Dixon, P.L.; Government of Newfoundland and Labrador, Memorial University of Newfoundland, Agriculture and Agri-Food Canada; *susansquires@gov.nl.ca*

Science drives management of Braya on the Limestone Barrens

The Newfoundland and Labrador Endangered Species Act was established to protect species at risk. For each listed species, such as Braya longii (endangered) and B. fernaldii (threatened) a recovery team is established. The Limestone Barrens Species-at-Risk Recovery Team is composed of scientists, government managers, community and industry members, and students. Comprehensive teams are essential in ensuring the best scientific data is collected and used in management decisions. The LBSARRT, established in 1998, ensured that the definition of Braya critical habitat and stewardship priorities are based on scientific evaluation. Recent management concerns surround the mitigation of Plutella xylostella (diamondback moth) infestation and three pathogenic threats. Demographic data recorded annually (1998-2006) in 13 Braya populations on undisturbed and anthropogenically degraded habitats and summarized into deterministic projection suggest severe Braya declines. Management options were explored by adjusting Braya survival rates to mimic the absence of pests. Populations on degraded habitats were most improved by the removal of pathogens; where as populations on undisturbed habitats were most improved by the removal of P. xylostella. Reductions in pest abundance, restoration of degraded habitats, and Braya introductions into undisturbed, unoccupied habitat will improve Braya viability. This research has allowed managers to set biological significant priorities in mitigation plans.

10.6 Squires, S.E.*; Hermanutz, L.; Dixon, P.L.; Government of Newfoundland and Labrador, Memorial University of Newfoundland, Agriculture and Agri-Food Canada; *susansquires@gov.nl.ca*

Are rare plant populations on degraded habitats less valuable for conservation?

Habitat loss and fragmentation is a severe threat to the persistence of rare plants, requiring conservation biologists to consider the use of degraded habitats in species recovery. Approximately 30% of the limestone barrens of Newfoundland, Canada, home to Braya longii (endangered) and B. fernaldii (threatened), have been anthropogenically degraded. We surveyed individually tagged Braya growing on degraded and undisturbed habitat for the presence of insects and pathogens. Plutella xylostella (diamondback moth) infested 30% of B. longii and 16% of B. fernaldii, 26% of B. longii died from root rot, 18% of B. longii lost flowering stalks to rot, and 27% of B. fernaldii had flowering stalk and leaf deformities. More insect infestations and the majority (66-100%) of pathogen infections occurred on degraded habitat. The presence of pests was linked with statistically higher mortality rates and declines (9-75%) in seed production compared to flowering plants that were neither infected nor infested. Presently, degraded habitats are considered important reservoirs for Braya seeds and receive legal protection. However, their ability to act a pest reservoir and lack of within population genetic diversity brings into question their conservation value. Our research suggests that rare plant populations surviving on disturbed or degraded habitats need to be screened for potential negative impacts to undisturbed populations. Some habitats may need to be restored as part of recovery efforts.

P2.127 Srinivas, V.*; Gangadharan, A.; Ram, S.; Foundation for Ecological Research, Advocacy and Learning; *srinivasv@feralindia.org*

A comprehensive ground-based framework for quantification of human impacts on wildlife and habitat

Ground-based monitoring of human impacts on wildlife and habitat is a critical component of conservation efforts, especially in biodiversity hotspots with significant human populations. Currently most efforts to monitor human impacts are limited to encounter rate indices, such as number of snares/km walked. However, such indices bear an unknown relationship with true impact prevalence because they do not account for imperfect detection, and are especially misleading when detectability varies spatially or temporally. We adapted a standardized detection-non-detection survey and a statistically robust framework to explicitly estimate detection probability and hence quantify the distribution and intensity of human impacts. We applied this framework in a multiple-use zone in the southern Western Ghats as a critical component of quantifying threats to connectivity for large mammals. Although very little evidence of poaching was detected during field surveys, our models indicate that 5 percent of the sampled area was impacted by it, a 110% increase from naÃ¯ve estimates of poaching presence. Our results highlight the influence of human settlements on the prevalence of several human impacts over the landscape. Our approach combines simple, cost-effective field methods with a robust analytical framework to quantify impact prevalence, prioritize conservation efforts and evaluate their outcomes. It also provides conservation managers with an intuitive visual tool for adaptive management.

SY25 St. John, F.A.V.*; Edwards-Jones, G.; Gibbons, J.M. ; Jones, J.P.G.; School of Environment, Natural Resources & Geography, Bangor University, Wales, UK; *afp647@bangor.ac.uk*

Testing methods for estimating rule breaking in conservation

Many approaches to conserving and managing natural resources depend upon rules, but the existence of rules alone does not guarantee compliance. Information on rule breaking behaviour is needed for designing interventions to improve compliance. However, directly investigating rule breaking is difficult as rule breakers may not wish to identify themselves. Other disciplines have developed methods for answering sensitive questions but so far these have not been widely applied in conservation. Using rule breaking among fly fishers as a case study, we tested two methods specifically designed for collecting sensitive data (the randomised response technique (RRT) and the nominative technique), against a conventional self-complete questionnaire. RRT resulted in much higher estimates of the prevalence of rule breaking than the self-complete questionnaire, particularly for more sensitive questions. The nominative technique yielded extremely low estimates, possibly because respondents are not well informed, or do not witness their friends' rule breaking behaviour. Despite requiring large sample sizes we suggest that RRT is a useful method for obtaining information about rule breaking and could be used more widely , for example in studies of poaching and other forms of illegal resource extraction.

P1.94 Stagoll, K*; Manning, AD; Knight, E; Fischer, J; Lindenmayer, DB; The Australian National University; *karen.stagoll@anu.edu.au*

Relating Bird Species Traits Directly to the Landscape: An Application to Urban Planning

Within urbanising landscapes, multivariate analyses that focus on species traits promise to be useful conservation tools because they can predict which traits may be affected by particular development decisions. By understanding how landscape vegetation and attributes relate to species traits, planners will have a greatly increased awareness of how faunal communities in the landscape will be affected by urban development. In our paper, we explored the conservation applications and implications of multivariate analysis for a pre urbanised landscape. We used RLQ analysis, a three-table ordination method, to directly relate species traits to environmental variables. We found that community composition was strongly influenced by landscape vegetation and attributes, and that species traits were clearly and directly related to environmental variables. These results increase our understanding of how the planned urban development for the landscape will affect bird communities, and have the potential to better focus species monitoring on those with traits that will be affected by development, and to proactively address negative effects. Our study has demonstrated that RLQ analysis can be effectively applied in urban planning, that its application informs our understanding of ecosystem structure and processes within a landscape, and hence aids conservation.

P2.205 Stanton, Jessica*; Pearson, Richard ; AkÃ§akaya, H. Resit; Stony Brook University, New York, USA , American Museum of Natural History, New York, USA; *jstanton@life.bio.sunysb.edu*

Combining Static and Dynamic Landscape Variables in Predicting Species' Range Shifts Under Climate Change

Methods to predict future range changes commonly involve species distribution (niche) models based on climatic variables. Values for these dynamic variables are predicted for the next several decades using the results of climate models. However, species distributions also depend on factors other than climate that are either expected to stay static into the future (e.g., soil type) or for which future scenarios may not be available (such as those from remote sensing). Ecological niche models built using present-day conditions and projected to future conditions can be misleading if the correlations between static and dynamic variables change in the future. The question of how best to combine dynamic variables predicted by climate models with static variables is not trivial. Using a set of artificial species displaying a range of life history traits and dispersal capabilities, we tested various methods for combining these different types of variables under future climate scenarios. We evaluated each method for how well it predicts both future available habitat and risk of extinction. Alternative methods include using the static variables as masks, and including them as independent explanatory variables in the model. The method that gives the most accurate results depends on the type of interaction (e.g., additive vs. multiplicative), the degree of correlation between the static and dynamic variables, and the degree to which these change in time.

SY36 Stanwell-Smith, D; UNEP World Conservation Monitoring Centre; *damon.stanwell-smith@unep-wcmc.org*

Tracking progress towards 2010: what do the global indicators tell us?

In response to global declines in biodiversity, over 190 countries have pledged under the Convention on Biological Diversity (CBD) "to achieve by 2010 a significant reduction in the current rate of biodiversity loss at the global, regional and national levels as a contribution to poverty alleviation and to the benefit of all life on Earth". This "2010 Biodiversity Target" has since been incorporated into the Millennium Development Goals. The 2010 Biodiversity Indicators Partnership (2010 BIP, www.twentyten.net) is a GEF funded global initiative that is mandated by the CBD to track progress towards the 2010 Biodiversity Target and strengthen the development, availability and use of biodiversity indicators at multiple scales. The 2010 BIP secretariat is based at UNEP WCMC and has worked with 41 international partner organizations since 2007 to develop indicators within 22 Headline themes over seven focal areas. We present the results of the initiative; highlighting biodiversity indicators within the CBD's flagship 2010 report "Global Biodiversity Outlook 3"; and including novel aggregation of 31 biodiversity indicators into a narrative of (i) current pressures on biodiversity , (ii) biodiversity status, (iii) policy and practical responses and (iv) benefits (ecosystem services); concluding that the 2010 Biodiversity Target has been missed.

SY79 Stelfox, B; ; *bstelfox@alces.ca*

Alberta s Oilsands - The pace of landscape transformation and change in ecological integrity

The boreal forest biome of northern Alberta contains the world's 2nd largest remaining deposit of oil. During the past half century, the pace and tempo of bitumen extraction in this region has increased exponentially and created a profoundly anthropogenic landscape through the construction of seismic lines, surface mines, wellsites, access roads, pipelines, processing plants, settlements, and workforce. Yet, the bitumen development of this region is still young, and most of the landscape transformation has yet to occur. This region also supports a large forestry sector whose longterm viability is challenged by the cumulative effects of a sympatric forestry and hydrocarbon sector. Against a backdrop of "range of natural variability", this presentation will chronicle the historical development of this landscape, will identify the current metrics of the anthropogenic and natural landscape, and will describe plausible future development trajectories. A suite of indicators will be presented including landscape metrics (landscape composition, fragmentation, age class structure), and economic metrics (bitumen production, wood production, GDP, revenue, workforce)

SY76 Stenbacka, F.*; HjÃ¤ltÃ©n, J.; HilszczaÅ ski, J.; Department of Wildlife, Fish, and Environmental Studies, Swedish University of Agricultural Sciences, Forest Research Institute, Department of Forest Protection, Poland; *Fredrik.Stenbacka@vfm.slu.se*

Occurrence and Assessment of Parasitoids (Hymenoptera, Ichneumonoidea) of Saproxylic Beetles in Managed Boreal Forest Landscapes

Understanding the ecological communities and their resilience to forestry related disturbance is essential for ensuring the persistence of functional forest ecosystems. However, we need more knowledge about species interactions in order to improve conservation-oriented measures and to develop more resource-efficient ways to minimize overall species loss. In particular, species of high trophic levels deserve more conservation concern, as these often occur in low/variable population densities due to high specialization and reliance on intact food chains. Such species are potentially more vulnerable to disturbances than their associated prey and might serve as indicators of ecosystem changes and provide useful insights into the effects of disturbance by modern forestry practices. Here we present data on habitat-, substrate- and host associations of parasitoids of saproxylic beetles, and also discuss the complementarity of sampling methods in assessing populations of these parasitoids. Idiobionts that have a wider host range preferred clear-cuts, while the more host-specific koinobionts were more common in closed canopy forests. Depending on the degree of specialization, habitat or microhabitat may be of primary importance for these species. Window traps gave a better measure of the species pool in different forest types, while emergence traps gave more detailed information concerning substrate requirements, hatching periods and to some extent host choice. For more precise parasitoid-prey relationships, debarking of logs may be a very suitable method.

SY71 Stenhouse,G.B.*; Nielsen, S.E.; Boulanger, J; Foothills Research Institute, Hinton, AB, Department of Renewable Resources, University of Alberta, Integrated Ecological Research, Nelson B.C; *gordon.stenhouse@gov.ab.ca*

Alberta Grizzly Bear Population Inventory - baseline data for recovery efforts

Abstract Grizzly bear population size and distribution in Alberta continues to be an important issue for wildlife management and conservation planning. In the 1980's biologists used available data and expert opinion to identify both management areas and current population size. Following recommendations on a change in status for this species in 2002 data deficiencies for this species were recognized. In 2004 the Foothills Research Institute Grizzly Bear Program was asked to undertake population inventory work on behalf of the Alberta government. Over the course of the following 5 years our research team conducted DNA hair snagging mark-recapture population inventory work to determine a population estimate for grizzly bears in each of 5 management units along the eastern slopes of Alberta. This work followed our habitat mapping and resource selection function modeling work undertaken within the larger research program. Results from these inventory programs provided a unique opportunity to evaluate the models that were generated and to allow a better understanding of the spatial distribution of grizzly bears in Alberta. We present the results of these population inventory programs and show the linkages to our mapping and modeling efforts that span a 10 year period. Finally, we discuss the value and importance of these combined data sets for future recovery efforts and population trend monitoring.

SP2.9 Stenson, GB*; Hammill, MO; Dept. of Fisheries and Ocean, St. John's NL, Dept. of Fisheries and Oceans, Mont Joli, QC; *Garry.Stenson@dfo-mpo.gc.ca*

Incorporating Ice Related Mortality into the Assessment of Northwest Atlantic Harp Seals, Pagophilus groenlandicus

Northwest Atlantic harp seals give birth and nurse their pups on the drifting pack ice of Atlantic Canada. Weaned young also use ice as a resting platform and having adequate ice is critical for survival. Comparing pupping locations to ice types indicates that females appear to prefer thin - medium first year ice. Both extent and thickness of ice has declined over the past decade, with 2010 being one of the lowest in 40 years. At the same time, harp seals have been hunted extensively in both Canada and Greenland. Harp seals are assessed every 4-5 years using a population model that relies upon survey estimates of pup production. As such, the impact of ice-related mortality will not be reflected in the surveys for many years. A factor to account for increased mortality due to poor ice has been incorporated into the model since 2004, but the importance of including this factor must be evaluated. Under scenarios of a constant harvest, ice mortality â ¥ 30% in a single year would result in significant changes in the population trajectory within a decade, although they would not be detected in pup production for at least 20 years. Repeated ice-related mortality of 10% had an impact if it occurs 6 or times in a decade. Changes in the population and pup production could not be detected before significant changes in the population can occur. Therefore, possible changes in natural mortality due to poor ice must be taken into consideration in order to management this species properly.

SA1 Stetz, JB*; Kendall, KC; Servheen, C; University of Montana/USGS, USGS, U.S. Fish and Wildlife Service ; *jstetz@usgs.gov*

Evaluation Of Bear Rub Surveys To Monitor Grizzly Bear Population Trends

Wildlife managers need reliable estimates of population size, trend, and distribution to make informed decisions about how to recover at-risk populations, yet obtaining these estimates is costly and often imprecise. The grizzly bear population in northwestern Montana has been managed for recovery since being listed under the U.S. Endangered Species Act in 1975, yet no rigorous data were available to evaluate the program's success. We used encounter data from 379 grizzly bears identified through bear rub surveys to parameterize a series of Pradel model simulations in program MARK to assess the ability of noninvasive genetic sampling to estimate population growth rates. We evaluated model performance in terms of: 1) power to detect gender-specific and population-wide declines in population abundance, 2) precision and relative bias of growth rate estimates, and 3) sampling effort required to achieve 80% power to detect a decline within 10 years. Simulations indicated that ecosystem-wide, annual bear rub surveys would exceed 80% power to detect a 3% annual decline within 6 years. Robust design models with 2 simulated surveys per year provided precise and unbiased annual estimates of trend, abundance, and apparent survival. Designs incorporating 1 survey per year require less sampling effort but only yield trend and apparent survival estimates. Our results suggest that systematic, annual bear rub surveys may provide a viable complement or alternative to telemetry-based methods for monitoring trends in grizzly bear populations.

P2.170 Stetz, JB; Kendall, KC; Macleod, AC*; University of Montana/USGS, USGS; *amacleod@usgs.gov*

Black Bear Density In Glacier National Park, Montana, USA

No demographic information exists on the status of Glacier National Park's (GNP) black bear (Ursus americanus) population. In 2004, we sampled the black bear population within GNP plus a 10 km buffer using noninvasive hair collection methods as part of a 7.8 million-acre study of the regional grizzly bear (U. arctos) population. We collected 5,645 hair samples from 550 baited hair traps, and 3,807 samples from multiple visits to 1,542 natural bear rubs. Microsatellite analysis identified 600 (51% F) individuals from the 2,848 samples identified as black bears. Data from individual bears were used in closed population mark-recapture models to estimate black bear population size and density in the 6,600 km2 greater GNP area. Preliminary results suggest that the density of GNP's black bear population was equal to or greater than other interior populations sympatric with grizzlies, despite the high density of grizzlies in this area. This project represents the first estimate of black bear abundance for this area, and demonstrates the efficiency of multi-species projects to inform management. Given the high density of both bear species we documented, it may be appropriate to reconsider the suitability of GNP as a translocation location for bears captured at conflict sites outside the park.

SY24 Steve Cumming*; Fiona Schmiegelow; UniversitÃ© Laval, University of Alberta; *stevec@sbf.ulaval.ca*

Mapping and modelling "intrinsic patches" in boreal forest for use in conservation planning.

An observed distribution of habitat patches is a snapshot of a dynamic pattern created by processes such as disturbance, dispersal and succession. To incorporate these processes into conservation planning, we must model the transitions between habitat types. However, the appropriate spatial units of analysis are often not those given by available mapped data. Geomorphology constrains patch transitions, resulting in temporally stable "Intrinsic Patches" (IPs) on which higher-frequency biotic processes take place. Abiotic processes such as natural disturbances may propagate over many IPs, changing their composition but not their boundaries. Thus, IPs are temporally invariant and may be appropriate spatial units for many purposes, including conservation planning. We mapped the IP structure of a 500,000km2 region of boreal forest in western Canada, using reclassified forest inventory data. We then used multivariate statistical methods to:1) assess the representativeness of an existing protected areas network; 2) compare patch distributions within and between mapped ranges of a threatened species, woodland caribou; and 3) assess the ecological significance of a larger scale mapping of "Enduring Features". Finally, we discuss how IPs could be used to construct stable ecological benchmarks or protected areas of desired composition in highly dynamic systems.

SY35 Steve Forrest; Northern Great Plains Program, World Wildlife Fund-US; *steve.forrest@wwfus.org*

Ecosystem Benefits of Larger Scale Bison Restoration

While there is little disagreement that grazing is a key ecological driver in grassland ecosystems, there are fewer studies demonstrating how bison grazing might have influenced ecosystem processes uniquely from cattle, leading some to suggest that there is no distinction between bison and cattle grazing that cannot be replicated by appropriate management. Differences that bison do exhibit include: 1) degree and frequency of "wallowing" and the creation of disturbed depressions; 2) uprooting of invasive shrubby vegetation (pinyon) and yucca; 3) less time spent congregating in riparian areas; 4) use of and need for water; 5) preference for grass versus forbs; 6) production of larger quantity of winter fur; 7) ability to forage in snow depths that would defeat cattle. However, whether these differences amount to significantly different ecosystem response is still questioned. Regardless, bison restoration is likely to result in increased regional predator populations, increased populations of competing herbivores, more persistent and higher streamflows, and lower rates of grassland fragmentation due to the nature of the simplified management regime needed for their production. As a result, the prediction is that large-scale bison restoration would support both more individuals and more species. Because the number of species is correlated with ecosystem multifunctionality, it is predicted that ecosystems where bison occur at scale would be more resilient, be able to provide a wider array of ecosystem services, and be more adaptive to predicted climate change than a comparable ecosystem where cattle were the primary grazer.

SP7.4 Steven C. Tannas*; Edward W. Bork; Walter D. Willms ; James F. Cahill; University of Alberta, AAFC; *sctannas@hotmail.com*

Environmental regulation of Festuca campestris grassland resistance to invasion by Poa pratensis

Invasion of non-native species such as Poa pratensis has become a serious threat to the ongoing conservation of native rough fescue grasslands in Alberta, Canada. Conservation efforts are currently limited by a poor understanding of the ecological mechanisms responsible for regulating resistance of native grasslands to encroachment by P. pratensis. Using a multi-factorial field study, we tested various mechanisms with the potential to alter Poa encroachment over 3 years, including changes in environment (water addition, nitrogen addition and litter removal), and defoliation during either summer or winter, in a factorial design. After one year summer defoliation was the most important factor altering community composition, including favoring P. pratensis encroachment. In contrast, low water conditions led to reduced P. pratensis. Vegetation responses at the community level suggested there were two divergent responses among most plant species, including one group that reacted similar to P. pratensis, and another that responded similar to the climax grass species (Festuca campestris). The latter group was negatively affected by summer defoliation and preferred low water conditions, but was relatively resistant to winter defoliation. Overall, we conclude that summer defoliation and soil moisture availability were the primary determinants of changes in composition of these Festuca campestris grasslands.

P2.141 Stevens, A.F. Joy*; Bayne, Erin M.; Wellicome, Troy I.; Canadian Wildlife Service, Environment Canada, Department of Biological Sciences, University of Alberta; *joy.stevens@ec.gc.ca*

Use of habitat selection models in unsampled environments for Burrowing Owl (Athene cunicularia) conservation in Canada

Habitat selection models explore species-environment relationships using empirical data, however, the utility of such models for conservation also depend on their ability to predict species occurrence in unsampled environments. This is particularly important for rare or endangered species in Canada, such as the burrowing owl (Athene cunicularia), which depend on critical habitat identification and protection for population recovery. Previously, we created six predictive home-range habitat selection models for the current distribution of burrowing owls in Alberta and Saskatchewan based on parameters that describe soil, climate, geography, land-use and grassland fragmentation. In this study, we applied these models to the 1990's burrowing owl range in Manitoba and evaluated their predictive ability using current and historical burrowing owl locations. Importantly, the habitat selection models can predict burrowing owl occurrence in Manitoba, however, the spatial distribution of suitable habitat sometimes varied from the known distribution based on field observations. These results will aid in the identification of critical habitat and increase survey efficiency for burrowing owls in Manitoba, a population that is almost extirpated. We conclude that habitat selection models can be extrapolated outside of the area they were designed for, provided that the results are verified with known species locations or additional field surveys.

P1.130 Stevens, C*; Leggo, S; De la Mare, C; Anderson, B; Golder Associates Ltd., Suncor Energy Inc.; *cameron_stevens@golder.com*

Resource Selection by the Canadian Toad at an Oil Sands Mine in Alberta, Canada

The Canadian Toad Bufo (Anaxyrus) hemiophrys, a species listed under Alberta's Wildlife Act, is a valued ecosystem component in environmental impact statements (EISs) for proposed mining developments in the oil sands. A good understanding of habitat selection is fundamental to making accurate predictions for an EIS. Our objectives were to examine patterns of habitat selection using Resource Selection Functions (RSFs) and to test the prediction that Canadian Toads select reclaimed habitat during post-breeding movements at an oil sands mine. RSFs were based on radio-telemetry data collected on 16 toads in northeastern Alberta during 2005 and 2006 (599 used locations in total). Toads travelled at a maximum speed of 655 m/d and as far as 2000 m from the first capture location. We combined data on used and available locations with environmental information to build a suite of a priori models. Based on Information Theory, top models were those with habitat type and proximity to nearby resources (e.g., hibernacula) as covariates. RSFs indicated strong selection for open habitat types (including reclaimed areas and industrial clearings) over treed habitat. However, RSFs failed to show selection for reclaimed habitat over non-reclaimed, open habitat. Field observations suggested that herbaceous grassland cover with a dense deadfall layer provides important microhabitat for foraging and refugia. The Canadian Toad may be more of a habitat generalist than previously thought.

P2.111 Stewart, WI*; Reeves, B; Kamineth, A; Miller, J; Mkosana, J; SRK Consulting, South Africa, Nelson Mandela Bay Municipality, South Africa, Nelson Mandela Bay Municipality, South Africa; *wstewart@srk.co.za*

Mainstreaming systematic conservation plans into multi-sectoral land-use plans at a local level: Key lessons from South Africa

The mainstreaming of systematic conservation plans into the land-use (town and regional) planning sector is a key challenge to the successful achievement of biodiversity conservation objectives at a local level. A major impediment to success is the frequency of design of conservation plans in isolation of socio-economic considerations, often resulting in poor support for the implementation of such plans. The Cape Floristic Region (CFR) and Maputaland-Pondoland-Albany recognised centres of diversity and endemism are currently subject to rapid transformation that threatens priority biodiversity along the eastern seaboard of South Africa. Key lessons from two systematic conservation planning projects in the Eastern Cape Province of South Africa, in which different multi-sectoral integrative approaches have been applied, will be shared. These projects involved the development and Ministerial gazetting processes for a Bioregional Plan for the Nelson Mandela Bay Municipality and an Environmental Management Framework for the central coastal zone of the Province. The approaches applied to resolve potential conflicts with other sector plans (e.g. agriculture, housing, industry) and integrate the outcomes of the conservation plans into overarching land-use planning frameworks highlighted a number of successful mainstreaming mechanisms. These mechanisms will be explored, including evaluation of the land-use needs of other sectors during the development of the conservation plans, inclusion of multi-disciplinary expertise in the conservation planning teams, capacity building, the development of conservation "champions" within implementing agencies, and the design of planner-friendly conservation products.

SY61 Stinson, G.*; Kurz, W.A.; NRCan, Canadian Forest Service; *gstinson@nrcan.gc.ca*

Conservation Impacts on Forest Carbon Budgets: Preliminary Results from Canada's National Parks

Forests and forest sector activities exert strong influence on the atmospheric concentration of greenhouse gases. Forest conservation is being considered as a climate change mitigation strategy. Since 1885, national parks in Canada have been established to conserve important ecosystems. Here we examine the impacts of forest conservation in national parks on current forest carbon (C) stocks and stock changes. We hypothesized that avoidance of timber harvesting in these parks should result in higher stand ages and higher C densities, but reduced net uptake of C compared to the surrounding managed forest. Park forests are, however, affected by natural disturbances: wildfire and insects can have large impacts, often with multi-decadal legacies. Using the Carbon Budget Model of the Canadian Forest Sector (CBM-CFS3), we compared contemporary forest C budgets for selected national parks in western Canada to the C budgets of their surrounding managed forests. Preliminary results indicate that although harvesting was excluded, natural disturbances caused C losses from park forests in some years, followed by C uptake during succession. Conservation, therefore, is by itself no assurance of a long-term sustained forest C uptake. On average, park forests were found to sustain higher ecosystem C densities, but by transferring C to harvested wood products (HWP), managed forests also contribute to climate change mitigation through increased HWP C stocks and substitution benefits.

P1.163 Stoddard, MA; University of Florida; *mstodd@ufl.edu*

Role of woody vines in determining abundance and movement of small mammals in a logged Bolivian forest

Woody vines maintain connectivity in logged forests for small mammals and are necessary for meeting their needs for foraging, dispersal, and refugia. I evaluated the importance of vines and vine tangles for terrestrial and arboreal small mammals in a transitional Amazonian forest in eastern Bolivia. Based on captures in sites representing a range of logging disturbance, I compared the abundance of animals with the availability of food (invertebrates and fruit) and vine density, followed movements of individuals using spool and line to determine whether vines are selectively used as substrates, and used giving up densities to determine if vine tangles serve as refugia by comparing foraging intensity under vine tangles and in open areas. Preliminary results suggest that animal abundance and diversity are positively associated with an intermediate density of vines even though these sites do not correspond with those with high insect abundance. However, vines do not explain differences in abundance and distribution of animal species and were not selectively used as movement substrate. Finally, small mammals foraged more beneath vine tangles than in other sites, suggesting tangles play an important role as refugia for some species. These results help identify ecological mechanisms that explain the structure of the small mammal community in forests disturbed by logging.

SY41 Stone, E.L; University of Bristol; *emzstone@hotmail.com*

Shedding light on bat behaviour - street-lights disturb commuting bats

Artificial lighting schemes can damage bat foraging habitat directly through loss of land and fragmentation or indirectly by severing commuting routes from roosts, polluting commuting and foraging habitat. The effect of street lighting on bat activity was tested in experiments along commuting routes of lesser horseshoe bats at eight sites across Wales and South West England. Hedgerows were illuminated at a mean of 53 lux using two portable high pressure sodium street lights. Bat activity was recorded using AnaBat remote acoustic detectors. Repeated-measures analysis of variance (ANOVA) was used to test the effect of experimental treatment on bat activity. Treatment type had a significant effect on bat activity (p =

SY31 Strand, O.; Norwegian Institute for Nature Research; *olav.strand@nina.no*

Status and Conservation of Wild Reindeer (Rangifer tarandus sp) in Svalbard and Southern Norway

Svalbard reindeer (Rangifer tarandus platyrhynchus) are endemic to the Svalbard Islands of Norway. As a result of overharvest and subsequent population declines, harvesting of the arctic sub-species of Rangifer was banned in 1925. A limited and regulated harvest was reopened in 1983. The population dynamics at the main reindeer areas on the west coast are characterized by large climatic and density-driven fluctuations, whereas little information is available from the remote and climatically different northern and eastern parts of the archipelago. Approximately 90% of all European wild reindeer (Rangifer tarandus tarandus) live in 23 isolated mountain areas in southern Norway, where land transformation and habitat fragmentation are the main conservation issues. Herds are monitored and managed by harvest at the scale of sub-populations, whereas land management authorities operate at the municipality and county level - a scale smaller than the home range of herds. This results in a complex mix of responsibilities and loss of reindeer habitats from piecemeal construction of human infrastructure. Larger regional land management plans are currently being established, hopefully leading to more holistic management of reindeer habitats. Other knowledge needs include: direct and secondary effects of harvesting, effects of climate change, and mitigations of closed migration corridors and important grazing habitats.

SY12 Strittholt, JR; Conservation Biology Institute; *stritt@consbio.org*

The Boreal Information Centre: A New Web-based Service to Help Conserve the Boreal

The Boreal Information Centre is part of a new web-based service called Data Basin (www.databasin.org) developed to advance conservation through data sharing and collaboration. Constructed on top of ArcGIS Online core technology by ESRI, Data Basin is a multi-faceted site that provides powerful, easy-to-use tools to collaborate around conservation datasets and maps. This free service allows users to: (1) gain access to thousands of spatial conservation datasets and experts; (2) produce and save customized maps with easy-to-use visualization tools from datasets uploaded to the system, resident in the Data Basin warehouse, or available through other map services; (3) create galleries (collections of datasets and/or maps) to publish their work; (4) create private or public groups to focus on particular issues; and (5) manage their work within a private workspace. Data Basin users also get access to various analytical tools developed to operate within the system architecture to answer basic questions. For example, the BEACONs project (University of Alberta) has generated numerous important conservation datasets and developed analytical models pertaining to the Canadian boreal. The Boreal Information Centre within Data Basin is hosting various BEACONs datasets and building the technical foundation to allow users to run some of these informative models.

P1.100 Stronen, AV*; Schumaker, NH; Forbes, GH; Paquet, PC; Brook, RK; UniversitÃ© de MontrÃ©al, U.S. Environmental Protection Agency, University of New Brunswick, University of Calgary, University of Saskatchewan; *astrid.vik.stronen@umontreal.ca*

Landscape resistance to dispersal: predicting long-term effects on a small and isolated wolf population in southwestern Manitoba, Canada

Landscape fragmentation affects wildlife population viability, in part through the effects it has on individual dispersal. Considerable fragmentation of native habitats and loss of forest cover has occurred in association with agricultural development over the past 50 years in our study area - the region surrounding Riding Mountain National Park (RMNP) in southwestern Manitoba, Canada. However, some forms of human disturbance impinge on dispersal without simultaneously fragmenting habitats. In this study, we examined how protected area boundaries, roads outside the protected area boundaries, and hostile human behaviour have altered dispersal success without simultaneously fragmenting habitat. We simulated dispersal using HexSim, a spatially-explicit individual-based population model, parameterized with data on wolves (Canis lupus) in the RMNP region. Scenarios that accounted for negative human attitudes and roads outside the protected area boundaries exhibited lower mean population size than scenarios that ignored these details. In contrast, increasing deflection from protected area boundaries did not appear to have a significant consequence for population viability. Our results illustrate how habitat fragmentation itself can fail to account for the impacts on wildlife imparted by some forms of dispersal barriers.

SP10.12 Sudhanshu Mishra*; Surendra Prakash Goyal; Wildlife Institute of India, Dehradun, India; *mishra.sudhanshu30@gmail.com*

A select panel of polymorphic heterologous microsatellite loci for genotyping of critically endangered Bengal tiger (Panthera tigris tigris): A pilot study

The Bengal tiger (Panthera tigris tigris) is an endangered species under IUCN and schedule I of Wildlife (Protection) Act, 1972 in India. Tiger populations have reduced drastically due to human activities and poaching. Inbreeding depression, mutations, loss of genetic variation, population fragmentation and reduction in migration are major genetic issues in conservation biology. For designing proper conservation plans, we aimed to genetically identify different regional tiger populations in India by noninvasive genotyping using faeces. Microsatellite markers are useful tools to study wild populations genetically. To identify a suite of polymorphic microsatellite loci, we obtained DNA from blood samples of nine captive Bengal tigers. We selected and screened 32 microsatellite loci developed for Sumatran tiger, Asiatic lion and domestic cat and all amplified in Bengal tiger. Average observed and expected heterozygosities for all loci are 0.524 and 0.445, respectively. The number of alleles per locus at polymorphic loci ranged from 2-5 (average 3.1). Based on these results, we have designed a panel of 13 microsatellite loci. Preliminary results for 50 faecal samples indicate 66% average amplification success rate. Results are promising for understanding genetic status of Bengal tiger in wild and individual identification of Bengal tiger from different body parts.

SP11.1 Sunarto Sunarto*; Marcellla J. Kelly; Sybille Klenzendorf; Dean F. Stauffer; Mike R. Vaughan; Zulfahmi; Harry Kurniawan; Karmila Parakkasi ; Virginia Tech, WWF US, WWF Indonesia; *sunarto@vt.edu*

Habitat Use of the Sumatran Tiger in Forest and Plantation Landscapes

Sumatran tigers are threatened by habitat loss, but habitat use by tigers outside of natural forests has rarely been studied. We investigated tiger habitat use in major landcover types (natural forest, acacia plantation, oilpalm plantations, rubber plantations, and mixed agriculture) in southern Riau Province, central Sumatra. We examined the habitat use of tigers in 28 17 x 17 km grid cells, surveyed an average of 40 independent 1 km transects in each cell. In total we sampled 1094 km of transects. We recorded tiger detections and habitat variables in 100 m segments. Tigers used natural forest areas in higher proportion (15.2%) than availability and used plantations of acacia (3.7%), oilpalm (0.8%), and rubber (0.5%) less than availability. Tiger habitat use in acacia plantations was influenced by distance to â core forest habitat', low levels of human activities, and older age stands. Within natural forests, general vegetation conditions influenced detection probability of tigers, with observers more likely to detect tigers in less dense forests. Tigers prefer native forests over any type of plantation, but could potentially use older acacia plantations with low human activity, as well as riparian forests, as movement corridors to travel between natural forest patches across the fragmented landscape. This information is important for the restoration of tiger population in Sumatra's forest and plantation landscapes through the improvement of habitat connectivity.

P1.70 Sutaria, D*; Marsh, H; Robards, M; James Cook University, Marine Mammal Commission; *Dipani.Sutaria@jcu.edu.au*

Dolphin-watching tourism in Chilika lagoon, India: Opportunities and Limitations

Chilika lagoon in India harbors an endangered population of Irrawaddy dolphins. Since the 1980's, the lagoon has been in a state of social and biophysical flux. The role of communities in managing their primary livelihood of fishing has been limited by administrative and environmental forces. The adaptive capacity of communities to deal with external changes has been variable. Through interviews and questionnaires we explore the socio-economic buffering capacity provided by locally operated dolphin-watching tourism to socio-ecological changes in the Outer Channel of Chilika lagoon. We identify a direct dependency between local communities and tourism which mimics the strength of their linkage to fishing. Fishers can switch between fishing and tourism activities, creating diverse income opportunities. The mechanism adds support to research elsewhere that multiple livelihoods offer a source of resilience to socio-ecological uncertainty. Growth of the industry has been unlimited since 2001 with approximately 750 boats currently active in an area of 30km2. We conclude that locally managed eco-tourism provides opportunities for communities to buffer environmental changes such as declines in fish catches. However, without strengthening local institutions, the largely unmanaged development opportunities provided by tourism could fail to accomplish the desired goals of either fishermen or those seeking to conserve Irrawaddy dolphins.

SY63 Sutherland, Glenn D.*; Waterhouse, F. Louise; Environment Canada and Cortex Consultants Inc., British Columbia Ministry of Forests; *gsutherland@cortex.ca*
Conservation lessons across borders: critical habitat protection for the endangered Canadian population of Northern Spotted Owls
With limited connectivity to the US population, the endangered Canadian population of Northern Spotted Owls faces imminent extirpation. Assessments of landscape management options using spatially-explicit modelled representations of population dynamics and habitat supply - particularly representing the multi-scaled functional nature of critical habitat - have informed successive stages of Spotted Owl recovery efforts under SARA. Important lessons from this collective, multi-staged effort are: (1) â critical' habitat for larger-ranging species is imprecisely defined, frustrating adequate policy implementation dependent on differentiating among multiple marginal utilities of habitat value; (2) projections of critical habitat condition integrating weighted habitat quality values across site, territory, connectivity, and population factors, assisted stakeholders to identify ecological and socio-economic risks of alternative decisions, although agreement on assumptions was difficult to achieve; (3) spatio-temporal habitat projections provides a consistent means for making iterative refinements to management plans as policy responses to the population's status changes. We conclude that the large investment of effort to develop an effective suite of tools for applying the science behind critical habitat does improve the transparency of the information used during the process and offers a framework for effectiveness monitoring, but does not necessarily expedite a policy driven process.

23.4 Sutherland, MB; student; *maggie.sutherland@mun.ca*
Caribou and its two major predators black bears and coyotes: a matter of perceptions?
Recently on the island portion of Newfoundland and Labrador populations of caribou have been declining. Coyotes arrived to Newfoundland in 1985, and for some this is a natural expansion requiring coexistence, but for others it is a non-native species that clearly must be eradicated. In Newfoundland coyotes have resulted in human-wildlife conflicts particularly with outfitters, hunters and sheep farmers. Data were collected in Newfoundland through a mail-out quantitative questionnaire representative of residents from the island portion of the province to understand attitudes of the urban (n=390) and rural general public (n=396) toward caribou, black bears, coyotes and their management. Although black bears are responsible for more predation on caribou than coyotes, the general public perceives the predation issue as mainly a coyote problem. This perception of coyotes has lead to strong negative attitudes toward coyotes including a general lack of future generation values and willingness to coexist. These perceptions then lead to support for reducing coyotes and less support for addressing the stronger culprit, black bears. This research suggests the challenges wildlife managers may face when setting policy actions to reduce predators.

SY4 Sutherland, WJ; University of Cambridge; *w.sutherland@zoo.cam.ac.uk*
Why collaborate with practitioners to generate priority research questions?
It is widely accepted that there is a serious gap between researchers and practitioners such as policy makers. However, there has been little effort to ask practitioners what they would like to know. In 2005 we thus decided to run an exercise to identify the ecological questions that practitioners in the United Kingdom would most like answered. To our amazement, this exercise was astonishingly successful in terms of participation (38 organizations), involvement (654 individuals participated in the question generation stage), publicity (a whole page in one of the UK's major newspapers), downloads (third highest of any of Blackwell's 850 journals in 2006), and policy impact (underpins the research component of the UK government's marine strategy). Key elements include inclusive collaboration, a democratic process, and the integration of practitioners and academics. Our subsequent exercises have included generation of questions for other regions, including the globe, identification of opportunities for policy development, and horizon scanning to identify forthcoming issues. This general method is now being used widely by a range of groups in different regions.

19.7 SUTTHACHEEP, MAKAMAS*; Thamasak Yeemin; Chaipichit Saenghaisuk; Sittiporn Pensakun; Wanlaya Klinthong; Kanwara Saengmanee; Watcharachai Donsomjit ; Marine Biodiversity Research Group, Department of Biology, Faculty of Science, Ramkhamhaeng University, Huamark, Bangkok 10240 THAILAND; *msutthacheep@yahoo.com*
Monitoring on Coral Rubble Caused by the 1998 Coral Reef Bleaching in the Gulf of Thailand
The severe coral reef bleaching phenomenon in 1998 caused coral reef degradation in a large area of the Gulf of Thailand, especially at Koh Tao, Koh Samui and Koh Phangan in Suratthani Province. Most dead branching Acropora spp. and foliaceous Pavona spp. became coral rubble fields. A monitoring program has been set up to detect changes of various types of coral rubble in order to determine appropriate methods for active coral reef restoration. The results clearly showed that coral recruitment rates on the coral rubble were very low however dead small juvenile coral colonies were frequently observed on the coral rubble. Coralline algae, sponges and other cryptic fauna were also abundant. We observed that many planula larvae settled on the coral rubble at Koh Tao but they died before reaching big sizes. Therefore a cheap engineering design for stabilizing coral rubble is needed in order to increase survival rates of juvenile corals which settled on the rubble.

2.7 SUZUKI, NOBUYA*; Olson, D. H.; Quest University Canada, 3200 University Blvd., Squamish, British Columbia, V8B 0N8, Canada, USDA Forest Service, Pacific Northwest Research Station, 3200 SW Jefferson Way, Corvallis, OR 97331 USA; *nobi.suzuki@questu.ca*

Analysis of Threats to Conservation of the Oregon Slender Salamander: a Practical Conservation Approach to Species with Small Geographic Ranges

Conservation of endemic specie with small geographic ranges requires knowledge to determine spatial distributions of suitable habitat and careful planning to minimize threats to species. Our objective was to develop an approach based on GIS modeling to assess threats to conservation of the narrowly endemic species. Using conservation of the Oregon slender salamander (Batrachoseps wrighti) as a case study, we developed landscape habitat models and identified the association of slender salamanders to the warmer and moderately drier part of the landscape and to forest stands with tall trees. We further developed risk assessment models to identify spatial distribution of threats in relation to habitat suitability across the species' range. Our models included fire, road density, land use allocation, and wildland-urban interface as 4 factors of potential threat. We analyzed levels of these 4 factors relative to habitat suitability across 49 5th field watersheds and identified 11 as having high concentrations of potential threats even though these watersheds currently maintain high habitat suitability. In the central-western portion of the species' range, high concentrations of intensively managed lands and roads are considered as primary threats, whereas fire appears to be the leading threat in the southwestern portion of the range. Our approach based on the analysis of available spatial data in GIS can easily be modified to a wide variety of organisms.

SP8.3 Swaminathan, Vinaya; Foundations of Success; *vinaya@fosonline.org*

Teaching Adaptive Management - A Network for the Conservation Community in Academia

Sound training in adaptive management - designing, managing, monitoring, and learning from conservation efforts - is essential for any conservation practitioner dealing with the challenges of a changing planet. Research by University of Maryland students found that while many conservation organizations seek adaptive management skills in prospective employees, few conservation graduate programs offer adaptive management training. To address this gap, Foundations of Success and Maryland's Sustainable Development and Conservation Biology Program developed a graduate course in adaptive management that combines hands-on group work on real conservation projects with traditional classroom lectures. Since its launch in Spring 2007, this course has been repeated annually at Maryland and has been reproduced in other academic institutions including the University of California Davis, University of Florida, Virginia Tech, Organization for Tropical Studies, and Eberswalde University. To help meet the growing demand from these and other institutions for information and materials on teaching adaptive management in an academic context, Foundations of Success has established a network for involved or interested faculty, staff, and students. This network serves the conservation community in academia by providing an open clearinghouse and forum for sharing the tools, lessons, and contacts for incorporating adaptive management training into a graduate conservation program.

SP9.3 Switalski, TA*; Nelson, CR; Peters, GM; Wildlands CPR, University of Montana, Independent; *adam@wildlandscpr.org*

Activity Patterns of a Hunted Black Bear Population in Response to Different Road Access Management and Restoration Practices in Idaho

Forest roads reduce habitat quality for black bears (Ursus americanus). Land managers can mitigate negative impacts of roads on bears by controlling road access or by permanently decommissioning roads. We assessed differences in bear activity patterns and available habitat on 18 paired open and closed (gated, barriered, and recontoured) roads on the Clearwater National Forest, ID. Over the course of four years, we detected a total of 44 black bears on 3,545 camera trap nights. Bears were detected significantly more on recontoured than open roads (3.34 v. 0.51, respectively). Additionally, bears were detected at a significantly higher rate on recontoured roads than on gated or barriered roads (2.69, 0.54, 0.56, respectively). Bears were not detected on open roads during the daytime, suggesting avoidance of humans. Fruiting shrub cover was higher on recontoured than on open, gated, barriered roads. Furthermore, while gates can restrict motorized access, these closed roads provide little hiding cover and can retain long lines of sight. Our results suggest that decommissioning roads by recontour is the most effective road mitigation strategy to improve black bear habitat. These findings may have implications for grizzly bear (Ursus arctos horribilis) expansion in the region.

SP5.13 Sydne Record*; Noah Charney; Aaron Ellison; University of Massachusetts Amherst and Harvard Forest, University of Massachusetts Amherst, Harvard Forest; *sydne.record@gmail.com*

Projecting from the past to test the effects of informative priors on forecasts of extinction risk made by Bayesian demographic models

When applied to the management of rare species, it is critical that the estimates from population viability analyses (PVAs) have high accuracy and low uncertainty. Long-term data sets help to reduce uncertainty in estimates of PVAs, but are often difficult to collect. A possible solution to reducing uncertainty in these models is to include information from similar studies as prior data in a Bayesian demographic model. The objective of this study was to evaluate the ability of prior probability distributions to provide more accurate and less uncertain PVAs of rare species. Bayesian demographic models specifying uninformed and informed priors were constructed for four rare plant species (Calochortus howellii, C. pulchellus, C. tiburonensis, and Pedicularis furbishiae) that were the focus of demographic studies in the 1980s. Informative priors were derived from demographic data collected on congeners of each species. The models were projected from the 1980s until 2009, and the originally studied populations of the four species were re-censused in 2009 to validate the results of the models. The inclusion of prior data decreased the variance around estimates of quasi-extinction risk. The inclusion of prior data did not increase the accuracy of most of the projections of quasi-extinction risk when stochastic events not included in the models decimated populations, or when the populations studied for the prior data were not on the same demographic trajectories as the focal species.

SP10.3 Sylwia Czarnomska*; Wlodzimierz Jedrzejewski; Bogumila Jedrzejewska; Sabina Nowak; Robert W. Myslajek; Tomasz Borowik; Cino Pertoldi; Malgorzata Pilot; Mammal Research Institute Polish Academy of Sciences, Bialowieza, Poland, Association for Nature 'Wolf',Godziszka, Poland, Aarhus University, Aarhus, Denmark, Museum and Institute of Zoology Polish Academy of Sciences, Warsaw, Poland; *s_czarnomska@zbs.bialowieza.pl*

Conservation genetics and ecological connectivity of the wolf Canis lupus metapopulation in Poland

Since 2000, a national census of wolves in Poland has been conducted by Mammal Research Institute PAS in cooperation with forestry services and national parks. A monitoring programme of the expanding wolf population was conducted by assessing population genetic structure and variability, based on nuclear markers and mitochondrial DNA, parallel to the creation of a habitat suitability model. Results from over 1200 fecal samples analysed showed that, based on frequencies of mtDNA haplotypes, Polish wolves belong to three genetically distinct subpopulations (NE Poland, mid-eastern part of the country, and SE Poland). The most intense gene flow occurs from north-eastern Poland, permanently inhabited by a viable wolf population, to the western part of the country, where a recolonization process is observed. Spatial genetic differentiation, based on microsatellite alleles and haplotype frequencies, explicitly indicates Carpathian subpopulation (SE Poland) to be the most genetically isolated from the rest of the country. To establish better connectivity between subpopulations, isolated due to habitat fragmentation and road construction, a map of potential ecological corridors was designed and effort in its implementation has been undertaken.

3.6 Szabo, ND*; Kerr, JT; University of Ottawa; *n.d.szabo@gmail.com*

The effects of surrounding natural or semi-natural areas on bee diversity and abundance in agricultural fields

Given that over one-third of our food supply is dependent on animal pollination, recent declines in pollinators indicate an urgent need for management action. Although European honey bees can be used to supplement pollination by wild pollinators, the prevalence of disease among managed bees and associated population declines suggest that wild pollinators will become increasingly important for crop pollination. In some cases, pollinator abundance and diversity and pollination services on farms are enhanced by surrounding natural or semi-natural areas. We investigated the effects of surrounding natural and semi-natural areas on bee diversity and abundance on strawberry farms, a crop which receives significant benefits from bee pollination. Bee surveys were conducted at 20 farms in the Ottawa area during the strawberry blooming period in the spring of 2009. Land cover surrounding the sites was assessed using high resolution satellite images. Our results indicate that bee diversity and abundance in fields increase with increasing amounts of surrounding natural or semi-natural areas. However, the fragmentation of these areas does not significantly affect bee diversity or abundance.

SY72 Tabor, GM; Center for Large Landscape Conservation/ Freedom to Roam; *wildcatalyst@gmail.com*

Scaling new heights to address the issue of scale in conservation

Can conservation biology rise to the occasion? What is our solution agenda for the enormous conservation challenges impacting all life on the planet? This presentation is the preamble to the Symposium entitled -- \"What\'s the Big Idea? -- A Conversation on North American Continental Conservation.\" The goal of the this symposium is to examine the various facets of continental scale conservation in North America - international perspectives; transboundary approaches; climate change mitigation and adaptation; protected area, connectivity and matrix conservation; wildlife corridors and species movement biology; private land and public land perspectives; and NGO, business, media, academic and governmental initiatives - all of which have science, policy and management implications. This presentation provides a road map for a touchstone collection of visionary talks on North American conservation followed by a conversational audience roundtable. The big ideas are most likely embedded in the symposium audience and our goal is to facilitate dialogue.

P1.98 Takahashi, H.*; Watanabe, M.; Univ. of Tsukuba; *ati_radeon_hd_3200_graphics@yahoo.co.jp*

Community structure of the ground beetles in the artificial cedar forests

The main component of forest floor arthropod community in the cool-temperate zone of Japan is carabid beetles, most of which cannot fly. The spatial distribution and abundance of the carabid beetles in the forest floor were examined by the capture-recapture method using pitfall traps for 4 artificial cedar stands, July and August 2009. One hundred and forty four pitfall traps with chicken meat were placed as a grid in each stand. Beetles captured were identified species and sexes, marked individually, and then released. Such procedure was performed for 3 to 4 times in each month. Four species of Carabinae (Carabus albrechti, Leptocarabus procerulus, Damaster blaptoides and Apotomopterus porrecticollis), and 3 species of Pterostichus spp. and 6 species of Synuchus spp. were found in all stands. The number of individuals marked was 324 in C. albrechti, 256 in L. procerulus, 23 in D. blaptoides and 23 in A. porrecticollis. The stand with poor understory vegetation provided the highest diversity of the beetles, irrespective of the degree of litter layer and soil moisture. Although the abundant understory of the forest stand showed the relatively low number of individuals captured, Pterostichus spp. and Synuchus spp. were common among the stands. Therefore, the understory of the forest vegetation affected the community structure of Carabinae spp., except Pterostichus spp. and Synuchus spp.

P2.73 Taki,W*; Watanabe., M; University of Tsukuba, Graduate school of Life and Environmental Sciences, Conservation Biology Lab; *s0730091@u.tsukuba.ac.jp*

Food intake and the number of eggs laid by the carrion beetle, Eusilpha japonica (Coleoptera: Silphidae), inhabiting in the artificially cedar forest

In the cool temperate zone of Japan, the carrion beetle is the first consumer of the food web starting from the decomposition in the artificial coniferous cedar forests. Eusilpha japonica is dominant among carrion beetles dwelling on the ground. In order to estimate the function of the decomposer, the amount of food required by wild adults and the number of offspring in relation to their daily food intake was investigated. A field survey was carried out to examine the attraction of carrion, using pitfall traps with putrefied meat and without meat, from May to September. The daily sex ratio of the beetles indicated that the carrion odor attracted females more strongly than males. The difference in distribution pattern between sexes suggested that males might search for mates as well as for food. The daily food intake of adults was measured by supplying the chicken meat of known weight. A lone female fed on the meat twice as much as a lone male. There was a positive relationship between the cumulative quantity of food intake until the first brood and the first clutch size. Thereafter, the females successively produced several broods. No significant relationship between clutch size after the second brood and the cumulative food intake during each inter-clutch interval was found. The quantity of food intake during the pre-oviposition period was critical for reproduction of the beetle.

SY61 Tam, JY; The University of British Columbia; *jordan.tam@gmail.com*

The psychology of climate change adaptation for protected areas: Beliefs, feelings, risk and uncertainty

Adapting protected areas to climate change may require fundamentally different approaches to conservation. Controversial interventionist measures and strategies have been proposed to aid adaptation to climate change, such as: assisted colonization; the use of non-native species to meet management objectives; and conservation triage. While some of the controversy appears to emerge from established ideological positions, other protests appear to stem from people's varying tolerances for risk and uncertainty with regard to outcomes. As such, a better understanding of people's preferences for conservation adaptation and their psychological basis could help in the design of effective and socially acceptable conservation strategies. Using surveys, this research found that people's support for different adaptation policies were influenced by several factors. These include: the level of uncertainty around climate change and its consequences; the perceived risk of negative outcomes of adaptation actions; and people's environmental beliefs and emotional state. These findings suggest an important role for better and more sensitive risk communication in adaptation policy development with greater attention to people's underlying beliefs and values.

P2.84 Tangavelou, A.C.*; Karthikeyan, S.; Ramakrishnan, B.; Bio-Science Research Foundation, 166/1, Gunda Salai, Moolakulam, Pondicherry 605 010, South India. , 2Post Graduate Dept. of Botany, H.H. The Rajah's College, Pudukottai 622 001, Tamil Nadu, India, 2Wild Lands Programme, Wildlife Trust of India, Field Office, Bannari Post, Sathyamangalam Taluk, Erode District, Tamil Nadu. South India; *actangavelou@hotmail.com*

Bioethical issues and Human-Elephant Conflicts in the Nilgiri Biosphere Reserve, Southern Western Ghats, India

Globally bioethics requires that fair consideration is given equally to three areas of moral concern such as human well being (rights and interests), non-human well being (rights and interests) and environmental well being (biodiversity and ecosystem integrity). Bioethical concerns, however, are not only restricted to issues directly related to human life but also to general issues related to every living being. Elephant's are known its co-existence with human as God, cultural and economical for more than centuries but then, there were fewer humans and more land fulfilled all ecological needs for elephants without conflict. During the past few years the reputed terrestrial giant is being considered as menace with special reference to Human-Elephant Conflict (HEC) issues and now the HEC became a challenging task. The Nilgiri Biosphere Reserve (NBR) was the first biosphere reserve by UNESCO, harbouring Asian elephant. The bioethical violations such as destruction of their habitat due to encroachments, legal violations, habitat fragmentation by loss of corridors, implication of developmental activities, unbalanced biotic threats by the local people, man made fire incidences, tapping natural and ground water and inferior quality of mitigating measures led loss of habitat and life of elephants and human beings resulted intolerance of HEC in all elephant ranges were assessed based on four bioethical principles - Autonomy, beneficence, Justice and non-maleficence are presented here.

12.2 Taper, ML*; Keim, JL; Lele, SR; Waser, SK; Montana State University/Bozeman,, Matrix Solutions Inc., University of Alberta, University of Washington; *markltaper@gmail.com*

Resource Selection Probability Function guided landscape sampling of scat for genetic mark-recapture improves precision of abundance estimation

Wolf removal is advocated in the Alberta oil sands to curb perceived caribou declines. However, reliable data and methods to measure the population sizes of caribou, wolf and alternate prey species are unavailable in this difficult to traverse region to justify such management or monitor its effects. We developed a new survey approach, improving the precision in abundance estimation from genetic mark and recapture, using detection dogs to sample for scat. We estimated the abundances and Resource Selection Probability Functions (RSPF) of caribou, moose and wolf from scat collected across 2500 km2 in the oil sands during two years. In the second study year, sampling was guided by species-specific RSPFs. A universal aspect of mark and recapture abundance estimation is that precision is monotonically related to detection probability. We show that detection probability and abundance estimate precision can be markedly increased without additional effort by disproportionately surveying high RSPF habitats. When RSPF guided sampling was applied, coefficients of error for wolf and caribou N estimates were reduced by 26% and 25% respectively. Guided sampling was not applied to moose, and the coefficient of error for this species increased slightly, indicating that the changes seen in wolf and caribou precision were not just a year effect. Our results are applicable to a broad array of wildlife sampling designs and provide the methods needed to effectively monitor trends in abundance.

P1.11 Tavera-BeltrÃ¡n F.*; Chaves-Portilla G.; Salazar-GÃ³mez E.; Gil-Acero J.; Gallo-Santos J.; Nossa-Pardo A.; RodrÃ–guez-GaitÃ¡n N.; Pulido-Barrera S.; FundaciÃ³n Ecodiversidad Colombia; *taveraled@yahoo.com*

Implementation of a model for the amphibian conservation: A case study at the Eastern Andes of Colombia

According to the Global Amphibian Assessment, Colombia is the second-highest country in amphibian diversity, but also is the country with the highest number of threatened species (209 species 30% of the total species in this country), demonstrating the need to conserve this important vertebrate group in this mega-diverse country. Over two years with the SupatÃ¡ golden frog project has been implemented a conservation model that has combined the biological research, the community involvement and the environmental education to achieve not only the conservation of the amphibian species in the municipality of SupatÃ¡ but of all the wildlife of the region. This model has as main purpose integrating the SupatÃ¡Â´s people in decisions making about environmental problems that are facing the amphibians of their region and that it is affecting them also, through the involving local community in diverse activities that have allowed creating a high degree of environmental awareness and ownership. To achieve this purpose we have used the amphibians, especially the SupatÃ¡ golden frog as flagship species to promote the conservation of the wildlife through sustainable use and management of natural resources particularly the Andean forest relicts still surviving. We expect to carry on with this model to achieve long-impact outputs that contribute to the conservation and preservation of natural heritage of the region.

SY73 Taylor, Philip D.; Acadia University; *philip.taylor@acadiau.ca*

Threats and prospects for Canada\'s Atlantic Maritime Ecozone

Threats and prospects for Canada\'s Atlantic Maritime Ecozone will be considered in light of its current status and future scenarios for change.

SP10.4 Taylor, SA*; Anderson, DJ; Zavalaga, CZ; Simeone, A; Luna-Jorquera, G; Friesen, VL; Queen's University, Wake Forest University, Nagoya University, Universidad Andres Bello, Universidad CatÃ³lica del Norte, Queen's Universtiy; *scott.taylor@queensu.ca*

Genetic Diversity, Gene Flow, and Subspecific Designations of two Eastern Pacific Booby Species

Increasingly, seabird populations are experiencing declines due to anthropogenic factors (competition with fisheries, habitat degradation, etc.) and potentially due to climate change (e.g. more severe and frequent El NiÃ±o Southern Oscillation, ENSO, events). Knowledge of genetic diversity, gene flow, and taxonomy are important for informing management of declining and harvested populations and for future management of species at risk of decline. Using a 540 base pair segment of the mitochondrial control region and eight microsatellite loci we characterized genetic diversity and intraspecific gene flow in blue-footed (Sula nebouxii) and Peruvian (S. variegata) boobies, and examined blue-footed booby subspecific designations. Both species rely on cold upwelling systems during breeding and are heavily impacted by ENSO events and competition with fisheries. Further, Peruvian booby guano is commercially harvested in Peru and appropriate management of their colonies is necessary for continued success of the guano industry. We found evidence of high genetic diversity despite historical and recent declines, high gene flow throughout the range of each species, and only weak population genetic structure. These results are encouraging and indicate that, while both species have undergone population fluctuations (especially Peruvian boobies) and continue to experience competition with fisheries, their high dispersal propensity may reduce loss of genetic diversity.

P2.83 Tejeda, WL; Centro de Analisis Espacial; *wendy.tejeda@gmail.com*

Application of ecological niche models for estimating the potential invasion of two mammals non-native in the ecoregion of Bolivia: Lepus europeus y Sus scrofa

Invasive alien species (IAS) are the second cause for the loss of biodiversity and ecosystem change worldwide. The establishment, expansion and success in the new habitat was accidental or deliberate introduction of these species by human activities. Two species, Lepus eropaeus (hare) and Sus scrofa (wild boar), were introduced to raise them and take their skin and meat for use, currently this are considered major threats to biodiversity in South America. For this have been created tools like the \"ecological niche models of species", the which predict through the native range of distribution, the invasion of IAS in their new habitat. Because of concern that represents the expansion of these two species, this study aims estimate and analyze the ecoregions that could be invaded in Bolivia. For this I used to the algorithm of maximum entropy \"Maxent", resulting in invasion models in fragile ecoregions identified in Bolivia as the Puna and Yungas in the case of L. europaeus; Chaco and Pantanal for S. scrofa. These models represent important inputs basics for the application of legislation for to control and eradicate these species in these ecosystems.

SP10.8 Teplitsky, C*; Charmantier, A; Tarka, M; Schroeder, J; Nakagawa, S; Mills, J; Moller, A; dpt of Conservation, MNHN, CEFE, University of Montpellier, dpt of Animal Ecology, Lund University, Dpt of Zoology , University of Otago, Independent researcher, Laboratoire Ecologie, Systematique et Evolution, University Paris XI; *teplitsky@mnhn.fr*

Is G matrix a strong constraint in rapid evolution ?

Global environmental change represents a major threat to biodiversity today. The habitats of species are being modified at a fast rate, raising an important question: will populations manage to adapt to the new conditions? Here we aim to quantify constraints on evolution in reproductive traits in terms of genetic correlations between traits. This requires assessing (1) how frequently evolutionary responses are constrained by genetic correlations, i.e. what is the angle between the optimal response to selection and the response actually achievable because of genetic constraints and (2) how stable these constraints are, i.e. if genetic correlations are changing rapidly, the G matrix should not represent a strong constraint on evolutionary response. These questions will be answered using animal models (MCMCglmm software) on long term data sets of wild bird populations for which detailed pedigrees are available. Ultimately, we seek for general patterns of genetic constraints on responses to global change among species.

P1.124 Teramoto,Y.*; Watanabe,M; Univ. of Tsukuba; *mochy26@hotmail.com*

Population growth of the endangered damselfly, Mortonagrion hirosei in an artificially established habitat

Habitats of red data book damselfly, Mortonagrion hirosei, were restricted in single dense reed communities established in estuaries. In Ise, the warm temperature zone of Japan, a reed community was artificially established by transplanting reed rhizomes adjacent to the tiny natural habitat in order to preserve to the local population of M. hirosei. In the first year of the establishment, a few M. hirosei adults immigrated to the margin of the new reed community, because both sexes have low flight activity throughout their live. Until 3 years after the establishment, adults had distributed whole area of the new reed community, resulting in increase of the yearly population size. Since no population increase was found in 2008 probably due to high density, the population size seemed to be saturated, showing the logistic growth. The relationship in the population size between the consecutive years indicated a traditional reproductive curve. Therefore, the increase of the immigrated population in the new habitat was under the density-dependent processes.

P2.169 Tesche, MR*; Hodges, KE; University of British Columbia Okanagan; *mtesche@interchange.ubc.ca*

Comparing survey methods for populations of the western painted turtle, Chrysemys picta.

The number of species at risk in Canada is increasing, and the funds available for the management and monitoring of individual species are decreasing. It is important that survey and monitoring techniques provide maximum information for minimal person-hours and total cost. This study compares visual surveys with mark-recapture surveys of the western painted turtle, Chrysemys picta, and compares the results from three common trapping methods. Using the capture histories of 1109 turtles from 12 ponds, representing over 4000 capture events, a multi-strata model was created to determine the likelihood of turtles transitioning between trap types in a single trapping period. Our results indicate that visual surveys are not a suitable proxy for mark-recapture surveys, and that hatchling turtles were under-represented in all trap types. We recommend a combination of basking traps and baited hoop nets to achieve a reasonable estimate of abundance while minimizing sex and size biases, required person-hours, and total cost.

SY9 Theobald, DM*; Comer, P; Leinwand, I.; Reed, SE; Colorado State University, NatureServe; *davet@cnr.colostate.edu*

Forecasts of land use scenarios and consequences for ecological systems in the US

Conservation biologists are increasingly concerned over the loss and endangerment of ecological systems due to land use change. We provide an assessment of the conservation status of ecological systems and how past, current, and likely future land use change has affected these systems in the conterminous US. To do this, we combined spatial data on over 500 current ecological systems from NatureServe, biophysical settings ("potential natural vegetation") from LANDFIRE, land use patterns for 2000 and 2050 from the Integrated Climate Land Use System/Spatially Explicit Regional Growth Model (US EPA), and detailed land use data interpreted from high-resolution aerial photography at over 3,000 locations. The direct human modification of land cover was measured from the detailed land use dataset, and a functional relationship between housing density and land cover modification was estimated. This model was then extrapolated for the US and overlaid with the "potential" and current ecological systems data to measure the extent of habitat loss historically and in the future, for each system. Two aspects of our approach offer important information for county and state land use planning: (1) the historical extent of ecological systems provides a benchmark for current conservation efforts, and (2) a consistent, seamless dataset transcends state and county boundaries, enabling conservation priorities to be relevant to ecological systems. That is, we measured the approximate historical extent and the approximate proportion of each ecological system within a given state.

SP1.7 Thieme, ML*; Sindorf, N; Rudulph, J; Higgins, J; Takats, J; Abell, R; Barnett, A; World Wildlife Fund, The Nature Conservancy, Global Freshwater Program, World Wildlife Fund, Southeastern Rivers and Streams Program Office, The Nature Conservancy, Southern Resource Office; *michele.thieme@wwfus.org*

Freshwater Conservation Potential of Protected Areas in the Tennessee and Cumberland River Basins

Freshwater ecosystems and species within protected areas (PAs) are often threatened by stresses originating outside of PAs, such as altered flows. External stresses may limit the ability of PAs to conserve the freshwater systems that occur within them. We conducted an assessment of the freshwater conservation potential of PAs in the Tennessee and Cumberland Basins based on a GIS analysis of sources of stress to these PAs and a survey of PA managers. Of the 297 PAs in our study, about half fail to cover an entire catchment and only 10 PAs encompass a catchment >50 km2. The majority of PAs have low upstream imperviousness (0.2% of upstream area with >10% imperviousness). Agricultural lands are prevalent upstream (83% with >10% agriculture). Fourteen PAs have at least one system with >6 months of annual discharge held behind upstream dams. Three-quarters of PAs actively manage aspects of their freshwater ecosystems. However, less than a quarter of the budget for most PAs is allocated to freshwater management and six PAs still stock non-native species. Our analyses confirm the need for holistic catchment management with PAs as a critical component; and indicate that more could be done to manage freshwater resources within existing PAs.

SY73 Thompson, ID; Canadian Forest Service; *ian.thompson@nrcan.gc.ca*

Boreal Shield and Newfoundland Boreal Ecozones - conservation issues into the 21st Century

This paper reviews conservation and management challenges in the boreal shield and Newfoundland boreal ecozones. These zones cover most of eastern Canada, to as far west as Saskatchewan. The southern Shield is characterized by transition forests, distinct from the conifer and mixedwood dominated north. Much of the Boreal Shield has been â managed' for forests, but northern areas have had relatively little activity. Resource management issues in the south and central portions include forestry, mining, and hydroelectric development. Ecosystem resilience following harvesting has been a concern especially on areas logged from 1800-1990, when scant attention was paid to biodiversity. In the transition forest, old growth forests and some invasive species are major issues. Continued road development and mining developments present a major threat to the ecology of northern areas due to segregation of animal populations, increased hunting, and changes in groundwater resources. There are few threatened species, some key species such as caribou and wolverine are listed. Invasive species in true boreal forests are rare and unlikely to be a major disturbance. Climate change is a major concern, especially to the north where soils are poorer, often paludfied and tree growth is stunted and scattered; here future tree growth is not assured. A rise in temperature and a reduction in moisture, as predicted, will cause ecosystems to shift states as important processes such as wildfire and herbivory become more common. Protected areas cover

P1.52 Thompson, LM*; Finnegan, L; Manseau, M; Wilson, PJ; Trent University, University of Manitoba, Parks Canada; *laurathompson2@trentu.ca*

Broad-Scale Genetic Structure of Woodland Caribou in the North American Boreal Forest

The boreal population of woodland caribou has declined substantially in recent decades, particularly in a south-north direction. Consequently, an understanding of the genetic connectivity among population groups will have important conservation implications. DNA extracted from over 1000 fecal samples of forest-dwelling caribou from the boreal forest regions of Ontario, Manitoba, and Saskatchewan (a geographic extent of 18,000 km) was genotyped at 11 microsatellite loci. We used both model-based (STRUCTURE, GENELAND) and non-model based (e.g. FST, PCA) structuring analyses to delineate genetic populations. Additionally, population graphs (a network of nodes connected by gene flow) and Bayesian MIGRATE analyses were used to assess genetic connectivity and directionality of gene flow between those populations. Our results provided a historical and contemporary comparison of gene flow, as well as a predictive model of core and sensitive nodes (populations) within the connected genetic network. Superimposing that network on landscape variables allowed for a broad-scale assessment of the individual and cumulative roles of natural (e.g., forest fires and rivers) and anthropogenic (e.g., road density) influences on the genetic diversity and connectivity of boreal caribou populations in central Canada.

SP9.2 Thornton, DH*; Sunquist, ME; Branch, LC; University of Florida; *coyote@ufl.edu*

Evaluating the Relative Influence of Habitat Loss and Fragmentation: Do Tropical Mammals Meet the Temperate Paradigm?

The relative influence of habitat loss vs. habitat fragmentation per se (the breaking apart of habitat) on species distribution and abundance is currently an area of intense debate. Although some theoretical studies predict a strong negative effect of fragmentation, consensus from empirical work is that fragmentation has weak effects compared with habitat loss and that this effect is as likely to be positive as negative. However, few investigations of this issue have been conducted on tropical or wide-ranging species, which may be strongly influenced by changes in patch size and edge that occur with increasing fragmentation. We tested the relative influence of habitat loss and fragmentation on patch occupancy patterns of 20 mid- and large-sized neotropical mammals in Guatemala. We related patch occupancy to measures of habitat loss and fragmentation in the landscape and compared the influence of these two factors while controlling for patch-scale variables. A larger number of species responded significantly to habitat fragmentation than to habitat loss, and this response generally was negative. Our results point to the need for management efforts to go beyond habitat preservation and restoration and also consider prevention of habitat fragmentation per se or manipulation of landscape pattern, at least for tropical mammals. Whether our findings apply more generally to other tropical species or wide-ranging temperate species should be the focus of continued empirical work.

P2.75 Thrasher-Haug, J; Strathcona County; *thrasher@strathcona.ab.ca*
Municipal Wetland Conservation Policy Development and Implementation
Strathcona County recognizes wetlands as important municipal infrastructure components for environmental, economic and social sustainability and has committed to conserving their value for present and future generations. As part of this commitment, a new Wetland Conservation Policy has been approved with the intent to conserve wetlands by requiring mitigation during land use planning and development. The policy requires specific procedures for landowners to realize the goal of No Net Loss of wetlands. No Net Loss requires proponents to work through a strict series of mitigation activities - avoidance, minimization, and compensation - with clear criteria and defined outcomes, as set out by the Provincial and Federal policy and legislation. Development of the Wetland Conservation Policy was driven by inconsistent wetland conservation at the planning stage of development across Strathcona County, with significant discrepancies between urban and rural development. Implementation will aim for consistent municipal land use planning in context of science-based conservation. The policy requires wetland delineation, classification, mitigation, and consistent compensation ratios. The result is a streamlined approval process, avoiding duplication of assessments and reports for multiple levels of government. The policy provides clear direction on what the municipality requires, parallel to provincial and federal regulations.

SY33 Thrower, F*; Hard, JJ; US Gov. NOAA/NMFS; *frank.thrower@noaa.gov*
Relative impacts of inbreeding depression and outbreeding depression on marine survival in steelhead: the nature of genetic variability matters
We mated resident rainbow trout and anadromous steelhead (Oncorhynchus mykiss) derived from a common source of wild fish to evaluate the consequences of inbreeding and outbreeding depression on marine survival. For six broods, we examined the effects of matings between full-siblings and half-siblings on survival in both captive and wild environments, and we compared those results with the effects of hybridization over two generations between these two distinct life histories. Neither inbreeding nor outbreeding in a captive (low selection) freshwater environment showed a consistent trend in survival for any of the test lines compared with randomly mated controls. In the wild (high selection) marine environment, we detected significant inbreeding depression for offspring of full siblings but not half siblings. Parental, first-generation, and second-generation hybrids did not differ in survival from controls in the low selection environment but were intermediate in survival to controls in the high selection environment. These results indicate that both inbreeding and outbreeding could substantially affect population viability in the wild. For small populations, maintaining adequate genetic variation by conserving effective population size is less risky than augmenting genetic variability through hybridization. These results have implications for the management of endangered species, small populations and population translocations

SY45 Tien Ming Lee*; Walter Jetz; Department of Ecology and Evolutionary Biology, Yale University; *tien.lee@yale.edu*
The structure of global extinction risk in birds
Extinction risk varies across species and space owing to the combined effects of a broad array of factors. As such, integrative models are needed to quantify the relative importance of potential factors and separate dynamic (geographic) from mostly static (life history) extinction risk drivers to make predictions into the future. Here, we integrate and map in space our understanding of the effects of key correlates of IUCN-assessed extinction risk for extant terrestrial birds. We find that species endangerment increases most strongly with decreasing range size but is also affected by environmental niche factors and life-history and ecological traits (e.g., body size and primary diet). Simple quantification of past human encroachment across species' distribution emerges as a key predictor, suggesting that projected land-use change may offer reliable estimates of future extinction risk. Using species-based model results, we generate grid-assemblage predictions that correlate well with the known spatial threat distribution in birds worldwide, particularly on islands and in speciose regions. Our findings underscore the need to appreciate the intricacies of the structure of global extinction risk in species and across space by adopting a species-level approach and to develop measures of future extinction risk thereby making conservation efforts more effective over time.

21.2 Tigner, DJ*; Bayne, EM; University of Alberta; *tigner@ualberta.ca*
Designing management thresholds to balance energy sector and wildlife interests in boreal northern Canada: Using martens and seismic lines as a model
Energy sector activity is booming across Canada's northwestern boreal forest. Massive development is on the horizon raising concerns regarding how energy resources can be recovered in an economically-viable yet ecologically-sustainable manner. Many stakeholder groups agree this balance is best met using management thresholds, or limits to the density of the industrial disturbance footprint. Seen as a win-win management tool, strict regulatory controls are enforced only when the impacts of additional development outweigh benefits. Unfortunately, it is unknown how most ecosystem components respond to energy sector development. This lack of understanding has led to disagreements over which disturbances to include in threshold calculations and where thresholds should be set to achieve desired results. Seismic lines cut by industry to explore potential resource deposits are the largest component of the energy sector's disturbance footprint and possible impacts on wildlife are of great concern. Cumulative line density is often a suggested threshold metric to protect wildlife resources. Here we use remote cameras to show how marten (Martes americana) respond to different line types and how their occupancy rates change relative to increasing line density. We illustrate how thresholds can be identified using actual species response patterns to line density and how an ecologically-based weighting system can properly account for different line types within a threshold framework.

P2.177 Tigner, DJ*; Bayne, EM; University of Alberta; *tigner@ualberta.ca*
Developing ecologically-based criteria for assessing seismic line impact and recovery in the northwestern boreal forests of Canada
Energy sector activity is booming across Canada's northwestern boreal forest. Concern over the impacts of massive energy development on wildlife in the region has led to discussions regarding how to best manage this land use. Stakeholders agree this is accomplished by limiting the density of the physical disturbance footprint before impacts to wildlife are unacceptable. Seismic lines are narrow linear corridors used by the energy sector to explore for resource deposits. They are the largest component of the sector's disturbance footprint, and many northern jurisdictions have implemented limits to line density as a result. These limits are highly contentious and challenged by industry because seismic lines exist across a range of width and recovery states, and there is no concrete data to suggest how most species respond to these line types. Thus, it is impossible to develop a defensible management strategy for seismic lines or line density. We used a paired design of remote cameras to assess behavioral response patterns of several boreal mammals to seismic lines relative to forest interior locations. Species' avoidance or use of lines was significantly influenced by line width and amounts of woody vegetation present on the line. For many species there are line width and recovery thresholds below and beyond which lines do not function as disturbances, respectively. The first of their kind, these data facilitate informed decision making and management of seismic lines.

SY10 Tillmann, PJ*; McKenzie, EJ; University of Massachusetts, Amherst, The Natural Capital Project and WWF-US; *tillmannpj@gmail.com*
What Role for Scientists? The Use of Scientific Tools and Information in Ecosystem Services Approaches to Decision Making
Our research evaluates the type and degree of impact of an ecosystem service mapping, modeling and valuation tool - InVEST (Integrated Valuation of Ecosystem Services and Tradeoffs) - on the decision making process. We present findings on how scientific and technical information provided by Tier 1 of InVEST is currently being integrated into, and influencing, decision making processes in Colombia, Ecuador, China, Tanzania, Hawai'i, and California. Our analysis is based on 18 semi-structured interviews with Natural Capital Project (NatCap) demonstration sites and decision makers. Site-based staff collaborate on projects such as the design of water funds and land use planning. Evidence from the interviews indicates that the success of a scientific framework in influencing decision making is determined by more than scientific and technical outputs. Based on the interviews and insights from the knowledge utilization and agenda setting literature, we suggest several factors that matter for successfully influencing decisions: successful framing; a favorable political opportunity structure; effective mobilizing structures; attention to issue and actor characteristics; and, attention to the political context. These factors are strengthened by synergy with InVEST outputs, particularly early in the decision making process where the primary power of scientific and technical information is to educate decision makers.

9.6 Timmerman, K.; St. John's University; *kristina_timmerman@yahoo.com*
How Far Do Andean Bears Range to Consume Ground Bromeliads in the Ecuadorian PÃ¡ramo?
Throughout the South American Andes, Spectacled bears enter pÃ¡ramo grasslands to consume plant tissue of the giant puya. The goal of this study was to determine if bears use the puya resource equally throughout the pÃ¡ramo or if they limit travel into the open, more exposed habitat. The study was conducted in Sangay National Park, Ecuador (May-July 2009). Two categories of puya were identified; 80 randomly selected plants and 80 consumed plants discovered after dedicated searches within the reserve. Data collected at each plant included: distance to forest (DTF), slope, aspect and horizontal visual cover. Of the measured variables, two were significant. Average DTF within the random puya group was 124.7 meters while average DTF in the consumed group was significantly less (39.3 meters). Horizontal visual cover data were significantly different between the two groups. There were no significant differences between plant categories for slope and aspect. Based on these results, bears appear to limit travel from cover to consume puya resource and horizontal cover has a role in plant selection. Why? Since bears take human agricultural products, they are shot by members of local communities (historically and currently). Bears may limit their travel from cover to reduce the probability of conflict. Therefore actual availability of this food resource may be much less than expected if travel limitations are not considered in management strategies for this charismatic, flagship species.

P1.39 Timmothy Kaminski*; Charles Mamo; Sarah Dewey; Mountain Livestock Cooperative, Longview Conservation-CANADA; *timmothy@montana.com*
Reducing wolf-livestock conflicts in the mountain West: What's missing ?
Abstract Wolves depredate repeatedly on livestock in areas where wolf behavior and learning combine with traditional grazing practice to exacerbate livestock vulnerability and largely explain chronic patterns of wolf conflicts in the Rocky Mountains. We contend that preventing and reducing wolf-livestock conflicts may be best achieved by manipulating prey vulnerability via adjusting grazing practice than sole reliance on lethally removing their predators. We review more than a decade of wolf-livestock conflict data on cattle that conform to this hypothesis in the Rocky Mountain U.S. and Canada. Data show that: 1) grazing practices that emphasize widely dispersed cow-calf pairs and yearlings are similar throughout public land grazing allotments where vigilance is intermittent or low relative to carnivore presence; 2) wolf predation is selective for behaviorally naÃ¯ve and anxiety-prone calf and yearling cattle; and 3) regardless of origin and turnover, wolf occupancy of home ranges similarly grazed by cattle are characterized by chronic livestock loss in near identical patterns, suggesting a combination of behavior, biological and human-related factors that predispose vulnerable age cattle to being pursued by wolves and killed. We report results and recommend practical steps to improve vigilance, sustain working ranches and public land grazing while reducing wolf-livestock conflicts.

SY13 Tognelli, MF*; Rondinini, C; Chiozza, F; Boitani, L; IUCN, University of Rome; *marcelo.tognelli@iucn.org*

Can we improve the Red List assessment with habitat suitability models?

The IUCN Red List of Threatened Species is the most comprehensive global assessment of the conservation status of species. During the assessments, species are assigned to one of a series of categories of extinction risk by applying quantitative criteria based on population size, rate of decline, and area of distribution. The latter is usually based on estimations of either the extent of occurrence (EEO) or area of occupancy (AOO) of the species. However, maps of EEO usually overestimate species' true occurrence as it may contain unsuitable or unoccupied habitat. Habitat suitability models provide a good alternative to eliminate false presences and a better estimation of the current distribution of a species. Consequently, this may have important implications for species listed in the Red List based solely on the area of distribution criterion as some species may meet the geographic range thresholds. Here, we use deductive global mammal models and inductive local mammal models to compare them to the area thresholds used in the Red List. Given the widespread use of habitat suitability models in the last decade, they may become an important tool in the estimation of species distribution for the assessment of their conservation status.

22.2 Torres Alva, G; MSc Environment & Development, London School of Economics; *gabriella.torres@gmail.com*

Using the Contingent Valuation Method to Estimate Willingness to Pay for Conservation in the Sho'llet Forest, Peru

Through the use of the contingent valuation methodology (CVM), the present study gathered primary data to valuate in monetary terms the benefits that people receive when the impacts of electricity towers in the Sho'llet Forest (SF) in the Central Jungle of Peru are minimized through conservation measures. The debate before the study was undertaken was whether people would care enough about minimizing the towers' impacts on the SF to valuate their welfare loss higher than the costs of conserving the forest under the current situation. This individual valuation was obtained by asking respondents how much they would be willing to pay (WTP) to minimize the impacts on the forest. Once these responses were aggregated and brought to present value, it was seen that the benefits of conserving indeed outweighed the costs, or at least came close to them. The study adds evidence to support that people do care highly for the environmental services, and that by obtaining the value people give to these services it can sometimes be shown that this exceeds the costs of conserving, suggesting that cost-benefit analysis can open doors for conservation.

P1.135 Townsend, PA; Groom, MJ*; University of Washington; *ptownsen@u.washington.edu*

How Do We Increase Restoration Success? Socio-economic Barriers to Maintenance and Monitoring of Cloud Forest Reforestation Programs

To increase restoration success, we need firsthand knowledge of both ecological and socio-economic bottlenecks. This study seeks to identify socio-economic barriers to cloud forest restoration success in Monteverde, Costa Rica. Restoration practitioners put a lot of effort into germinating native tree seeds and planting the seedlings, usually with the help of volunteers. Although ~ 1 million trees have been planted in the past 20 years, no monitoring data have been taken to evaluate restoration success. How do we turn this enormous tree planting program, which is critical for regional conservation goals, into one that incorporates the practice of restoration science? We conducted interviews with 23 reforestation practitioners and landowners. Our goal was to find how reforestation on a large scale could be improved. Questions focused on the problems people encounter in maintaining planted trees and monitoring the trees survival and growth. Lack of time, money and knowledge were found to be common constraints. One potential solution, which is the focus on our on-going research, is assistance from local educators and students of semester-long sustainability or topical biology courses in providing both knowledge and labor for restoration practitioners.

P2.21 Trainor, MS*; Ashton, MS; Yale University School of Forestry and Environmental Studies; *Meredith.Trainor@yale.edu*

Impacts of community forest management on plant diversity in Nepal's Middle Hills: identifying opportunities for adaptive management and conservation

Community forest management has been the primary form of management practiced in the Middle Hills region of Nepal for more than three decades, with over 14,000 active community forest user groups (CFUGs) documented to date. Although extensive attention has been devoted to case studies of the short-term effects of community forest management practices in Nepal, relatively little attention has been devoted to understanding the longer-term impacts of community forest management on forest diversity and regeneration. We evaluated the long-term impact of community forest management in 12 mixed Schima-Castanopsis forests stratified across three different forest management units (rangeposts), and "ages" (defined as years since incorporation) and compared them with a control group, government forests, in order to determine the effect of CFUG management on species diversity and regeneration. The study sought to tease out factors influencing diversity and regeneration within the existing management approach in order to identify opportunities for application of adaptive management to future community forest management decision-making. We conclude that adaptive management of community forests is a critically important tool for community forest user groups working to ensure the successful regeneration of forest parcels, and identify key variables informing successful management in the Middle Hills region.

14.7 Tremblay, Marie*; St. Clair, Colleen Cassady; Dept. of Biological Sciences, University of Alberta; *mariet@ualberta.ca*

Movement costs and local habitat features determine the abundance and distribution of native birds in an urban landscape

Urbanization is viewed by many ecologists as a major threat to global biodiversity because cities tend to overlap with some of the most biologically diverse areas on the planet. We surveyed 183 sites located across a gradient of urbanization from intensively developed sites to near-natural forest stands in Calgary, Alberta, Canada. Using multiple regression and GIS-based cost-distance modelling, we then examined the role of land cover type, local vegetation characteristics, and landscape composition and configuration on avian community composition and the occurrence of individual focal species. Of the 55 species detected during our surveys, 39 (71%) were primarily associated with natural areas and of these, 21 (38%) were exclusively found in these areas. Moreover, in 13 of 16 species-specific models, cost distance to natural features explained more variation in the probability of occurrence than straight-line distance, suggesting that barriers to movement affected settlement patterns, presumably by constraining dispersal flows. These results suggest that conserving avian biodiversity in urban landscapes should begin with the preservation of a network of functionally connected natural areas. Other results from our study suggest that such a network may also be important for sustaining native bird populations both within natural areas and the urban matrix.

13.4 Tremblay-Boyer, Laura*; Gascuel, Didier; Pauly, Daniel; Fisheries Centre, University of British Columbia, Vancouver, Canada, Fisheries and Aquatic Sciences Center, Agrocampus Ouest, Rennes, France; *l.boyer@fisheries.ubc.ca*

Five decades of industrial fishing: how much biomass is left in marine ecosystems worldwide?

Modern fisheries affect marine ecosystems worldwide and it is important to understand their historical and current impacts at this scale. We developed a simple but useful model to represent ecosystems as a function of energy fluxes through trophic levels. This model was used to generate global estimates of biomass for marine ecosystems and evaluate the impacts that fisheries have had on ocean biomass since the 1950s. Using primary production, sea surface temperature, fisheries catch and trophic level of species, the model was applied on a half-degree grid covering all oceans. Estimates of biomass by trophic levels were derived for marine ecosystems in an unexploited state, as well as for each decade since the 1950s. Trends in fishing impact, defined as the ratio of fished to unexploited biomass, were analyzed for all oceans, with a special focus on predator species given their status as preferred target species with high vulnerability o fishing. This first application of modelling to a worldwide estimation of the impacts of fishing provides an independent confirmation of observations previously reported by other researchers. Our results highlight three main trends about the global effects of fishing: (1) predators are more affected than lower trophic levels; (2) declines in ecosystem biomass are stronger along the coasts; (3) the extent of fishing and its impacts have expanded from northern to southern waters in the last 50 years. These spatial and temporal trends provide a global synthesis of the ecosystem impacts of fishing and can serve as an indicator of the current, and possibly future, state of marine ecosystems.

P2.164 Trindade, Mariana; Peckham, Dana; Mahoney, Shane P.*; Sneddon, Gary; Department of Environment & Conservation, Government of Newfoundland & Labrador, St. John's, NL A1B 4J6, Canada, Department of Fisheries & Aquaculture, Government of Newfoundland & Labrador, St. John's, NL A1B 4J6, Department of Statistics, Memorial University of Newfoundland, St. John's, NL, A1B 3X9, Canada; *colleensoulliere@gov.nl.ca*

Investigating the impact of hunting on Newfoundland caribou using virtual population analysis

Virtual Population Analysis (VPA) was performed using long-term hunter submissions to reconstruct the demographics of the Newfoundland caribou (Rangifer tarandus) population from 1980-2003. During this time the population rapidly increased (1980-1995) and subsequently declined (1997-2003) from and estimated 96,000 in the mid-1990s to about 32,000 in 2008. Our analysis indicated VPA is an accurate and cost-effective tool to reconstruct caribou populations and is strongly correlated with estimates produced from costly census and surveys (r=0.973, p

17.3 TROMP, S.A.*; Goldizen, A.W.; Seddon, J.M.; University of Queensland, School of Biological Sciences, University of Queensland, School of Veterinary Science; *s.tromp1@uq.edu.au*

The effects of past climatic fluctuations and landscape features on the genetics of mongooses endemic to Namibia's granite inselbergs.

North-western Namibia's inselbergs support unique ecosystems with high levels of endemism in both vertebrates and plants; however the genetic structures of taxa specific to this area are completely unknown. Past climatic fluctuations and unusual landscape features are likely to have had a significant impact on the patterns of genetic variation within taxa restricted to this highly fragmented habitat. We investigated the genetic population structure of the endemic black mongoose by analyzing mtDNA haplotypes (cytochrome b, 1089bp) and nuclear microsatellite genotypes (15 loci) of 46 individuals from 6 populations. While the distribution of mtDNA haplotypes suggested unexpectedly high levels of genetic connectivity between isolated inselbergs in the past, there was little evidence for recent dispersal across major geographical barriers. The data also suggested the locations of inselbergs that may have supported population refugia during past extreme climatic events. These particular inselbergs supported a higher genetic diversity than others and presumably experienced less extreme micro-climatic fluctuations than did other inselbergs; thus we recommend them as specific areas that should be prioritized for conservation of this valuable ecosystem which, to date, remains unprotected.

SY43 Trouwborst, A; Tilburg University; *a.trouwborst@uvt.nl*

Climate Change Adaptation and International Nature Conservation Treaties

To assist adaptation of species and ecosystems to climate change, international cooperation between states is called for, inter alia to facilitate climate-induced dispersal across jurisdictional boundaries and to promote resilience generally. Most existing international nature conservation treaty regimes, however, were concluded without considering the implications of climate change. Legal analysis of four global regimes (Ramsar Wetlands Convention; World Heritage Convention; Migratory Species Convention; Biodiversity Convention) and one regional regime (EU Birds and Habitats Directives) in fact reveals significant shortcomings in this regard. These include the use of static conservation objectives and a lack of attention for habitat connectivity. Other regimes are similarly expected to fall short of what is required to adequately facilitate the adaptation of nature to climate change. To accurately gauge the resultant mismatch and to frame comprehensive proposals for eliminating it, a multidisciplinary research effort is called for, combining conservation biology and international law. The required law reform is anticipated to be substantial and unlikely in the short term. In the meanwhile, there is much to be gained by fully exploiting the current legal framework, in particular through interpreting outdated obligations in conformity with treaty objectives and recent decisions of Conferences of the Parties on climate adaptation.

SP1.4 Turnbull, MR; De Vos, A*; Mapping Africa's Protected Areas Project, University of Cape Town/ Mapping Africa\'s Protected Areas Project; *alta.devos@gmail.com*

Digitization for conservation: using Google Earth to map the African conservation landscape and assess and improve African conservation actions.

The Mapping Africa (MAPA) project is a non-profit organization that maps protected areas in Africa and uses Google Earth as a platform to make these data accessible to the world. The project outputs include a populist digital layer on Google Earth that depicts the African conservation landscape (including its critical habitats such as key biodiversity areas and Ramsar sites), describes protected areas, and outlines conservation actions and research projects. To facilitate the involvement of the conservation community in the generation of this digital layer we developed a database that allows third parties to access and input information online. Beyond its role as a participatory tool and the platform on which the layer functions this database has substantial application to conservation assessment and as an information resource in its' own right. The input screens to the database are designed to allow categorization of projects according to a standard lexicon of threats, actions, stressors, and other key attributes. We recognize that, if shared amongst conservationists, this wealth of organized information could allow the improvement of conservation practice throughout the African continent, and thus we propose to make this database available as a networking tool. Additionally, these input project data combined with geospatial statistical tools such as weight-of-evidence analyses can be used to perform an integrative assessment of conservation activity in Africa.

SP2.1 Tzankova, Zdravka*; Vallano, Dena; Environmental Studies, UC Santa Cruz; *tzankova@ucsc.edu*

The Endangered Species Act and the next generation of ecological threats: insights from the case of the Bay checkerspot butterfly

The Bay checkerspot butterfly (BCB) reached its threatened status largely as a result of habitat loss through development. The species now benefits from the habitat protection powers of the Endangered Species Act (ESA), yet the biggest new hazard to the survival of remaining BCB populations comes from atmospheric nitrogen (N) deposition. Driven by combustion and fertilizer use, such deposition is an important cause of change in ecosystem structure and function. We use the BCB case to examine whether ESA, as it currently stands, is capable of protecting endangered species from the newly appreciated, remote-origin threat of N deposition. We employ legal analysis that builds on relevant case law to determine whether the limitations on harmful activities as set by Sections 7 & 9 of the Act do, in fact, apply to the emissions that cause N deposition. We also juxtapose our case with a similar case that has become quite salient in recent discussions of conservation law - the case for using ESA to control emissions of greenhouse gases (GHG). Based on this analysis, we find that extending ESA to protect against the harmful impacts of N deposition is both legally and practically more feasible than any attempt to use ESA against GHG emissions and the climate change impacts on listed species. We conclude that Sections 7 & 9 of the ESA could be fruitfully leveraged against existing federal and state air quality and emission control programs to achieve improved ecological outcomes.

SP4.5 Upgren, Amy*; Foster, Matt; Hole, David; Koenig, Kellee; Larsen, Frank; Luther, David; Skolnik, Benjamin; Turner, Will; Conservation International, Smithsonian Institution, American Bird Conservancy; *aupgren@conservation.org*

The impact of sea level rise on high-priority biodiversity conservation sites in the Americas

Sea level rise resulting from climate change is predicted to have considerable consequences not only for human populations, but also for biodiversity. We determined which sites of biodiversity importance in the Americas would be impacted by a sea level rise of 1, 2, and 3 meters, using Key Biodiversity Areas (KBAs) and Alliance for Zero Extinction (AZE) sites as the basis for our analysis. To better understand risks to and potential recommendations for preserving these sites, we then examined the biophysical geography of each site. Our results demonstrate the significant impact that sea level rise can be anticipated to have on sites that protect the most threatened species in the Americas. For example, of the 273 AZE sites in the Americas, each of which protects the last known refuge of a species, nearly 20% will be affected by a rise in sea level of 2 m. In our presentation, we will present these results and discuss potential options for conserving biodiversity at these sites in the face of sea level rise, how those options vary among sites based on regional and geographic differences, and how a strategy to preserve the species dependent on these sites might be framed.

P1.42 UrbÃ¡nkovÃ¡, S*; Mendel, J; Stefanov, T; Nowak, M; Å anda, R; HalaÄ ka, K; VeteÅ¡nÃ–k, L; Institute of Vertebrate Biology, v.v.i., Czech Republic , Institute of Vertebrate Biology, v.v.i., Czech Republic , National Museum of Natural History, Bulgaria, University of Agriculture in KrakÃ³w, Poland, National Museum, Czech Republic ; *urbankova-sona@seznam.cz*

A Revision of the Species Structure of the Genera Gobio and Romanogobio in the Eurasian Context

The freshwater fish species of the genera Gobio and Romanogobio continue to be a topical subject for many European ichthyologists. This is because of the changing taxonomy at the species and generic levels, the relatively frequent discovery of new species from various geographical areas and the expansive area of occurrence of some which leads to frequent sympatries and thus to their problematic identification. Very often they are endemic species at various levels of endangerment. Molecular study brings new perspectives on taxonomy, occurrence, hybridization and identification from regions of various countries. The gudgeon species of six European ichthyofaunas and sympatric zones were clearly identified and the level of inter-species hybridization was detected. New localities of the species Gobio sp. 2 were found, which expand the boundaries of its occurrence as far as the Baltic Sea, while also becoming a newly discovered species for seven European countries for the time being. The success of the diagnostic method "S7indel diagnostics" as a molecular identification key was assessed for both genera. A histologic study of epidermal structures with regard to their inter-generic diagnostic character was evaluated. This study was carried out within the framework of research project no. 206/09/P608, supported by the Grant Agency of the Czech Republic.

SY26 V.Meena; (no affiliation at present); *meena.venktraman@gmail.com*

Managing Lion-human conflict in India

Efforts towards Asiatic lion (Panthera leo persica) conservation are as old as the number of times the resilient lions have swung back from the brink of extinction. Efforts lasting more than a century under the rule of three successive nawabs of Junagadh, the British, administrators and conservationists of independent India have resulted in salvaging a population of 360 free ranging lions in Gir Protected Area, western India. Territorial male lions require larger home ranges than do females while nomads utilize a much larger range. In meeting these requirements, lions have dispersed to natural habitats at average distance of 20 km from the Protected Area that are varied in vegetation, terrain, human pressure and distance to source population. They survive in a high density human landscape constituting a vibrant and varied economy dependent on agriculture, animal husbandry, horticulture, tourism and industry. Lion movement outside park boundaries endangers human life and causes substantial economic loss due to livestock predation. In addition, accidents, poaching and disease are impending dangers that threaten lion conservation. Effective conservation strategies need to encompass all of these issues and strategize differently for inside and outside the Protected Area. Within Protected Areas, regulated grazing, tourism and habitat management have to be the focus while outside Protected Areas, conflict mitigation approaches are required. I debate the various approaches of lion conservation.

SY35 Vaadeland, G.*; Cherry, S.; Sturgeon River Plains Bison Stewards, Prince Albert National Park of Canada; *vaadeland@xplornet.ca*

Best Practices for Engaging Multiple Owners from Sturgeon River in Bison Restoration

Since 1969, Prince Albert National Park (PANP) in central Saskatchewan has been home to Canada's only free ranging herd of plains bison still within historic range. In recent years, the herd has increased in numbers and began to frequent farms and ranches along the southwestern boundary of PANP. As a result, local landowners, PANP, and the Saskatchewan Ministry of Environment have been faced with some interesting challenges regarding how to proceed with managing this important population. Our presentation will look at the collaborative processes being used by PANP and the Sturgeon River Plains Bison Stewards (SRPBS), a grassroots non-government organization dedicated to creating an environment where plains bison can coexist with local landowners in a mutually beneficial way. Gord Vaadeland will present a summary of how new partnership opportunities are being explored and utilized. An overview of the Bison Stewards' "Bison on the Edge" conference, held from June 8 to 10, 2010 in Big River, SK, will be provided, including next steps identified in the development of a long-term Sturgeon River Plains Bison Management Plan. Seth Cherry will speak on past, present, and current activities being undertaken by PANP. This will include an overview of management and monitoring techniques, research activities in co-operation with UniversitÃ© Laval, and actions being undertaken through PANP's "Reconnecting Bison, Grasslands and People Project".

P1.123 Valentin Serebryakov*; Ludmila Lonina; Igor Davydenko; Shevchenko National University; *bcssu2@gmail.com*

White Stork numbers changes as a result of climate changes in Ukraine

White Stork censuses in 1931, 1987 and 2004 in Ukraine give a good data for comparison of their numbers. So in general it was recorded the decreasing of bird numbers between 1931 and 1987 years and increasing between 1987 and 2004. However, in different administrative districts there were different trends in both periods (increasing, decreasing and permanent numbers). So in compared censuses in 1931 and 1987 the decreasing was recorded in 64% of districts, increasing - in 32% and permanent numbers - in 4%. But in compared censuses in 1987 and 2004 the increasing of bird numbers was recorded in 75% of districts, decreasing - in 49% and permanent numbers - in 4% of total districts. Distribution of these districts where increasing, decreasing and permanent bird numbers were recorded is different in both periods. The positive attitude of the local people to White Stork is the same everywhere in Ukraine. Climate changes are characterized with uneven distribution of heat and moisture on large territories. So it could be the reason of such uneven trends of bird numbers changes.

SY26 van Aarde, R.J.*; Trimble, M.J.; Conservation Ecology Research Unit, University of Pretoria; *rjvaarde@zoology.up.ac.za*

A Paradigm Shift in Managing Free-Ranging African Elephants

Many managers of elephant populations neglect conservation of a key ecological process-population fluctuation in response to temporal and spatial variation of resources. We examined a database of population time series and fecundity and survival estimates for selected populations to ask 1) are elephant populations limited, 2) do resources limit numbers and activate regulatory mechanisms, 3) do regulatory mechanisms operate through density, and 4) do management actions disrupt limitation and regulation? We found evidence of population limitation and a dependence of asymptotic densities on resources. We also observed decreased fecundity at high densities relative to resources and increased mortality of weaned calves as breeding herds roamed further when resources were more limited. Resource limitation thus activates density related regulatory feedback mechanisms that reduce reproduction and survival rates. Case studies illustrate that management actions that alter survival and reproduction deactivate natural regulatory mechanisms and population limitation. This warrants a paradigm shift in management towards responsible megapark design-clusters of interconnected conservation areas that transcend international boundaries-to maintain natural regulatory mechanisms including dispersal and metadynamics. This systemic approach emphasizes the population as a spatial entity and embraces dynamic management that allows spatial and temporal population responses to resource variability.

11.7 Van Houtan, Kyle S*; Hargrove, Stacy; Balazs, George; NOAA Fisheries, Pacific Islands Fisheries Science Center; *kyle.vanhoutan@gmail.com*

Eutrophication and the spatial epidemiology of a tumor forming disease in marine turtles

Wildlife diseases are an increasing concern for endangered species, but their patterns and cause are often unknown. We analyzed 3,939 stranded turtles over 28 years to understand fibropapillomatosis, a tumor-forming disease in Hawaiian green sea turtles (Chelonia mydas) that is caused by a herpesvirus. Demographics are a consistent risk factor and models that characterize disease rates locally are highest ranked, revealing a variety of patterns. Some regions in the Hawaiian Islands reached peak disease rates in the 1990s and then declined, others remained constant, and in some regions disease rates increase - implying a local cause. Elevated disease rates are clustered in watersheds with high N footprints; a measure of natural and anthropogenic factors that influence coastal eutrophication. Further spatial analysis shows strong epidemiological links between disease rates, N Footprints, and nuisance algal blooms. A postulated mechanism for these links involves a dietary shift to nonnative and invasive macroalgae, which sequester excess environmental N in the amino acid arginine. Arginine is known to regulate immune activity, promote herpesviruses, and contribute to tumor formation. These results taken collectively have implications for understanding diseases of aquatic organisms, eutrophication, herpesvirus, and tumor formation.

P1.127 Van Uytvanck, J; Research Institute for Nature and Forest; *jan.vanuytvanck@inbo.be*

How to use domestic large herbivores in restoring Europe's threatened woodpasture landscapes on former intensively used agricultural land.

Till the end of the nineteenth century woodpasture landscapes were the dominant landscape type in large parts of Europe. Now, only remnants are left of these small scaled mosaic landscapes with high conservation value. The decline was mainly due to the intensification of agricultural use. On the other hand, the abandonment of nutrient poor or poorly accessible areas resulted in spontaneous forest recovery. Our main questions were: (1) what processes, interacting with large herbivore grazing, enable establishment of tree seedlings? (2) what patterns develop on former pastures and arable land? (3) what grazing pressures and strategies should be used by managers to initiate and steer developing woodpasture landscapes? Using exclosure experiments, tree emergence experiments and survey studies in 20 grazed nature reserves in Belgium (W-Europe), we studied establishment, survival and growth patterns of tree species under different grazing regimes interacting with different structural vegetation types. Our results showed that woodlands regenerate below grazing pressure thresholds of 125 and 180 grazing days ha-1year-1 on grassland and former arable land, respectively. Lower grazing pressures allow the development of a variety of half open to closed forests within 100 years, given natural disturbances temporarily initiate tree regeneration and protective vegetation types provide safe sites for tree seedlings and saplings.

SP9.10 Vance, CK*; Kouba, AJ; Nei, YG; Willis, EL; Wei, FW; Willard, ST; Biochemistry and Molecular Biology, Mississippi State University, MS USA, Memphis Zoological Society, Memphis T, USA, Institute of Zoology, Chinese Academy of Sciences, Beijing China, Memphis Zoological Society, Memphis TN, USA, Institute of Zoology, Chinese Academy of Sciences, Beijing China, Biochemistry and Molecular Biology, Mississippi State University, MS UAS; *ckvance@memphiszoo.org*

Remote sensing using Near Infrared Reflectance Spectroscopy (NIRS) for monitoring wild giant panda populations: part one - gender discrimination

We are developing a new remote sensing approach to the study of wild populations of giant pandas using NIRS to discriminate between gender, individuals and reproductive state by rapidly scanning fecals in the field. The objectives of the current study were to develop NIRS pattern recognition libraries for prediction of panda gender and compare the technology's resolution on fecal samples from wild and captive animals. Leaf fecals from Memphis Zoo's male (n=26) and female panda (n=35) were dried whole and evaluated with a portable ASD FieldSpecÂ®3 and contact probe for spectral surface analysis. Similarly, leaf fecals from two female (n=25 total fecals) and two male GPS-collared giant pandas (n=62 total fecals) from the Foping Nature Reserve in China, were evaluated. For chemometrics analysis, we used GRAMS/AI software to build our discriminant algorithms and one-out CV analysis using Savitsky-Golay 7-point first derivative mean center processing. Prediction of panda gender discrimination correctly identified 91% of female and 81% of male samples from the captive pandas. For wild pandas, gender predictions identified 100% of female and 95% of male samples correctly. NIRS has the potential to collect, non-invasively and remotely, physiological information about a species for population survey estimates. As the calibration libraries are expanded we will begin to test other applications for this technology with respect to reproductive state and individual identification.

5.8 Vance-Borland, K; The Conservation Planning Institute; *kenvb@consplan.net*

Regional Conservation Social Networks: Mapping, Analysis, and Weaving

Conservation research and planning frequently does not lead to conservation action. Closer collaborations between conservation biologists and empowered stakeholders is one factor that might contribute to greater implementation success. But who are the stakeholders in a planning region, how can conservation biologists build partnerships with them, and is there anything planners can do to facilitate a shift from 'informed' to 'empowered' stakeholders? Social network analysis was first developed in the 1930s, has been applied to a great variety of contexts, and has begun to be applied to study natural resources management questions. Researchers report the value of greater understanding of relationships among participants in natural resource networks, but don't describe a process for applying that understanding to address conservation issues. Projects to 'map' the social network of people and organizations (from academia, government, business, NGOs, fishers, ranchers, foresters, church groups, etc.) working on sustainable natural resource issues (terrestrial, freshwater, estuarine, and marine) on the Oregon coast and elsewhere suggest opportunities for conservation planners to engage others in new, mutually-beneficial collaborations. A process of 'network weaving' can take social network analysis to the next level by using it as a basis for facilitating conservation network participants working together in new ways to find better solutions to the problems they face.

P1.191 Vargas-RamÃ–rez, M*; JÃ©rÃ´me, M; Fritz, U; Museum of Zoology (Museum fÃ¼r Tierkunde), Senckenberg Natural History Collections Dresden, KÃ¶nigsbrÃ¼cker Landstr. 159, D-01109, Dresden, Germany, L'Association du Refuge des Tortues, Mairie des BessiÃ¨res, 26, place du Souvenir, F-31660 BessiÃ¨res, France; *mavargas@yahoo.com*

Red- and yellow-footed tortoises in South American savannahs and forests: Do their phylogeographies reflect distinct habitats?

Using sequence data of the mitochondrial cytochrome b gene, we investigated phylogeographic differentiation of the Amazonian tortoise species Chelonoidis carbonaria and C. denticulata. While C. carbonaria is generally restricted to savannah habitats and adjacent forests, C. denticulata is associated with wet tropical and subtropical forests. Our study suggests a correlation between distinct habitat preferences and phylogeography of the two species. In Maximum Parsimony, Maximum Likelihood and Bayesian analyses, haplotypes of C. carbonaria cluster in several distinct clades reflecting the species' patchy distribution in savannah habitats. By contrast, haplotypes of C. denticulata are only weakly differentiated; a finding also confirmed by parsimony network analysis. This suggests that the contiguous Amazonian rainforest allows gene flow between populations of the forest-dwelling C. denticulata throughout the range, but significantly impedes gene flow in C. carbonaria. The phylogeographic structure and extant distribution pattern of C. carbonaria is supportive of former Amazonian rainforest fragmentation, enabling the dispersal of savannah species. Based on fossil calibration, we dated divergence times for the C. carbonaria clades using a relaxed molecular clock, resulting in average estimates ranging from 4.0-2.2 mya. This implies that the onset of rainforest fragmentation could predate the Pleistocene considerably. Furthermore, our findings call for further research on geographic and taxonomic variation in C. carbonaria and for a reassessment of the conservation status of the distinct genetic units.

SP6.3 VanHoutan, K.; Bass, Jr., O.L.; Lockwood, J.; Pimm, S.L.*; Emory University, South Florida Natural Resources Center, Rutgers University, Duke University; *kyle.vanhoutan@gmail.com*

Importance of estimating dispersal for endangered bird management

Endangered species recovery plans are frustrated by small, spatially structured populations where understanding the influence of birth, death, and dispersal is difficult. Here we use a spatially explicit, long-term study to describe dispersal in the Cape Sable seaside sparrow (Ammodramus maritimus mirabilis). Since 1990, this species declined > 50%. It occurs as several geographically isolated sub-populations across the Florida Everglades. We characterize dispersal, recognizing that our sampling, as well as the species' distribution, is spatially heterogeneous. The annual movements of juveniles and adults are statistically heavy-tailed. That is, while most individuals are recaptured locally, a significant portion exhibit long-distance dispersal. Individuals move between sub-populations to distances > 30 km. Not accounting for the spatial heterogeneity of sampling or the species range itself underestimates dispersal and can lead to ineffective management decisions. Recovery focused on translocation will be less successful than strategies that protect habitat and increase breeding. (147 words)

P1.150 Vargas-Salinas, F JA*; Lopez-Aranda, F; University of los Andes, Universidad del Valle; *f.vargas216@uniandes.edu.co*

Roadkills and inhibition to cross road by mammals in an isolated forest in the western Andes of Colombia

Roads can produce fragmentation of animal populations because they impose barriers difficult to overcome, inclusive for vertebrates with considerable mobility. In spite of this conservation concern, published studies about fragmentation on animal populations due to roads are almost inexistent in Neotropics. Along six months (February-July of 2006) we studied the mortality of vertebrates due to vehicular casualties in a segment of 2.4-Km of the Buga-Buenaventura highway, which crosses a protected fragment of sub-Andean forest in Western Andes of Colombia. Also, we established 38 Shermann traps, for marking and recapturing small mammals to monitoring movements by individuals. We recorded 49 dead vertebrates on the road, 13 of them were medium-large mammals (e.g. opossum Didelphis marsupialis). We marked and released 170 individuals of five species of small mice (Melanomys caliginosus, Oryzomys talamancae, Rhipidomys mastacalis, R. cf latimanus, Heteromys australis), and one small opossum (Marmosa robinsoni). Results indicated that small, but not medium-large mammals, exhibited inhibition to cross the highway. If small mammal species of edge forest and disturbed areas, such as those recorded in this study, exhibited inhibition to cross the road, it is expected a stronger effect in species of forest interior.

10.5 Varina Crisfield*; S. Ellen Macdonald; University of Alberta; *crisfiel@ualberta.ca*
The Effects of Human Disturbance on an Alpine Plant Community in the Canadian Rockies
Alpine tundra is notorious for its fragility and slow recovery following disturbance. In recent years tourism in alpine areas has increased, and effective management of the impact of recreational activities will require a better understanding of the nature of these impacts. The objective of this study is to examine the effects of hiking on an alpine plant community, and to determine whether they differ from the effects of natural disturbance. In order to do this we censused plant community data in 0.5x1m plots on a hiking trail, on the adjacent, intact, tundra meadows as well as on gravel patches formed by frost disturbance. The three treatments were compared in terms of vascular plant cover, richness, diversity, non-vascular and abiotic cover composition, species composition and species morphological attributes. As predicted, the trail was found to be significantly different from the surrounding tundra. However, it was also quite unlike the community found on natural gravel patches, despite the superficial resemblance of the two treatments. Human activities appear to lead to the establishment of a community type that is unique in the context of the surrounding ecosystem; in order to minimise such community changes, managers may consider minimizing the number and the size of trails in alpine areas.

12.8 VÃ©lez-Espino, LA; Koops, MA*; Fisheries and Oceans Canada; *Marten.Koops@dfo-mpo.gc.ca*
Demographically Sustainable Recovery Targets in the Face of Random Catastrophes: Canadian Freshwater Fishes at Risk
Population recovery targets are a pressing need for the conservation and management of freshwater fishes at risk. However, fish populations have generally been under-represented in considerations of demographically sustainable population thresholds. The small number of population viability analyses conducted on freshwater fishes is too limited for cross-species study or meta-analysis of minimum viable population size (MVP). Here, we conduct a population viability analysis of stage-structured populations to determine MVPs for freshwater fishes listed as Threatened and Endangered in Canada. Here MVP is defined as the number of adults necessary for a 5% risk of extinction (a 95% chance of persistence) over 250 years. In addition to explicitly incorporating demographic and environmental stochasticity, density-dependent population processes, and vital rate covariation, computer simulations are repeated at various probabilities of random catastrophes within the range observed in vertebrate populations. Catastrophes emerged as the main determinant of MVP for any given species, seemingly overwhelming the influence of environmental stochasticity and density-dependence. However, the influence of catastrophes decreased with body size and age at maturity. Our results represent the first indication of life history correlates of MVP, showing that in spite of their higher return rates smaller, short-lived, early maturing species require larger populations.

P2.136 Vega, LA*; Koike, F; Doctorate course student of the Graduate School of Environment and Information Sciences, Yokohama National University, Professor of the Graduate School of Environment and Information Sciences, Yokohama National University; *luis.a.vega.i@gmail.com*
Importance of historical land use in the spatial distribution of evergreen broadleaved species at their northern limit in Japan
At their northern and southern distribution limits, plant species subsist under climatic stress and are considered as regionally endangered due to bio-geographical importance. Also, land use change over time increases the environmental stress and influences modern vegetation composition. Such effect could affect marginal plant populations more significantly and cause their reduction. In this research, the factors explaining the current distribution of 20 evergreen broadleaved species (5 at their northern limit) were studied at the Tokyo University Forest (2171 ha) from topographic, geographical and historical stand points. 7185 plots of 10m by 10m were surveyed along the census line recording presence and absence of individuals. Current distribution was modeled by multivariate logistic regression with factors derived from a 10m mesh digital elevation model (elevation, slope, solar radiation, topographic wetness index, surface curvature), a 1 km mesh climatic data set, and land use maps: current (2005) and historical (1900). Unlike the case of the rest of the studied species, for northern limit species the historic land use landscape was always a more important factor than the current land use landscape in explaining their current distribution. Surface curvature and winter minimum temperature were also very common significant factors. We concluded that for northern limit species, the historical land use has a relatively stronger influence over their population distribution.

P2.97 Velankar, Avadhoot Dilip*; Punde, Sameer; Applied Environmental Research Foundation; *avadhoot.velankar@gmail.com*
Threats Of Uncontrolled Tourism To Protected Area : A Bhimashankar Wildlife Sanctuary Case Study
Biodiversity hotspots around the world continue to face human population pressure due to overexploitation of natural resources. Protected area managers here, face the dilema of whether to prioritize conservation or meet human needs. Bhimashankar wildlife sanctuary in north Western Ghats is no exception to this, where religious tourism is being given priority over conservation. We studied the extent of damage done by unmanaged tourism to the sanctuary. Spatio-temporal variations in direct and indirect impacts were assessed by noting frequency of occurrence of impacting factors on transects. We also monitored the tourist influx by point counts of people and vehicles in the sanctuary. Awareness among the people about the sanctuary was studied using questionnaires. Opportunistic observations of destructive tourist behaviours were also documented. It was found that the direct impact of tourism like improper solid waste disposal and tourist activity were more localized near the tourism zone while indirect impacts such as grazing, lopping, fire, etc. were more widespread. It was also found that tourists were aware of the negative effects caused by improper solid waste disposal and the necessity for conserving protected areas. However, due to the religious sentiments attached to the Bhimashankar temple, they were more tolerant about them.

P1.3 Velasco, JA; GÃ¡rces, MF; Roncancio, N; Saavedra, C; Rios, C; Franco, P; Wildlife Conservation Society, Colombia Program; *jvelasco@wcs.org*

Predictions of climate change effects on distribution of rare and endangered species in the Andes of Colombia

Are species' responses to climate change idiosyncratic or is there a general rule in the response of each species in a particular region? We explored how the current distribution for some restrict and endangered species in the Andes of Colombia could be affected by climatic changing conditions, attempting to identify if there are general patterns for the Andean species under climate change. Our aim was to identify whether is possible predict patterns in contraction/expansion of geographic ranges in Andean species in several climate change scenarios or in other terms why some species are more threatened by climate change effects than others in the Andean region. We used environmental niche models approaches to predict changes in distribution of eight Andean species in Colombia with several climatic future scenarios. We predicted the future potential distribution using three climatic scenarios models in three different times. Species with a narrow distribution in the Andes region would suffer contractions in the geographic range in the future. Our results show a general rule that species with narrow distributions in the Andean region probably will suffer more impacts by climate change than species with distributions in lowlands or inter-valley Andean.

SY76 Venn, S*; Ikonen, H; University of Helsinki; *Stephen.venn@helsinki.fi*

Managing urban meadows for biodiversity

Communities of forbs and insects have adapted to habitats managed for agricultural purposes over several centuries in Europe. Urban regions often encapsulate remnants of semi-natural habitats that, with appropriate management, provide potentially suitable habitat for threatened species. Municipalities, such as Helsinki, are committed to policies for maintenance of biodiversity. However, little is known about the influences of urbanization factors (e.g. nutrient deposition, landscape composition) on meadow assemblages. In the Helsinki Meadows project, we investigate plant, carabid beetle, spider and ant assemblages of dry and fresh meadow habitats in and around Helsinki. The effects of management regime, environmental and spatial factors on these taxa are evaluated. This information is being applied to refine the planning and management of networks of meadow habitats for the enhancement of biodiversity. The carabid and spider assemblages were species rich and included a number of regionally rare species. A number of carabid species were sensitive to management intensity and less intensive management resulted in more even carabid assemblages. There were also clear responses to site characteristics. Habitat heterogeneity and the presence of deadwood were important factors for ant species richness. These results suggest that management should comprise of mowing and brush clearing, to keep meadows open, but to retain dead wood and heterogeneity.

SP2.6 Venter, JA*; Fouche, PSO; Vlok, W; Moyo, NAG; University of Kwazulu-Natal, University of Venda, University of Johannesburg, University of Limpopo; *Jan.Venter@ecparks.co.za*

The development of a conservation framework for threatened southern African fish

Water Research Commission funding was granted to develop a conservation framework applicable to threatened fish species southern Africa's highly diverse and important freshwater ecosystems. Because of its sensitivity rating and conservation status the Southern Barred Minnow, Opsaridium peringueyi, was selected as a candidate species. The selection criteria included that the species should be listed as threatened, sensitive to environmental variables and that its perceived population size should be large enough to accommodate research and sampling. An attempt was made to use the widest possible range of methodology and procedures. This allowed the team to produce a practical conservation framework with different options, i.e. comprehensive versus rapid planning methodology. Practical application of the methodology allowed the research team to develop guidelines usefull for the development of conservation plans for threatened fish species in southern Africa.

SY23 Venter, O*; Possingham, HP; Wilson, KA; University of Queensland; *oventer@uq.edu.au*

REDD in Berau, Indonesia: Systematic Prioritization of Strategies and Locations to Reduce Forest Carbon Emissions

A carbon payment mechanism termed reduced emissions from deforestation and forest degradation (REDD) has the potential to slow deforestation, contribute to sustainable livelihoods and help safeguard the biologically diverse forests of developing countries. REDD provides financial incentives to voluntarily reduce deforestation rates and associated carbon emissions below a reference level. In Indonesia, as in other developing countries, a suite of on and off reserve strategies are available to reduce forest loss, and these strategies may be applied in any number of locations with variable costs and benefits. In this study we draw on systematic conservation planning to develop an approach to prioritize interventions for REDD. The approach incorporates multiple strategies, multiple goals, socio-economic concerns and landscape configuration. We apply this approach to a large and complex REDD program run by The Nature Conservancy in the Berau regency of East Kalimantan, one of the few remaining areas on either Sumatra or Borneo that still contain substantial expanses of relatively undisturbed lowland dipterocarp forest. We find that our approach can help maximize the benefits from REDD while minimizing costs to stakeholders.

P1.20 VerÃ–ssimo, Diogo*; MacMillan, Douglas; Smith, Robert J; Durrell Institute of Conservation and Ecology, University of Kent, UK; *dv38@kent.ac.uk*

Towards a systematic approach to the flagship concept in conservation

Flagship species have traditionally played a pivotal role in our ability to fundraise, lobby or raise awareness for biodiversity conservation. However, procedures for selecting flagships generally lack empirical evidence or an objective methodology. This has resulted in confusion over what flagship species are and what they are supposed to achieve, which in turn has undermined their effectiveness. In this paper we describe a systematic framework to support the selection of conservation flagships drawing on insights from other cognate disciplines including economics and business, and concepts such as social marketing. Our model highlights the need for flagship selection to be driven not only by the specified conservation goal, but also by the wider values and attitudes of the target audience towards that goal. Thus, the process needs to be tailored to fit the social, cultural and economic reality of the key stakeholders and based on an understanding of the relationship of this audience with the conservation goal. Furthermore it reinforces the need for a rigorous evaluation process for any flagship based strategy, as the only means to measure success and determine the scope for improving the use of flagship species in conservation. This conceptual framework should help conservationists develop more effective flagships with wider support from a range of key stakeholders, such as donors, local communities or government officials.

SY67 Verbeek, P; Miyazaki International College; *pverbeek@miyazaki-mic.ac.jp*

The Primate Relationship with Nature

Around the globe people are feeling the impact of anthropogenic extinctions and climate change. Studies from multiple disciplines identify threats to our health posed by biodiversity loss. Once the essence of our existence, our relationship with nature has become dysfunctional. Psychology has been slow in waking up to the realities of our dysfunctional relationship with nature. The emerging area of conservation psychology focuses on the bidirectional relationship between humans and nature. Here I draw on our primate heritage to describe psychological bases of our relationship with nature. It makes evolutionary sense to take a look at our endangered primate cousins to better understand our own place in nature. Extant primates and human beings have walked the evolutionary road together for a long time and, along the way, faced similar problems in finding their way in nature. In particular, direct perception of what nature affords, and the way that emotions of investigation and discovery mediate rapid learning about and from nature, are psychological particularities that are most likely shared by human and nonhuman primates alike. In this talk I discuss research on how nonhuman primates perceive, explore, and exploit their natural habitat, and on how these behaviors are mediated by social interaction and emotion. I link these findings to our own perceptions and actions to show that a better understanding of the primate relationship with nature can help humanize conservation.

P1.96 Versteeg, L.*; Bentham, P.; Coupal, B.; Grindal, S.; Wolsey, T.; Golder Associates Ltd., ConocoPhillips Canada, Suncor Energy Ltd.; *lversteeg@golder.com*

Caribou Habitat Restoration Pilot Study

A pilot research project in the Little Smoky caribou range in west-central Alberta, Canada was initiated to monitor how natural vegetation recovery and habitat restoration efforts may influence predator and prey presence and mobility along linear disturbances, such as seismic lines. The study was designed to compare wildlife use of areas with natural re-vegetation (i.e., > 1.5 m vegetation height) along linear disturbances to control areas with reduced vegetation height (i.e., < 0.5 m vegetation height). Thirty-eight remote cameras were deployed on 76 linear disturbance plots to assess how natural regeneration and/or habitat restoration techniques along linear disturbances affected caribou, predators and alternate prey species mobility and use of these disturbed landscape features. Additional vegetation and soils data were collected on selected sites to provide a broader context for evaluating the re-vegetation success of these lines relative to wildlife use. Pooled prey species preferentially selected re-vegetated sites over non-vegetated sites, with deer and moose exhibiting the strongest preference for re-vegetated sites over control sites. Prey may be keying into increased forage and/or cover value (i.e. predator avoidance) as line of sight on re-vegetated lines is typically 50 - 100 m on control lines. Caribou showed a slight preference for re-vegetated sites over control sites, however there was insufficient data to draw any firm conclusions. Pooled predator species also showed a preference for re-vegetated sites over control sites, with black bear and wolf showing a slight preference for re-vegetated sites. These results indicate that wolves may be responding to prey species occurrence on re-vegetated lines.

P2.43 Viddi, F. A.*; Harcourt, R; Graduate School of the Environment, Macquarie University; Centro Ballena Azul, Chile, Graduate School of the Environment, Macquarie University; *fviddi@gmail.com*

Habitat-dolphin modeling of sympatric species in southern Chile: implications for the conservation of Chilean and Peale's dolphins

Environmental features play a key role in shaping animal distribution and habitat selection, and quantitatively understanding these processes have major implications for effective conservation. The extraordinary productivity off the Chilean coast is highly influential in the distribution and abundance of the poorly known Peale's dolphin (Lagenorhynchus australis) and the endemic Chilean dolphin (Cephalorhynchus eutropia), two species sympatric throughout most of their range in Chile. Geographic information systems and generalized additive models were used to assess data collected from fine-scale marine surveys in the northern Patagonian fjords to determine habitat selection and the ecological determinants of the distribution of these two dolphin species. Dolphins shown to be unevenly distributed, with the presence of Chilean dolphins significantly related to shallow waters, rivers and tide regime, while Peale's dolphins were associated to rivers, shallow waters, tidal fronts, clearer waters, were found near kelp beds and far from salmon farms. The identification of suitable habitats for these dolphins will assist towards proposing and recommending conservation actions and policies, such as marine protected areas or zones free of aquaculture. This study greatly improved our understanding of the distribution of sympatric and endemic dolphin species in the northern Patagonian fjords, highlighted the importance of these marine ecosystems and provided insights about how animals may respond to a changing environment.

SY57 Vigerstol K; Aukema JE ; Molnar JL*; The Nature Conservancy; *jmolnar@tnc.org*
Human adaptation to climate change: Using conservation strategies to increase resilience
Climate change is happening, and recent projections indicate that changes are likely to be greater and happen faster than we anticipated only a few years ago. The resulting changes are going to be significant, with sea levels potentially rising over a meter in the next century, storms increasing in intensity and frequency, and changes in precipitation patterns bringing drought and flooding. We not only need to be reducing carbon emissions, but also planning for how people and ecosystems are going to adapt to the changes. Adaptation to these changes may take many forms, but the tendency is to focus on structural options such as seawalls and dams. We propose that using conservation based adaptation to respond to expected impacts to climate change can provide a less expensive alternative that results in additional benefits to people and ecosystems. Conservation based adaptation strategies include conserving and restoring habitats such as mangroves and salt marshes that can directly protect communities from threats like rising seas and storm surges, as well as maintaining the resilience of ecosystems that provide crucial services, such as fisheries or forestry, to people. In this presentation we will introduce the concept of ecosystem based adaptation and lay out some guiding principles to frame the presentations and discussions that will follow.

P1.89 Vijayan, S; McLaren, B E*; Morris, D W; Faculty of Forestry and Forest Environment, Lakehead University, Thunder Bay, ON, Canada, Dept of Biology, Lakehead University, Thunder Bay, ON, Canada; *vsundara@lakeheadu.ca*
Livestock Density Alters Vigilance Behavior of Wild Prey in a Dangerous Grazed Ecosystem
Large and vulnerable livestock that occupy protected areas in developing countries often become preferred prey for large carnivores. Livestock can thus alter interactions between predators and native prey species, but there are few empirical examples. We address this shortcoming by assessing whether predation risk from Asiatic lions (Panthera leo persica) on spotted deer (Axis axis) varies with the density of large domestic prey. We assessed prey vigilance between areas with low and high density of domesticated cattle and buffalo in Acacia- Zizhypus forests in the Gir Protected Area, Western India. Vigilance was significantly greater where livestock density was low, than where it was high. This finding, together with the fact that lion predation rates on livestock are twice as great where livestock are more abundant, implies a form of prey commensalism. Conservation managers must anticipate a variety of non-linear indirect interactions in large prey-predator systems.

SP5.4 VINAYAKA*; KRISHNAMURTHY; KUVEMPU UNIVERSITY; *ks.vinayaka@gmail.com*
Host preference, diversity and conservation of lichens in Bhadra wildlife sanctuary, Western Ghats, Karnataka, India
Knowledge of the degree of host specificity of lichens serves a useful purpose in the estimation of their diversity and conservation. In the present study we identified the lichen supporting host tree species and their threats and conservation status. A total of 48 lichen species belonging to 25 genera and 13 families were identified from several tree species. The majority of them were corticolous. The highest species diversity was found in the tropical deciduous forest followed by semi-evergreen, evergreen and montane forests. The recorded 126 individuals of lichens belonging to 48 species in different types of trees preferred 33 species of host plants. Graphina fissofurcata is present in 7 different host plants where as Ficus tsjahela and Rhandia dumetorium plants hosted 9 and 6 lichen species respectively. The GBH of the host plants documented in transects, range between 10 cm and 300 cm. The host plants with GBH 21-40 cm provide substratum for more number of lichens, whereas the plants of 81-100 cm GBH support less number of lichens. The major threats to lichen of these regions were structural change in agricultural landscapes, illegal harvesting and deforestation, due to which rich habitat was being continuously destroyed. Cyanobacterial lichens appear to be very sensitive to habitat disturbance such as changes in forest age, structure and composition. The study revealed that the lichen assemblages do vary depending upon the types of habitats and host plants. The study identifies the rare species in the macrolichens community based on quantitative information on pattern of distribution of populations in landscape, without such information any program is meaningless in conservation and sustainable management of bioresource of an area.

SA1 Viorel D. Popescu*; Malcolm L. Hunter, Jr.; University of Maine, Dept. of Wildlife Ecology; *dan.v.popescu@maine.edu*
Forest succession and amphibian migration: implications for landscape connectivity
Long-term persistence of pond-breeding amphibian populations is contingent upon the successful dispersal of individuals between breeding sites. We investigated the influence of timber harvesting practices on the movements of the juvenile (dispersing) stage of a forest-dependent amphibian, the wood frog (Lithobates sylvaticus) in central Maine, USA using two experimental approaches. Following large scale habitat manipulation (2 ha treatments), newly metamorphosed L. sylvaticus showed a strong preference for closed-canopy habitat and avoided recent clearcuts. Despite substantial vegetative succession there was no increasing trend in the use of clearcuts up to six years post harvesting. A mesoscale field experiment (50 x 3 m terrestrial enclosures) that involved releases in four treatments (recent clearcut, mature forest, 11-year-old conifers, and 20-year-old natural regeneration) revealed that recent clearcuts and young coniferous stands were significant barriers to movements and were three times less permeable to movement compared to the mature forest and 20-year-old regeneration. Because extinction and recolonization processes are common in amphibian populations, forestry practices that involve canopy removal and conversion of natural forest to conifer plantations may affect regional population viability by hindering successful dispersal. However, 20 years of natural succession mitigated the negative effects of clearcutting for dispersing wood frogs.

P1.26 Vitazkova, SK*; Jones, RC; Marchant, A; Christen, C; Sevin, J; Buff, J; Dallemeier, F; Mason Center for Conservation Studies, George Mason University, Center for Conservation Education and Sustainability, Smithsonian Conservation Biology Institute ; *svitazko@gmu.edu*

The Smithsonian-Mason Conservation Education Program: A model for immersive, experiential training in conservation science and practice

Effective conservation requires not only academic knowledge, but also hands-on skills that cannot be learned in a traditional classroom, even if supplemented with occasional short-term fieldwork. George Mason University's College of Science and College of Humanities and Social Sciences have collaborated to create the Mason Center for Conservation Studies (MCCS), and have joined forces with the Center for Conservation Education and Sustainability (CCES) of the Smithsonian Conservation Biology Institute (SCBI) to develop and implement residential, hands-on undergraduate, graduate and professional education programs in conservation science. Both undergraduate and graduate/professional training includes courses in conservation theory, field methods and practice, and human dimensions of conservation. Training takes place at SCBI's 3,200 acre facility in Front Royal, VA, USA, home to several endangered species and home base for scientists working at the cutting edge of reproductive science, spatial ecology and international conservation. Course instructors include Mason faculty, CCES-SCBI's scientists, and colleagues at US and international conservation organizations. Program management and administration are shared equally between Mason and the Smithsonian Institution at all levels. This collaboration between an academic institution and a leading research center provides much-needed experiential training for today's conservation professionals and tomorrow's conservation leaders.

P2.81 Vitule, JRS*; Prodocimo, V; Freire, CA; LFCO - LaboratÃ³rio de Fisiologia Comparativa da OsmorregulaÃ§Ã£o da UFPR / GPIc - Grupo de Pesquisas em Ictiofauna MHNCI, LFCO - LaboratÃ³rio de Fisiologia Comparativa da OsmorregulaÃ§Ã£o da UFPR; *biovitule@gmail.com*

Estuaries as saline bridges to adjacent freshwater systems: Comparing salinity tolerance between native and non-native catfishes

Introduced fish in inland waters have a long history of consequences. One of the most worrying features is their potential for dispersal and colonization of new areas. Estuaries can act as bridges to new invasions by freshwater fish. Osmoregulation is central to invasion of new basins through estuaries. Native Rhamdia quelen (Rq) and introduced into Atlantic Forest Clarias gariepinus (Cg) were exposed for 6 h to salinity 15â °, but in average survived only 1:30 h (Rq) and 2:30 h (Cg) in 30â °. Plasma osmolality, chloride, sodium, potassium, magnesium, and glucose were assayed. Both species presented a similar pattern of response to the salinity challenge; plasma concentrations increased in 15 and 30â ° when compared to respective values in controls. Through a PCA analysis, the two species separate widely in 30â °, with Rq displaying larger increases. However, in 15â °, Rq is more similar to its controls than Cg. Both species could invade other river systems within a same estuarine system (and Rq would be more likely to enter the estuary), but neither one would be able to invade other estuarine systems through the ocean. Thus, both species, if introduced into areas where they did not occur before, could use estuaries as bridges.

10.8 VOLIS, SERGEI*; Dorman, Michael; Blecher, Michael; Sapir, Yuval; Ben Gurion University, Israel Nature and Parks Authority, Tel Aviv University; *volis@bgu.ac.il*

Use of variation partitioning in canonical ordination for analysis of environmental effects on plant translocation success

We present an innovative application of variation partitioning in canonical ordination. This method is proposed as a tool for analysis of environmental factors that determine success or failure of plant translocation and the relative importance of each factor. In this study, six soil parameters, abundances of 60 plant species and their total biomass were used to explain the variation in translocation success of Iris atrofusca plants, among 22 microsites. The relative importance of each of the three factors was estimated using ordination techniques. The effects of soil and of total plant biomass were not significant, while species composition had a significant effect on the performance of translocated irises. Abundance of rare species, rather than common species, was closely correlated with iris performance, suggesting that rare species may serve as \\\"indicators\\\" of other environmental conditions directly affecting the relocated irises. The proposed application appears to be a highly promising tool for planning and assessing success in conservation efforts involving translocation.

P2.78 von Stedingk, H*; de Jong, J; Swedish Biodiversity Center; *Henrik.von.Stedingk@svek.slu.se*

Selecting sites for peat harvesting based on conservation values in the landscape

The project aim was to create a tool for practitioners for selecting mires for peat harvesting, without threatening the biodiversity in the landscape. The approach was to combine landscape ecology and local species diversity to rank sites in terms of conservation value. Eight drained mires were selected in south-central Sweden. The mires were classified into vegetation types and inventoried for vascular plants, mosses, saproxylic fungi, birds and ground living beetles. A special survey of indicator species and red-listed species was also performed. A database of relevant environmental landscape variables were created, by combining different sets of geographic data. It was found that occurrence of indicator-species or red-listed species was not sufficient to rank the sites in terms of conservation values. Due to high variation of different habitats, some of the drained mires had large diversities of various organisms. Some structures, such as old trees, which were rare in the surrounding managed forest, were found in higher abundance. The drained mires also had a higher proportion of deciduous forest than the surrounding landscape. It is suggested that the diversity of vegetation types, in combination with occurrence of structures and landscape elements underrepresented in the surrounding landscape, shall be used for making priorities for exploitation of drained mires based on conservation value.

SY31 Vors, LS; University of Alberta; *vors@ualberta.ca*
A global perspective on caribou conservation
Caribou (Rangifer tarandus), an ungulate with an holarctic distribution, is a symbol of the threats and opportunities facing the northern hemisphere. Its widespread population declines have rendered it the subject of much conservation attention due to the species' ecological, cultural, and economic importance. There is wide agreement that caribou taxonomy is outdated and requires revision; four extant subspecies, several ecotypes and many discrete populations are recognized across North America. Both natural and anthropogenic pressures witnessed thus far have translated into dramatic declines for populations throughout their global range, although it is not clear whether all of these are inconsistent with historical population fluctuations. In Canada, some caribou have appeared on species at risk lists, while others have not been assessed; indication of any progress on recovery anywhere is non-existent. All have in common the cumulative effects of continued northward encroachment of industrial resource development and the longer-term spectre of climate change. Over-harvesting is also a compounding factor for some migratory tundra caribou populations, which has become a sensitive political issue for aboriginal hunters.

SY28 Vucetich, JA*; Hebblewhite, M; Smith, D; Peterson, RO; Michigan Tech University, Univ of Montana, Yellowstone Center for Resources; *javuceti@mtu.edu*
Assessing The Influence Of Wolf Predation On Prey Growth Rates In Isle Royale, Yellowstone, And Banff National Parks
Attitudes about wolves are strongly shaped by whether wolf predation is an additive or compensatory source of mortality for their prey. We assessed the impact of predation rate on prey growth rate for three systems where predation rate had been estimated for 38 years (Isle Royale), 19 years (Banff), and 12 years (Yellowstone). Prey growth rate declined with increasing predation rate for Isle Royale and Banff, but not Yellowstone. While elk have been declining in Yellowstone, predation appears not to have been an important cause of that decline. Moreover, while wolves and moose have coexisted on Isle Royale for more than six decades, predation has had an important destabilizing effect on growth rate of Isle Royale moose. In Banff, increasing predation rate weakly reduced elk population growth rate, but there was no relationship between wolf density and predation rate. We also review how different analytical approaches have given very different impressions about whether wolf predation on Isle Royale has been a strong top-down influence.

SA1 Vynne, Carly*; Keim, Jonah; Machado, Ricardo B.; Marinho-Filho, Jader; Wasser, Samuel K.; University of Washington, Matrix Solutions, University of Brasilia, University of Brasilia; *cvynne@uw.edu*
Agricultural expansion and the plight of the maned wolf in Brazil
Emas National Park (ENP), Brazil, has historically been considered a stronghold for the survival of the maned wolf (Chrysocyon brachyurus), which is endemic to the grasslands of central South America. Land clearing and agricultural intensification outside of ENP have been rapid and expansive and the Park now stands as a virtual island in a sea of agriculture. This project seeks to assess how land use practices and remnant habitat configuration are likely to affect persistence of this critical population of maned wolves. Specially-trained detection dogs enabled us to non-invasively acquire more than 800 scat samples of maned wolves across a diversity of habitat conditions. Spatial analyses and resource selection functions were applied to understand maned wolf ranging behavior and habitat preferences. Maned wolf pairs make extensive use of the landscape matrix and select agricultural fields for foraging, while strongly avoiding ranchlands and closed-canopy habitat. Results from steroid and thyroid hormone and diet and parasite analyses indicate a cost to making a living in the matrix. Stress hormone profiles, for example, are significantly higher for maned wolves found more than 15 km from the Park border. This information will contribute to conservation and management of maned wolves, simultaneously providing an important model for applications to other free-living, threatened or endangered species.

SY42 WA Wall; Alaska Village Initiatives; *williamwall11@gmail.com*
Key Components of Conservation-Hunting Programs and Their Relationship to Wildlife Populations, Ecosystems, and People
There has been growing recognition from the international conservation community that conservation-hunting programs can provide the basis for successful sustainable use conservation. These programs based in an ecosystem context can be of significant support for community based wildlife management programs. A conservation-hunting program is one that contributes to the short and long-term viability of species populations within an ecosystem context by generating incentives, management regimes, and/or sources of funds for purposes of conservation. However, there is a general lack of understanding of the necessary components for these programs and how interaction of these components provides for success or impediments to conservation. Components of conservation-hunting programs include: a transparent legal basis within the range state including linkage with international regulatory bodies such as CITES; an adequate biological management system based in adaptive management; an adequate economic base which links incentives for local conservation to a local or international market through good business practices; and an appropriate local cultural context. Conservation hunting-programs worldwide have reached varying levels of success. Since different governments, cultures, ecosystems and species populations respond differently, it is critical to fit the program to the local and regional circumstances. This paper presents a framework for organizing and describing key components of conservation-hunting programs and discusses their relationship to wildlife populations, ecosystems, and people. Presented are axioms of biodiversity conservation and conservation-hunting programs to establish common ground from which a series of principles and criteria are derived.

SA2 Wade, ASI*; Norris, K; University of Reading; *a.s.wade@reading.ac.uk*

Management strategies for maximising carbon storage and tree species diversity in cocoa-growing landscapes

Efficient management of land in the tropics that maximises biodiversity, ecosystem service delivery and agricultural yield is paramount. There are two potential strategies to achieve this: land sparing (high yield per unit area allowing land to be conserved as native habitat) or wildlife friendly farming (greater area to achieve the same yield with better conservation on agricultural land). We examine which would be the optimal strategy in cocoa-growing landscapes to achieve high carbon storage and species diversity in trees. We sampled tree species and size along transects, in addition to interviewing farmers. Increased management intensity explained higher yield and in turn this explained a reduction in carbon storage and species diversity. There were substantial differences in tree species diversity between forest and cocoa farms suggesting land sparing would conserve more species. Based on mean values, there would be little difference between carbon storage under wildlife friendly (131 Mg/ha) and land sparing (112 Mg/ha) management. However, the degree of intensification in wildlife friendly farming alters which management strategy leads to greater carbon storage. In situations where wildlife friendly farming would be preferable, there would be conflict with biodiversity. In conclusion, it can be difficult to identify the optimal strategy to meet agricultural demand whilst retaining high biodiversity and ecosystem services, in part because trade-offs can be dynamic.

SP10.9 Wagner, V.*; Durka, W.; Hensen, I.; Martin Luther University , UFZ-Helmholtz Centre for Environmental Research UFZ; *viktoria-wagner@gmx.de*

Are Populations at the Range Edge Really Genetically Depauperate?

Populations at the periphery of a species geographic range are considered to be important targets for conservation because they are often smaller and more spatially isolated than in the core. This might lead on the one hand to lower within population genetic diversity and enhanced extinction risk but on the other hand to higher genetic differentiation. We tested these predictions in the perennial steppe grass Stipa capillata, analyzing AFLP fingerprints in 20 core populations in Kazakhstan, Asia, where the species is widespread, and in 23 peripheral populations in Central Europe, where it is rare, spatially isolated and red listed. Contrary to the predictions, we found no difference in within population genetic diversity between the core and periphery. However, genetic differentiation among populations was larger at the periphery as shown by analysis of molecular variance (AMOVA) and neighbor-net networks. Our study shows that predictions for genetic structure in peripheral populations do not have to be simultaneously met. The stronger genetic differentiation in peripheral populations is likely the result of hampered gene flow due to geographic isolation. Because this genetic divergence is regarded as an important component for a species' capability to shift its range and undergo speciation processes the conservation of peripheral populations is highly justified from a population genetic perspective.

9.2 Waits, LP*; Adams, JA; Bohling, JH; University of Idaho, Michigan Tech University; *lwaits@uidaho.edu*

Quantifying Recent Hybridization and Introgression by Reconstructing the Pedigree of the Endangered Red Wolf (Canis rufus) Population

Hybridization is a conservation concern for many endangered species. We use both parentage and kinship analyses to assess the effect that hybridization with coyotes (Canis latrans) has had on the genetic integrity of the endangered red wolf (Canis rufus) population. A total of 703 genetic specimens were obtained from canids captured in the red wolf experimental population area of North Carolina. Genotypes were generated at 18 microsatellite loci and the ancestry of each sample was assessed using a likelihood ratio based approach. Parentage was tested for over 300 individuals with some or no parentage information known using the program CERVUS 2.0. In addition, parentage assigned by field observations was verified for 303 individuals. Both parents were successful assigned for 148 individuals and one parent was assigned for 38 individuals. Results indicated the presence of between 14 and 24 F1 hybridization events within this dataset. The first F1 hybridization event occurred in 1993, and the offspring of this event are the only individuals known to have backcrossed into the red wolf population. As a result, all verified 75% red wolves to 96.9% red wolves trace to the 1993 hybridization event. Thus the impact of hybridization on the wild red wolf population is much less than originally believed. Our results suggest the adaptive management plan adopted in 2000 has had a positive impact on slowing introgression within the red wolf population.

SY36 Walpole, M; UNEP World Conservation Monitoring Centre; *matt.walpole@unep-wcmc.org*

Biodiversity targets and indicators in a post-2010 world

You can't manage what you can't measure. Thus in any strategic plan, the important of targets that are SMART, with associated metrics, is paramount. The 2010 biodiversity target adopted by the Convention on Biological Diversity was broad and aspirational, but its lack of specificity made it difficult to evaluate progress. Likewise the time lag between agreeing the target and agreeing a framework of indicators left little time to develop a comprehensive set of robust indicators before the target deadline. In a post-2010 world targets and indicators must be better aligned. Resources for developing new indicators are likely to be limited, and as far as possible a minimum, streamlined set of global indicators will be required, drawing on existing science, with efforts focused on improving capacity to develop and use indicators at national, regional and local scales. This final presentation in the symposium â Tracking progress towards the 2010 Biodiversity Target and Beyond' will consider the kinds of post-2010 targets and indicators likely to be agreed at the 10th Conference of the Parties to the CBD in Nagoya, Japan in October 2010, and identify what is required to ensure the best scientific underpinning.

P2.104 Walters, M*; Smith, G.F.; Crouch, N.R.; South African National Biodiversity Institute; *m.walters@sanbi.org.za*

Conservation status of South African succulents

South Africa has a remarkable diversity of plant life with more plant species occurring here than in any other region of similar size, making it the world's richest temperate country in terms of floral wealth. A large proportion of this floral wealth is made up of succulents, with an estimated 47% of the world's diversity occurring in southern Africa. Succulents are collected by enthusiasts the world over and are frequently taken out of habitat and illegally traded, putting pressure on natural populations. In the southern African context succulents are often used by traditional healers as medicinal plants putting even more strain on these natural resources. A list of all South African succulents was compiled and Redlist statuses for each of these taxa were obtained from the recently completed Red List of South African Plants. From a total of 4083 succulent taxa 498 were considered to be threatened i.e. critically endangered, endangered and vulnerable. We provide recommendations for prioritizing future conservation effort.

SP11.12 Wang Dajun*; Li Juan; Haxi Zhaxiduojie; Yin Hang; Peking University, The snowland great rivers environmental protection association, Shan Shui Cinservation Center; *djwang@pku.edu.cn*

Study on the Causation and Solution of Human-Wildlife Conflict in Qinghai-Tibetan Plateau, China.

The human-wildlife conflict report has been rapidly increasing in the Qinghai-Tibetan Plateau, China, in recent 5 years. Numbers of wildlife species including brown bear (Ursus arctos), snow leopard (Uncia uncia), wolf (Canis lupus) and Kiang (Equus Kiang) are on the conflict list. We initiated a study to understand the causation of the increasing of conflict between human and wildlife, and try to find ways to solve or reduce the conflict, to help the local people with their daily life, and maintain the traditional conservation awareness of local people. The field survey was conducted in Sanjiangyuan area in Qinghai province, interviews to local people and some government officers was also processed to collect data of locations, timings and patterns of conflict, and the economic damage. Remote sensing based GIS analysis was used to map 2 conflict species habitat and human distribution to understand the special pattern of conflict. Historical policy events were also put into analysis to find the conflict causation of wildlife management strategies. We ranked the conflict species, suggested the ecological causation and the policy causation of the increasing of conflict. Suggestions on conservation activities and management policies were made based on information and result of this study.

SP5.8 Wang, O*; Ciarleglio, M; University of texas at Austin; *opheliawang@mail.utexas.edu*

Conservation area prioritization in the Ecuadorian Amazon using remote sensing and GIS data

Traditional conservation planning relies on gap analysis to overlay maps of land coverage, species distribution, and stewardship status in order to identify conservation "gap" areas that require protection. The Ecuadorian Amazon is one of the world's high-biodiversity wilderness areas and important ecoregions, but its remote location and little accessibility hinder detailed documentations of species distribution and modeling or land management. In this study we use land cover classification derived from satellite images and GIS data based on local surveys to locate areas that should be prioritized for conservation to ensure biodiversity representation. We use both traditional supervised classification of Landsat images and the software Feature Analyst to extract ten classes of land and vegetation cover that serve as biodiversity representation surrogates in our analysis. GIS data of indigenous community centers, inter-community paths, and flight strips are used as constraints for sites to be excluded from conservation. Distances to the nearest anthropogenic features are used to determining production suitability. With specific targets of biodiversity representation and spatial configuration of shape and connectivity of the conservation areas, we use the software ConsNet to construct area prioritization. This study provides an example to achieve biodiversity conservation, ecosystem function maintenance, and sustainable development through an integration of data sets.

SY33 Waples, Robin; NOAA Fisheries; *robin.waples@noaa.gov*

Evolution and conservation of Pacific salmon in a changing world

Contemporary evolution of Pacific salmon (Oncorhynchus spp.) in human-altered environments is best viewed in the context of the evolutionary history of the species and the dynamic ecosystems they inhabit. Speciation was complete by the late Miocene, leaving ~6 million years for diversification within each species, and considerable evidence exists for local adaptations. On the other hand, salmon ecosystems remain dynamic on several spatial and temporal scales, and evidence is accumulating that, in some cases at least, salmon evolution can be fairly rapid. This suggests the importance of conserving ecological and evolutionary processes that are capable of producing a mosaic of locally adapted populations, rather than focusing on fine-scale patterns evident at any point in time. Some local human disturbances (e.g., culverts blocking access to areas higher in watersheds) that select against specific life history types are replicated pervasively across the species' range, creating evolutionary pressures that are perhaps unprecedented in their spatial scale. If anthropogenic changes can be shaped to produce disturbance regimes that more closely mimic those under which the species evolved, Pacific salmon should be well-equipped to deal with future challenges, just as they have throughout their evolutionary history.

2.4 Wassens, S.*; Spencer, J.; Charles Sturt University, Department of Environment, Climate Change & Water; *swassens@csu.edu.au*

Interactions between wetland dependant taxa are important when managing freshwater reserves for endangered species conservation

Globally freshwater ecosystems are threatened by river regulation, water extraction and habitat alteration. Australia's Murray-Darling Basin contains some of the most highly regulated and degraded freshwater ecosystems in the world. Managed environmental flooding is currently the principle mechanism used to maintain wetland habitats and dependant species, including the endangered frog, Litoria raniformis. Since 2001 reductions in environmental flooding has contributed to the large-scale degradation of nationally important wetlands and the near extinction of L. raniformis throughout the basin. In 2007 small amounts of environmental water were released to maintain critical habitats for L. raniformis and associated species. Outcomes of the environmental watering were monitored between 2007 and 2010. Litoria raniformis remained at four out of six watering sites, and recruited successfully at two sites. Waterbirds, introduced and native fish also responded to the environmental flooding and increased levels of competition and predation may have contributed to the poor recruitment outcomes. The exclusion of European carp Cyprinus carpio increased frog recruitment success during subsequent watering. Environmental watering is an essential tool for maintaining endangered wetland species and there are significant follow-on benefits for other wetland taxa, however successful management depends on understanding how these taxa interact under restricted flooding regimes.

SY25 Wasser, Samuel; University of Washington; *wassers@u.washington.edu*

The Illegal Ivory Trade and Organized Crime

There has been a marked intensification of illegal trade in wildlife during the past decade. This industry is now estimated to be worth $20 billion annually. Liberalized global trade laws tend to facilitate the shipment of large consignments of contraband by limiting time-consuming physical inspections. Prosecutions often are few and penalties are inadequate to deter continued trafficking. The combination of high profit and low risk make illegal trade in wildlife especially attractive to organized criminal syndicates, whose involvement has been repeatedly noted by law enforcement authorities. These trends are clearly reflected by the progressive increase in the illegal trade of African elephant ivory during the past decade. Record high annual seizures of nearly 30 tons during multiple recent years indicate the current intensity. We argue that habitat countries are the best place to suppress this burgeoning illegal trade and describe DNA assignment methods to facilitate these efforts. We summarize our analyses of some of the larger seizures on record since the 1989 listing of all elephants on CITES Appendix I and describe how such results help pinpoint major poaching hotspots in Africa, identify countries that claim to be unaware of the extent of their poaching and illegal trade, and deduce postulates regarding strategies employed by criminal syndicates involved in ivory trafficking. These timely, cost effective methods offer reliable estimates and have broad applicability for any species currently being illegally exploited on a commercial scale.

SY26 Watanabe, M.; Univ. of Tsukuba; *watanabe@kankyo.envr.tsukuba.ac.jp*

Factors affecting conservation of the endangered damselfly, Mortonagrion hirosei, in an artificially established habitat

In 1998, a tiny habitat of the brackish water damselfly, Mortonagrion hirosei, which is an endangered species in Japan was discovered in Ise, Mie Pref. It was a dense reed community on the brackish water, from which had be reclaimed under the construction of sewage plant. The local government of Mie Prefecture decided to preserve the local population of the damselfly. Then the mitigation project was started, because the habitat seemed to be too small to maintain the local population, and because surroundings of the habitat would become unavailable vegetation for the damselfly due to the sewage plant development. In those days, however, there were few reports on the biology of the species. Therefore, we had to begin to clarify quantitatively the population parameters of larvae and adults, behaviour, flight habit, body colour change for adults, saline tolerance of larvae as well as to measure abiotic environment, such as saline, water depth, water temperature and relative light intensity in the original habitat. According to the accumulation of information on the quantitative environmental factors, the design for a newly established habitat was proposed. Then, in early spring of 2003, huge number of reed rhizomes were collected near the original habitat, and transplanted for establishing the new habitat. Artificial brackish water was continuously supplied throughout the year. The reed community has developed year after year and nearly completed to the dense community, overcoming a lot of problems appeared. Consequently, the adult population has increased in both the original and the established habitat. The mitigation project has now proved successful.

SP7.10 Watari, Y*; Caut, S; Bonnaud, E; Bourgeois, K; Courchamp, F; Ecologie, SystÃ©matique & Evolution, UMR CNRS 8079, Univ Paris Sud, EstaciÃ³n BiolÃ³gica de DoÃ±ana, Apdo, Institut MÃ©diterranÃ©en d\'Ecologie et de PalÃ©oÃ©cologie, Univ Paul CÃ©zanne; *yuya.watari@u-psud.fr*

Ecosystem dynamics after introduced rat eradication

There has been growing evidence that rat eradication generally results in the substantial recovery of native species. However, focus of most previous studies has been restricted to the conspicuous and charismatic species in direct interaction with rat predation. Next challenges could be to assess other native groups, such as invertebrate community, which can have important functions in recipient ecosystems. An important point could be that invertebrate community should be assessed in community-wide perspective, because invertebrate community is likely to be affected not only by direct predation by rat but largely by indirect effects as well. In this regard, we studied the ecosystem of Surprise Island in New Caledonia. We eradicated the invasive rat population in 2005 and compared the community structure including invertebrate community, seabirds, vegetations, and skink between before (2002-2005) and after (2006-2009) rat eradication. Summary of results of this study was that 1) rodents were eradicated from Surprise Island; 2) seabirds and vegetation cover increased; 3) skink (mesopredator) increased; 4) most invertebrates increased or were not affected. These results highlight that mesopredator increase does not always exert negative effects on native ecosystems. In this case, it is likely to depend on the community structure of recipient ecosystems.

P1.141 Waylen, KA*; Fischer, A; McGowan, PJK; Milner-Gulland, EJ; Macaulay Institute & Imperial College London, Macaulay Institute, World Pheasant Association, Imperial College London; *k.waylen@macaulay.ac.uk*

Working with local culture to influence environmental behavior: pro-ecological Buddhist teachings in the Republic of Kalmykia, Russia

The Republic of Kalmykia is the only Buddhist nation in Europe, and is undergoing cultural resurgence following the break-up of the Soviet Union. Its environmental problems include desertification, water shortage and poaching of its iconic species, the saiga antelope. An intervention which aimed to promote environmentally positive behaviors through pro-ecological Buddhist teachings was evaluated, by thematic analysis of semi-structured interviews. Those who had experienced the teachings were more likely to express pro-environmental attitudes and behaviors, by praying and cleaning their surroundings. The cause was a sense of individual agency fostered by the teachings. Other individuals had little sense of responsibility and felt a limited ability to influence environmental outcomes, even though they perceived the problems to be serious. Indeed, government was widely expected to control environmental problems, in accordance with the collectivist culture fostered by their Soviet past. In Kalmykia, linking environmental messages to Buddhist teachings may influence audiences otherwise uninterested in personally tackling environmental problems. However, as many expect government control and direction, top-down policies may be the best accepted and most effective way to tackle environmental problems. This highlights a general need for conservationists to understand human societies and local culture, and to avoid prescribing one-size-fits-all solutions.

SY71 Webb, N*; Allen, J; Stashko, R; Alberta Government; *nathan.webb@gov.ab.ca*

The Alberta BearSmart Program: Enhancing Opportunities for Humans and Bears to Co-exist

The Alberta BearSmart Program is a province-wide, multi-stakeholder initiative to reduce human-bear conflicts. Led by the Alberta Government, the BearSmart program utilizes public education and management of bear attractants to promote public safety, reduce human-caused bear mortality, and reduce property damage. The program provides educational messaging on bear natural history, proper management of bear attractants, methods to avoid bear encounters, and appropriate responses to close encounters with bears. Education and conflict prevention efforts are focused on communities, outdoor recreationalists, agricultural producers, and industry. Karelian Bear Dogs are used to enhance the investigation of and response to human-bear conflicts and serve as ambassadors to deliver BearSmart messaging. Bear hazard assessments have been completed or are ongoing in several communities, and help to identify the causes of bear-human conflict and recommend solutions. Alberta Government staff and program volunteers work with municipalities and landowners to encourage the proper management of garbage, livestock carcasses, and vegetation. Bear-resistant containers, electric fencing, and aversive conditioning are used to prevent habituation and food-conditioning of bears, and to reduce depredation on livestock. Collaboratively, these efforts promote public stewardship of bears and enhance opportunities for humans and bears to co-exist in Alberta.

SY28 Webb, N; Alberta Sustainable Resource Development; *nathan.webb@gov.ab.ca*

Resilience of Cougars and Wolves to Population Management: An Alberta Perspective

Large carnivore populations are often assumed to be highly vulnerable to human-caused mortality. Harvests of these species have been linked to social disruption, poor hunting success, increased rates of sexually selected infanticide, declines in breeding success, and large-scale population declines. Recent research has suggested that human take of some carnivore species is additive and that population persistence is dependent on unharvested source areas. In Alberta, cougars (Puma concolor) and wolves (Canis lupus) have been managed as game animals since the end of bounty programs in the 1960s. For the past 50 years, wolves have been subject to liberal harvest regimes, with long hunting and trapping seasons, no quotas, and no hunting license required for resident hunters. More limited in their distribution, cougars are managed with a strict quota system. Over the past 20 years, we have documented substantial increases in the density of wolves across Alberta, and increases in both the density and distribution of cougars. Wolves are believed to be the proximate cause of declines in woodland caribou across Alberta, and cougars have begun to reoccupy their former range in prairie and parkland habitats and appear to be expanding into the boreal forest. Densities of both species are substantially higher on provincial lands than in adjacent National Parks, where they are fully protected. While management of these species may cause temporary, small scale disruptions in social behaviors, our experience suggests that at the population level, cougars and wolves are highly resilient to harvest.

SY60 Weber, M.; Alberta Innovates; *Marian.Weber@albertainnovates.ca*

Carbon Offsets and Habitat Conservation - will the goose lay a golden egg?

To what extent can biological carbon markets leverage biodiversity conservation opportunities? This talk will explore the potential externalities (both positive and negative) associated with carbon offset markets within the context of how profitable opportunities for forest carbon sequestration may overlap or conflict with other conservation objectives. The integration of carbon offsets with other conservation markets will be examined with an emphasis on how this issue is handled in other jurisdictions and implications for boreal forest conservation in Canada.

24.7 Weber, T. C.*; Allen, W. L.; The Conservation Fund; *tweber@conservationfund.org*
Integrating Conservation and Restoration Planning Into Highway and Pipeline Environmental Mitigation and Stewardship
Construction of roads, railroads, pipelines, powerlines, and other infrastructure fragments and degrades ecosystems and habitat throughout the world. Unfortunately, environmental mitigation of projects such as road or pipeline construction is often opportunistic, misses broader landscape contexts, and has a low benefit-cost ratio. The Conservation Fund developed a "green infrastructure" approach to environmental mitigation and stewardship that: (1) solicits feedback from stakeholders; (2) reviews pertinent literature; (3) identifies species and ecosystems of concern; (4) models habitat of focal species and ecosystems using maximum entropy and other approaches; (5) models and validates a conservation network of high-quality wildlife and plant habitat (core areas), large contiguous natural areas (hubs), and linkages to facilitate wildlife movement and gene flow (corridors); (6) characterizes and ranks elements of this network at multiple scales; (7) identifies high priority areas for conservation and restoration; (8) assesses potential projects in the field; and (9) identifies the best suite of projects with a given budget, using benefit-cost optimization. We will illustrate this process with two examples: (1) identifying and evaluating natural resource stewardship opportunities in watersheds potentially impacted by construction of a highway bypass; and (2) designing and coordinating endangered species mitigation for maintenance of a 25,000 km gas pipeline network.

P1.142 WEBLER, THOMAS; DAVIDAR, PRIYA; SHOCKEY, INGRID*; YOGANAND, K; SERI, PONDICHERRY UNIVERSITY, WORCESTER POLYTECHNIC INST, A-TREE; *twebler@seri-us.org*
Vulnerability of forest-dependent communities to biodiversity conservation actions: The case of Mudumalai Tiger Reserve, Southern India
In 2008 India's Mudumalai National Park and Wildlife Sanctuary was upgraded to a Tiger Reserve. The entire Sanctuary (321 km2) was designated core habitat, meaning that all human habitation and extractive activity is prohibited. It is likely that portions of reserve forests adjoining Mudumalai will be designated "buffer zones," meaning that human uses will be curtailed. Previous studies have documented that local residents rely a great deal on these reserve forests for subsistence and economic income. Consequently, they appear to be susceptible to impacts from these possible policy changes. We used rapid vulnerability assessment to document the stresses associated with regulatory change facing individuals in communities adjoining Mudumalai. The technique enables researchers to explicate how a stressor (in this case, regulatory change) impacts affected parties differently because of differing sensitivities to equivalent exposures and due to unequal capacity for adaptive actions. All impacts are not negative. The technique also allows us to investigate the possibility that new opportunities, such as enhanced eco-tourism, may create lasting benefits. We discuss how this information could be used by conservation managers interested in minimizing the negative impacts to livelihoods while still achieving their biodiversity conservation goals.

23.6 Weclaw, P.*; Hubbs, A.; University of Alberta, Government of Alberta; *pweclaw@ualberta.ca*
The science behind successful conservation - modeling population dynamics of an endangered species in a changing world
The boreal population of woodland caribou is listed as threatened under the federal Species at Risk Act (SARA). A variety of natural and anthropogenic factors, which may impact caribou populations, act cumulatively in space and time. We employ a computer simulation model as a tool for the assessment of these complex cumulative effects. First, we estimate the natural range of variability for caribou population dynamics and argue that, in natural ecosystems, caribou can coexist with uncontrolled wolf populations. Next, we examine the impacts of cumulative effects of industrial activities and natural disturbances. Based on our analysis, we propose actions that should result in stable caribou populations and allow for industrial activity within caribou ranges. In simulation experiments, we illustrate the importance of key scientific concepts (e.g., functional response curve) as fundamental drivers for wildlife management and successful conservation. We suggest key research areas where future studies should be focused to advance the ecological theory that is critical for successful conservation of threatened species. Our findings shed new light on the current understanding of predator - prey dynamics and the role of predation in limiting or regulating ungulate populations under a spectrum of cumulative effects, concepts critical in conservation biology.

13.7 Weinbaum, KZ*; Golden, CD; Brashares, JS; Getz, WM; Dept. of Environmental Science, Policy & Mgmt, University of California, Berkeley; *kzw@berkeley.edu*
Sustainability assessment of wildlife harvests: a systematic review
The direct exploitation of wildlife for human consumption is a threat to global biodiversity and to the humans who depend on it. In theory, wildlife is a renewable resource whose regenerative capacity should allow some level of offtake. Milner-Gulland and AkÃ§akaya (2001) call attention to the fact that sustainability indices used most commonly "do not perform well under realistic conditions", and yet little work since has been done to evaluate current efforts in the field. We conducted a systematic review of the empirical work to date to ask (1) what indicators are being used to assess the sustainability of wildlife harvesting, (2) are there regional biases in indicator use, (3) are certain taxa more prone to unsustainability, and (4) is there correlation between sustainability indicator and evaluation outcome? We find that the (i) Robinson-Redford (1991) index, (ii) population growth models, (iii) population size over time, and (iv) comparing population abundances across space are the most commonly used indicators, even though at least two (i, iv) have received heavy criticism. Primate harvests tend to be unsustainable across studies, while reptiles and rodents tend to be sustainably harvested (GLMM; all p

P1.153 Weir, Jackie N.; Soulliere, C.E. ; Gullage, Steve; Mahoney, Shane P.*; Department of Environment & Conservation, Government of Newfoundland & Labrador, St. John's, NL A1B 4J6, Canada; *colleensoulliere@gov.nl.ca*

Caribou reactions to human infrastructure and activity in Newfoundland, Canada: Potential cumulative and interactive effects

Anthropogenic changes to the landscape have long been known to affect caribou (Rangifer tarandus) populations throughout their range. Since the 1970s, several studies have been conducted in Newfoundland, Canada, to assess the effects of such changes on the insular woodland caribou. Newfoundland caribou show an avoidance of infrastructure and activity associated with resource extraction and direct human disturbance. Resource extraction reduces caribou habitat directly by removing it or altering its composition and displaces caribou 3-9 km beyond the footprint of development and may induce changes to the timing of seasonal migrations. In some cases these effects persist for multiple years after infrastructure construction ceases. Direct disturbance through human encounter induces a flight response; snowmobile disturbance induces a flight of 60-237 m, pedestrian disturbance in summer induces a flight response of 50-135 m. All avoidance and flight responses have energetic consequences for caribou, potentially influencing productivity, survival and recruitment. Cumulative and interactive effects energy expenditures, degradation of habitat and functional habitat loss are expected as Newfoundland's interior resources are subject to increasing interest following the drastic and prolonged reduction in coastal resource industries.

SY68 Well, JV; Roberts, DL*; Carlson, M; Cheng, R; Boreal Songbird Initiative, Canadian Boreal Initiative, Global Forest Watch Canada; *droberts@intlboreal.org*

Boreal Opportunities: Expanding conservation prioritization principles to capture forgotten biomes

Prioritizing ecosystems for conservation based on measures like species richness, endemism, rarity, and endangerment have focused global conservation attention on < 10 percent of global terrestrial areas mostly within tropical biomes. While protecting such hotspots is critically important to biodiversity conservation, other regions with highly valuable, important, and irreplaceable conservation values are often not recognized, protected or managed. We apply new ways of assessing conservation value in North America's Boreal Forest region, which covers 1.5 billion acres and contains the world's largest intact original forest. This region supports the most abundant bird populations in North America as well as the world's largest remaining populations of wolf and caribou. Ecosystem services provided by the Boreal Forest region are estimated at $90 billion. The peatland and forest ecosystems of the Canadian Boreal store an estimated 186 billion tons of carbon. The Boreal's vast unfragmented landscapes, meanwhile, will likely be important for adaptation for plants and animals impacted by climate change. A broader accounting of conservation values of ecoregions is vital to implementing conservation actions that maintain a full complement of biodiversity values and healthy ecosystems that support sustainable human communities.

SY52 Welsh-Rodriguez, CM*; Ochoa Martinez, CA; Tejeda Martinez, A; Veracruz University; *cwelsh@uv.mx*

Sea level rise planning in the state of Veracruz, Mexico

The state of Veracruz represents one of the most vulnerable places in the Gulf of Mexico to sea level rise. Veracruz University, with funds from the U.K. Global Opportunities Fund, developed the Veracruz Action Plan on Climate Change with the strong alliance of the National Autonomous University of Mexico (UNAM) and the Ecology Institute (INECOL). This plan includes selected studies to show the vulnerability from the biophysical systems and the impacts on the economy and society. As a result of the vulnerability studies and with public participation, Veracruz University delivered a strategic plan to the Veracruz Government in order to establish a state public policy on adaptation and mitigation for Veracruz. In the strategic plan, sea level rise was examined from a broad perspective; as a regional impact on the productive system and society, as a risk factor to the power industry, and as a driving factor of change on biodiversity. As a result, methodological guidelines have been designed to develop regional action plans on climate change in Mexico. The planning process models in Veracruz were far from ideal; the society, the government, the industry, the producers, and all the stakeholders did not share concerns or an objective that helps to build an accurate action plan to adapt Veracruz to the new reality on climate change.

P1.62 Wendland, KJ*; Volker, R; Lewis, D; Ozdogan, M; University of Wisconsin-Madison, University of Puget Sound; *kwendland@wisc.edu*

Local context and forest outcomes: The role of regional heterogeneity in explaining resource management results in Russia

A fundamental challenge in natural resource management is designing appropriate institutions to provide society's desired economic and ecological outcomes. After the collapse of the Soviet Union in 1991, the Russian Federation followed neoclassical economic arguments and decentralized forest management and privatized forest use. At the same time Russia transitioned to a new political system and a market economy. The outcomes of these changes contradicted economic theory: timber production and ecological integrity declined while illegal logging increased. In this research we provide a descriptive understanding on how regional political and economic arrangements mediated institutional change in Russian forest management, resulting in differential outcomes across space. We construct a panel dataset on regional timber utilization and management, timber enterprises, forest agency capacity, and transparency and corruption measures from 1992 to 2005. We use this data to examine forest outcomes and to inform causal hypotheses on the role that regional heterogeneity played in these results. These hypotheses will be used in the future to modify traditional forest management models and tested using remote sensing data on harvesting decisions. Understanding how contextual factors mediate natural resource outcomes is important as countries consider decentralization, market-based incentives, or new property rights arrangements.

2.2 Westgate, MJ*; Driscoll, DA; Lindenmayer, DB; Australian National University; *martin.westgate@anu.edu.au*

Testing hypotheses relating to fire effects on an amphibian community

While amphibian species are generally considered to be behaviourally adapted to avoid post-fire effects, there is evidence that fire frequency may influence amphibian communities. However, studies which quantify the effect of fire at the community level are rare, which is unusual given that fire can impact species already at risk from ongoing declines. We tested whether terrestrial or aquatic habitat, and two fire variables (frequency of fire over 30 years, and burning in a single wildfire) contributed to variation in species occurrence, richness, or assemblage structure. Species richness was not influenced by either fire variable, but assemblage structure was significantly correlated with fire frequency, among other variables. Further analysis showed that this result was due to the response of a single, uncommon species. Aquatic habitat variables were more commonly selected, and explained higher proportions of variation, than fire variables in most models. Our results suggest that large ponds, with long hydroperiods and well developed riparian vegetation, disproportionately contribute to species richness and variation in assemblage structure in this community. Management would be better focussed on conservation of these attributes than on maintenance of particular fire regimes.

P2.159 Wheatley, M*; Fisher, J; Gould, J; Alberta Parks Division, Sustainable Ecosystems, Alberta Innovates; *matthew.wheatley@gov.ab.ca*

Biodiversity Research in Large Protected Areas: Balancing Rare and Common Elements.

As landscapes are increasingly developed, conservation of biodiversity often relies on protected areas. Understanding this reliance requires research relevant not only to the park itself including rare elements of low detectability (often the ones of most conservation concern), but should also enable assessments of a park's broader ecological role. Because these two objectives commonly conflict, we examine associated trade-offs by implementing a novel biodiversity sampling program in the mountainous 460,000 ha Willmore Wilderness Park in west-central Alberta, Canada. Focusing on vascular plants, songbirds, and carnivores, and building upon methods developed by the Alberta Biodiversity Monitoring Institute (ABMI), we examine how combinations of systematic and stratified sampling can be used to target rare elements of biodiversity, and how these designs affect measures of overall biodiversity. Preliminary results show our techniques facilitate comparisons of park-specific biodiversity to that of the surrounding working landscape, and we provide recommendations to increase one's ability to detect rare species. We also discuss how our results are being integrated into major Provincial land-use planning including evidence-based decision tools for park-specific management.

SP1.6 White, J B*; Arp, P; Ogilvie, J; Government of Alberta, University of New Brunswick; *barry.white@gov.ab.ca*

Alberta's Wet Areas Mapping Initiative: a Cost Effective and Innovative Approach to Facilitate Conservation Strategies

Riparian and other wet terrestrial habitats and aquatic systems are significant contributors to biodiversity. However, poor understanding of their precise location and distribution across complex landscapes often constrain implementation of effective conservation strategies. The requirement for these strategies is ever more important in Alberta given the accelerated rate of industrial development. Innovative planning solutions that are economic, timely and ensure positive conservation outcomes are urgently needed by land managers. Accordingly, the Province of Alberta has been working closely with researchers at the University of New Brunswick to refine a depth to water table mapping tool for Alberta's landscapes. Computer generated maps predict the location of small water bodies such as ephemerals, as small as 10cm in width, and wet areas which are currently not known to resource planners but yet are sensitive to disturbance. The mapping process incorporates newly acquired light and distance ranging (LiDAR) data to produce maps of superior quality with a resolution of 1m. Efforts are underway to map 17 million hectares of primarily forested lands in the foothill and boreal regions of Alberta. These innovative maps, unique to Alberta, are expected to significantly enhance stewardship of Alberta's landscapes and aid development and implementation of conservation strategies.

SA2 Whitehead, AL*; Leathwick, JR; Elliott, GP; McIntosh, AR; University of Canterbury, New Zealand, National Institute of Water and Atmospheric Research, New Zealand, Department of Conservation, New Zealand; *amylouisewhitehead@gmail.com*

Get more ducks for your bucks: tools for prioritising conservation management of threatened species

Conservation frequently requires immediate responses to prevent further declines of threatened populations, often in the absence of detailed information. Consequently, population distributions are often used to guide conservation decisions. However, such patterns may be misleading if threats have restricted species to low quality habitat, meaning it is not always apparent where conservation should be targeted for maximum gain. Our aim was to improve conservation effectiveness by examining this issue in whio, a rare New Zealand duck. We used modelling to answer 3 questions: 1) what are the threats to whio, 2) how can these threats be managed, & 3) managing which whio habitats will give the biggest conservation gain? A spatial analysis of current whio habitat revealed large range losses, with predation more important than habitat modification. Monitoring found stoats the primary cause of whio declines, while population viability analyses showed untrapped whio populations were at high risk of extinction. Predator control was useful for short-term whio conservation, but trapped populations still declined & further intervention is needed to prevent whio extinctions. Analysis of fitness-habitat relationships found that South Island whio occurred more often in poor habitat, indicating they may occupy a relict distribution. Our approach will improve threatened species conservation by quickly informing managers in situations where distributions may not follow habitat quality.

12.7 Whittington, Jesse*; deCesare, Nick; Robinson, Hugh; Bradley, Mark; Neufeld, Layla; Musiani, Marco; Hebblewhite, Mark; Parks Canada, University of Montana, University of Calgary; *jesse.whittington@pc.gc.ca*

Population Viability Analysis of Translocation-Assisted Woodland Caribou Recovery

Caribou in Banff and South Jasper National Parks face an uncertain future given that an avalanche killed most if not all caribou from Banff in 2009 and two of three sub-populations in South Jasper contain less than ten animals. Declining densities of elk and wolves may result in conditions more suitable for caribou persistence. Here we used a population viability analysis to assess the likelihood of caribou persistence in Banff, Brazeau, Maligne, and Tonquin with and without translocation-based management. We used population-specific survival rates and pooled calf-cow ratios to create a female-based projection matrix. We simulated population projections for 20 years using estimated process variance, demographic stochasticity, and three years of post-translocation survival rate depression. Our results suggested the Tonquin caribou are likely to remain viable for the next 20 years without management action. However, almost certain extirpation is predicted for the Brazeau and Maligne. With translocations, the addition of 45 female caribou into Banff, Maligne, and Brazeau resulted in a 50-97%, 22%, and 5% chance respectively of > 8 caribou after 20 years. Thus, Banff may be the preferred destination for caribou translocation. Population persistence depended strongly on estimated survival rates and post-translocation survival rate depression; therefore prognosis could improve for each sub-population if lower elk and wolf densities result in increased survival rates. Given limited resources and source populations of caribou, caribou recovery efforts should be prioritized from both regional and provincial scales.

SY41 Wilkinson, E; Branch, LC; Stoddard, MA*; Bird, BL; University of Florida, Oakland County Parks, MI; *mstodd@ufl.edu*

Light alters movement of beach mice at the patch and landscape scales

Effects of artificial light in coastal systems are poorly understood except with respect to sea turtles. Beach mice (Peromyscus polionotus spp.) are vulnerable to habitat loss from hurricanes, development, and introduced predators, and these factors likely are exacerbated by artificial light because light increases risks associated with moving across open landscapes. To project how artificial light might influence Santa Rosa beach mouse movement at the landscape scale, we used foraging paths to evaluate the effect of natural light levels (new vs. full moon) on: 1) width of open sand gaps crossed by mice during foraging, 2) size of resource patches, and 3) landscape context of foraging. Moonlight had a strong, negative effect on foraging activity of beach mice. Gap width crossed was similar under all conditions, but average size of patches visited was smaller during full vs. new moon periods, likely reflecting the need for animals to maximize cover from predators. Mice left dunes over a narrower range of angles during full moon periods, indicating they restrict foraging to certain parts of the landscape when perceived risk is high. Our results reinforce earlier research showing increased light (artificial or moonlight) restricts foraging time in beach mice and emphasize the importance of including coastal lighting in conservation planning for terrestrial species.

SY71 Willcox, Louisa L; MacFarlane, Wally*; Natural Resources Defense Council, Geo/Graphics; *lwillcox@nrdc.org*

A Perfect Storm for Yellowstone Grizzlies: Climate Change, Beetles and the Collapse of Whitebark Pine Forests

The seeds of whitebark pine (Pinus albicaulis) are critically important to the health of Yellowstone's grizzly bear (Ursus arctos) population. Whitebark pine forests of the Greater Yellowstone Ecosystem (GYE) are threatened by mountain pine beetles (Dendroctonus ponderosae), global warming, and white pine blister rust (Cronartium ribicola). The likely harmful impacts to Yellowstone's grizzly bears from a significant loss of whitebark pine have been well documented. GYE whitebark pine forests have experienced an unprecedented outbreak of mountain pine beetles due to warming temperatures. In 2009, the Forest Service contracted with GeoGraphics to conduct the first-ever comprehensive assessment of beetle activity in the GYE; Natural Resources Defense Council contributed to this project. The survey used geo-referenced aerial photography to evaluate mortality at a sub-watershed scale. We found that roughly 50% of sub-watersheds have experienced high levels of whitebark pine mortality, and demonstrate the need for immediate, meaningful management responses to ensure a healthy future for Yellowstone's grizzly bears. The recent restoration of U.S. Endangered Species Act protections for Yellowstone grizzly bears can facilitate: 1) reconstituting grizzly bear management to foster adaptive responses; 2) improving efforts to reduce grizzly bear mortality; and 3) expanding the Recovery Area to compensate for whitebark pine losses.

1.2 Williams, BW*; Proctor, H; Coltman, DW; Department of Biological Sciences, University of Alberta; *bwwillia@ualberta.ca*

Molecular Characterization of a Crayfish Invasion

Freshwater crayfish have gained a reputation as effective invaders, with many reports of damaging effects on diversity and ecosystem function when introduced outside of their native ranges. The distribution of the northern crayfish, Orconectes virilis, in Alberta, Canada, was previously restricted to a small area of the Beaver River drainage. Recent collections reveal a rapid invasion of crayfish into previously unoccupied watersheds throughout Alberta. Our objective was to determine whether this spread was due to human introductions or to natural, albeit exceedingly rapid, range expansion. We used DNA sequences and newly developed microsatellite markers to identify regional and within-river genetic patterns that can be used to infer mechanisms of movement. Results were unexpected: we found that the invasion of northern crayfish into Alberta involves two genetically distinct lineages. Crayfish in the southern part of the province are genetically the same as O. virilis sensu stricto from the United States, and were likely introduced by human actions. Crayfish in more northern watersheds are genetically distinct, and may represent a previously unidentified species. These latter crayfish appear to be spreading mainly via natural dispersal. The combination of human and natural spread raises pragmatic questions about appropriate responses by managers to these new members of Alberta's biodiversity.

P1.134 Williams, E. R.*; Erskine, P. E.; Mulligan, D. R.; Plowman, K. P.; Centre for Mined Land Rehabilitation, The University of Queensland, Biodiversity Assessment and Management Pty Ltd; *e.williams@cmlr.uq.edu.au*

Ants as Bioindicators of Rehabilitation Management Practices on the World's Second Largest Sand Island, North Stradbroke Island, Australia

North Stradbroke Island, on the east coast of Australia, is the second largest sand island in the world. It has a multitude of vegetation types and a number of nationally threatened ecosystems. Additionally, several rare or vulnerable animal species inhabit the island. Despite this, 70% of the island is under sand mining lease and 20% of the island has been disturbed by mining operations. As required under Australian legislation, mined land is rehabilitated post-operation with remedial procedures to ensure that re-established ecosystems proceed towards specific completion criteria. Typically, biotic recovery is monitored solely by vegetation surveys. In this research, ants were used as bioindicators to assess management practices in mine-site rehabilitation. This research aimed at identifying whether the practices targeted at improving vegetation parameters caused a detrimental impact on another biotic component. Results indicate that the current vegetation management procedures employed on rehabilitated sites may only have a short-term impact on the ant fauna of North Stradbroke Island. It also suggests that these ant communities in the rehabilitation were relatively resilient to fires and clearing despite the overall community being in a recovery phase. Furthermore, ant communities did not precisely reflect vegetation response in this study, demonstrating that more than one biological indicator would be valuable in monitoring studies.

SY72 Williams, Jamie; Love, Eric*; The Nature Conservancy, Trust for Public Land; *jwilliams@tnc.org*

Rethinking the scale of private land conservation - conservation finance and the Montana Legacy Project

This presentation will focus on a real-world example of taking private land conservation to scale to protect large-scale ecosystems for the benefit of wildlife and people. The lessons of island biogeography, climate change, and local people looking for real conservation solutions have all converged on the need to protect large, connected landscapes, but conservation efforts often lack the tools or funding to get to scale before urgent threats close the window of opportunity. Responding to the vast turnover of American forest lands over the last decade, many private/public partrnerships have now sprung up and taken action, mobilizing unprecdented private and public resources to sustain large working forests critical for conservation and community well being. One such project is the 310,000-acre Montana Legacy Project where local resident in Montana's Swan, Clearwater, and Blackfoot valleys came together with conservation groups and public agencies to acquire and protect forestlands that stitch together entiure valleys for wildife connectivity in the Crown of the Continet region surrounding the Bob Marshall Wilderness and Glacier-Waterton Parks. A look at the history of how local, collavorative efforts evolved into transfotrmational conservation work may suggest some lessons learned for how this kind of work could be accomplished more broadly.

P2.189 WILLIAMSON, LP*; Johnson, CJ; Seip, DR; Parker, KL; University of Northern British Columbia, Department of Natural Resources and Environmental Studies, Prince George, BC, V2N 4Z9, Canada, Wildlife Ecologist, British Columbia Ministry of Forests, Prince George, BC, V2L 1R6, Canada; *williame@unbc.ca*

Impacts of Industrial Development on Habitat Selection of Wolves and Woodland Caribou in the South Peace Region of BC

Since the early 1990's, regions surrounding the Peace River in Northeastern British Columbia have experienced rapid land-use change from resource extraction activities, in addition to large-scale commercial agriculture and forestry developments. Woodland caribou (Rangifer tarandus caribou) are thought to minimize predation risk by selecting habitats that spatially separate them from predators. Landscape change has altered this relationship and caribou are now threatened by increased predation as a result of apparent competition. My principal research goal is to understand factors influencing seasonal wolf (Canis lupus) distributions relative to areas of high-quality habitat for northern woodland caribou using Resource Selection Functions (RSFs) and count models. Because caribou herds within the study area prefer wintering in a variety of habitats, I will also quantify the seasonal variation in wolf distributions in the context of herd-specific wintering strategies. My study will provide new insights on wolf-caribou interactions that may be applicable to other wildlife negatively influenced by increasing human disturbances and apparent competition.

P2.110 WILLIS, EL*; Kersey, DC; Durrant, BS; Kouba, AJ; Memphis Zoo, Department of Conservation and Research, Western University of Health Sciences; Smithsonian's National Zoological Park, Conservation and Research Center, San Diego Zoo's Institute for Conservation Research; *ewillis@memphiszoo.org*

Development of a non-invasive urinary assay for the determination of pregnancy status in the giant panda (Ailuropoda melanoleuca)

Female giant pandas experience a phenomenon known as pseudopregnancy after ovulation, during which a non-pregnant female exhibits physiological changes similar to those observed during pregnancy. For many mammalian species, reproductive hormone patterns clearly differentiate the pregnant from non-pregnant state. However, pregnancy cannot be diagnosed in the giant panda by hormone monitoring as the patterns are invariable between pregnancy and pseudopregnancy. Among species of Canidae, a family of carnivores that similarly experiences obligate pseudopregnancy, phase proteins have been successfully utilized to differentiate pregnancy from pseudopregnancy. Therefore, in this study we evaluated enzymatically active urinary ceruloplasmin (EAUC), a phase protein, in four adult female giant pandas. Urine was collected (3-7d/wk) throughout 15 reproductive cycles. Results revealed a distinct increase in EAUC during pregnant compared to known pseudopregnant states. Furthermore, among term pregnancies, EAUC was elevated one week following mating/artificial insemination and remained elevated until 20-23 days prior to parturition. This study provided the earliest method to determine pregnancy in captive giant pandas and the first non-invasive physiological assay to diagnose pregnancy. This technique may also be applicable for monitoring the reproductive status of wild populations using ceruloplasmin excreted in feces.

SY28 Wilmers, CC*; Estes, JA; Laidre, KL; Edwards, M; UC Santa Cruz, U. of Washington, San Diego State U.; *cwilmers@yahoo.com*

Can predators reduce atmospheric CO2 through trophic cascades?

Top predators, by suppressing herbivores, often have positive indirect effects on plant biomass. Plants utilize CO2 in photosynthesis and store most of the earth's non-fossilized organic carbon in their living tissues, detritus, and in the tissues of their consumers. This suggests that predators can ultimately increase NPP, thereby decreasing atmospheric carbon. Here we analyze the impacts of sea otters on carbon NPP and sequestration. We find that sea otters, by suppressing herbivorous sea urchins, increase kelp biomass 100-fold, resulting in a 31 to 50 TgCyr-1 increase in NPP and a 10 TgC increase in carbon sequestered by living kelps. These increases represent 34-55% (NPP) and 11.4% (living kelp) of the carbon contained in the atmosphere above the North American sea otter range or 136-220% (NPP) and 44% (living kelp) of the increase in atmospheric carbon since pre-industrial times, and the sea otter-induced increment in just the living kelps has a present day value of over $700 million on the European Carbon Exchange. Populations of large predators have been extensively depleted or lost throughout much of the globe. These losses probably substantially altered the rates of carbon flux through global ecosystems. The conservation and restoration of large predators might thus have indirect ecological effects that will figure prominently in the future trajectories of atmospheric CO2 concentration and global climate change.

SY31 Wilmshurst, JW*; Bradley, M; Whittington, J; Theberge, J; Dibb, A; Casimir, D.; Hebblewhite, M; Parks Canada, University of Montana; *john.wilmshurst@pc.gc.ca*

Conserving Southern Mountain Caribou in Canadian National Parks

We have identified five threats to the persistence of Southern Mountain Caribou in the national parks of British Columbia and Alberta; habitat destruction, predator-prey dynamics, facilitated predator access, direct human disturbance and small population effects. With the loss of the Banff National Park caribou herd in 2009 during an avalanche, conservation efforts for all southern mountain caribou in national parks have taken on renewed urgency. Current actions include winter trail closures to prevent facilitated access to caribou habitat by wolves, prohibiting domestic dogs on hiking trails in caribou habitat, lowering automobile speed limits in high caribou collision areas and reduction of wolf primary prey to reduce apparent competition with caribou. The effectiveness of these programs in addition to population dynamic monitoring and modeling have suggested that future actions should include continued reduction of wolf (and bear) primary prey (elk and deer) numbers adjacent to caribou habitat and translocation of caribou into the now vacant habitat in Banff National Park. Southern Mountain caribou populations are declining across their range, and we present how we our actions can reverse this trend within the Canadian mountain national parks.

P2.196 Wilson, JW*; Fay, JP; Haddad, NM; Biology Department, Campus Box 7617, North Carolina State University, Raleigh, NC 27695, USA , Nicholas School for the Environment, Duke University, Durham, NC 27706, USA; *johnnybirder@gmail.com*

Considering connectivity in prioritizing reintroduction sites for threatened species

Connectivity enables organisms to disperse among habitat patches. Despite being critical for the persistence of many threatened species, connectivity has been neglected in reintroduction efforts. We propose techniques that consider connectivity in selecting reintroductions sites. Using a graph-theoretical approach in a GIS framework, we analyze regional patch dynamics of the St. Francis' Satyr Neonympha mitchellii francisci, a federally endangered species globally restricted to Ft Bragg, NC. We conduct analyses using (a) limited ecological data and (b) species-specific biological information. For each analysis we identify functionally distinct population networks over our study species' entire range, and those habitat patches that act as critical stepping-stones (i.e. facilitate connectivity) within each population network. We prioritize reintroduction sites based on the relative contribution of unoccupied stepping-stones to each population network's connectivity. Models suggest that the St. Francis' Satyr persist as five distinct population networks. We identify the priority reintroduction site as the unoccupied stepping-stone connected to the greatest number (18%) of dispersal routes. By selecting highly connected reintroduction sites, we increase opportunities of reintroduced populations to disperse to unoccupied habitat over the medium term. Over the long term connectivity will enable reintroduced populations to adapt their ranges under changing environment.

SY13 Wilson, K.A; Boitani, L; Chiozza, F; Evans, M.C*; di Marco, M; Possingham, H.P; Rondinini, C; The University of Queensland, Sapienza UniversitÃ di Roma; *k.wilson2@uq.edu.au*

Prioritising conservation investments for mammal species globally

Priorities for conservation need to be set because we cannot do everything, everywhere, at the same time. Our aim is to determine priority areas for investment in threat abatement actions for mammals globally, in both a cost-effective and spatially-explicit manner. We estimate the cost of actions based on the known threats to each mammal. We also evaluate the likelihood of success of these investments, using global indicators of governance and country stability, and factor this into the prioritization analysis. We account for the interactions and dependencies between conservation actions - that is, account for the joint contribution of threat abatement activities to multiple species in the same region, and the fact that some species may require investment in multiple conservation actions to persist. We show that by prioritising investments in this way we deliver more cost-effective investment portfolios then when prioritising each species based on their threat category, by identifying sites for reservation regardless of the threats that the species face, or by assuming that conservation actions act independently. We conclude that information about the threats to species and the locations where they occur is essential for determining the actions required to ensure their persistence, but are not an appropriate basis for prioritising conservation investments.

P1.170 Wilson, KT*; Lehman, SM; University of Toronto; *katy.wilson@utoronto.ca*

Quantifying the extent of edge effects on mid-altitude humid forest structure of southeastern Madagascar using spatially explicit techniques.

Modern forest landscapes are characterized by fragments where edges are the norm. This is particularly evident in Madagascar as it has lost 80-90% of its original vegetative cover and the remaining forest is highly fragmented. Edge effects penetrate the forest to varying degrees resulting in ecological boundaries. The composition of boundaries may not resemble that of either the interior or the edge environment, altering the flows of energy and affecting species distributions. Moving split-window and lattice-wombling are spatially explicit techniques that are reliable in their detection of boundaries. These methods were applied to dendrometric data collected from mid-altitude humid forest in southeastern Madagascar. The two methods provided comparable results. The edge influenced the interior forest from 300-m up to 900-m and produced gradual and sharp boundaries. The orientation and type of edge as well as the inclination of the terrain contribute to the depth at which the edge environment penetrates the interior, as well as the resulting type of boundary created. This study has important implications to the management of the remaining forests of Madagascar as conservation efforts may be tailored depending on the structure of the edge environment and the degree to which it penetrates the forest interior.

P2.120 Windels, SK; Voyageurs National Park; *steve_windels@nps.gov*

Monitoring the Ecological Effects of Lake Level Management on Voyageurs National Park Using Beavers (Castor canadensis)

Water levels and flow regimes of the international waters of Rainy Lake and the Namakan Reservoir on the Minnesota-Ontario border have been controlled by several private dams since the early 1900s. Voyageurs National Park, MN contains more than 27% of these water bodies. In response to documented ecosystem degradation, the International Joint Commission (IJC) issued the 2000 Rule Curves to mimic a more natural water cycle, particularly in reducing the winter drawdown in the Namakan Reservoir. Beavers (Castor canadensis) in lake environments are especially sensitive to fluctuations in water levels, particularly changes that occur after lodge sites have been established in late fall. Therefore, beavers were selected as one of a suite of indicators for assessing the ecological effects of the new hydrologic regimes. Several aspects of beaver ecology were studied from 2004-2009 to compare with similar data collected in 1984-1986 during the previous water level management regime (i.e., the 1970 Rule Curves). Beavers appear to have deeper and more stable access to water during the winter drawdown at present than during the 1970 Rule Curves. Consequently, beavers spent more time inside their lodges versus outside of the lodge during the winter than before the changes in 2000, which has implications for beaver energetics and predation risk. Other aspects of beaver ecology related to water level management, including body condition, reproduction and survival, and availability of aquatic forages will be discussed.

P2.23 Wippich Whiteman, C.*; Saldanha, N.; Oliveira, E.C.; Ramos do Carmo, A.; Brazilian Institute of the Environment and Natural Renewable Resources ; *whitemanchristina@hotmail.com*

Mining activity licensing and wildlife management in the Eastern Brazilian Amazon

In the Estearn Brazilian Amazon, state of ParÃ¡, there are important sites of interest for mining. Many, for instance, concentrate in the CarajÃ¡s region, where there is a mosaic of five very important protected areas, and mining activities may be developed, under the approval of Brazilian government environmental agencies. In the year 2009, the Ibama (Brazilian federal wildlife authority) unit located in MarabÃ¡, state of ParÃ¡, received 11 requests for fauna impact studies/survey, fauna rescue or monitoring projects related to the licencing of mining activities. An evaluation based on the analysis of such requests was performed. Positive aspects involved the biodiversity data generated through these studies, logistics and equipment offered by mining companies for general wildlife studies and academic/teaching opportunities emerged through the projects. Negative aspects involved a deficiency of knowledge and procedure patterns regarding fauna rescue in this context; lack of patterns between deforestation and fauna rescue procedures, and its field inforcement; and scarce information on the real loss of biodiversity caused by the mining activities. Moreover, a critical problem was the effect of political pressure of large mining companies on the governemnt to utilize conservation zones inside protected areas, as well as to utilize protected areas where such activities are not legally allowed.

SY41 Wise, Sharon*; Buchanan, Bryant; Dawes, Patrick; Racchumi, Joelle; Rohacek, Alex; Utica College; *swise@utica.edu*

Impacts of Artificial Night Lighting on the Behavior of Nocturnal Salamanders

Artificial night lighting (ANL) is of increasing concern as human habitation encroaches into natural habitats. The effect of ANL on amphibians has not yet been widely studied. We examined the impact of ANL on the nocturnal activity of terrestrial salamanders (Plethodon cinereus) in the natural habitat and in the laboratory. These salamanders remain under cover objects during daylight hours and emerge above-ground to forage and mate at night. We hypothesized that ANL affects the nocturnal behavior of salamanders by delaying emergence from under cover objects. We tested this hypothesis using forest transects (N= 12) in which half were dimly, artificially lit (10-2 lx) and six were left dark (10-4 lx). Fewer salamanders were active 1 h after dark in the lighted transects, suggesting a delay in time of emergence. In laboratory experiments in which salamanders were exposed to nocturnal light from 10-4 to 100 lx, we found that salamanders were more active at higher than at lower illuminations when no cover was available, but were less active at higher than at lower illuminations when cover objects were available. Results from the laboratory and field provide evidence that salamanders are avoiding higher nocturnal illuminations, resulting in increased activity when cover is absent and delayed emergence from cover under higher illuminations. Thus, ANL has the potential to alter the normal nocturnal foraging and breeding activity of salamanders.

SP7.6 Witczuk, J*; Griffin, SC; Mills, LS; Museum and Institute of Zoology, Polish Academy of Sciences, Wilcza 64, 00-679 Warszawa, Poland, Wildlife Biology Program, College of Forestry and Conservation, University of Montana, Missoula, MT; *juliawit@miiz.eu*

Non-Native Coyote Predation on Endemic Marmots

Olympic marmots (Marmota olympus) are endemic to the Olympic National Park, Washington State, and studies in 2002-2006 have documented declines and local extirpations of the species. Predation by non-native coyotes (Canis latrans) was shown to account for 33-90% of the mortality at the intensive study sites. We implemented park-wide carnivore scat analysis to determine the spatial extent of coyote predation on Olympic marmots, and the magnitude of coyote predation relative to other carnivore species. Out of 958 carnivore scats collected, 10.3% contained marmot remains. Predator species identification with mtDNA for scats with marmot shown that 85% arose from coyote, 10% from bobcat (Lynx rufus) and 5% from cougar (Puma concolor). Distribution of scat indicated that coyotes were present and preyed on marmots in all studied regions of the park. With frequency of occurrence >10 %, marmot was the fifth most important prey item of coyotes in the Olympic alpine, after snowshoe hare (Lepus americanus), mountain beaver (Aplodontia rufa), voles and cervids. Twelve out of 13 coyote individuals identified with microsatellite markers included marmots in their diet. Overall, occurrence of marmot remains in coyote scats observed could be considered high, especially if relatively low marmot densities are taken into account, supporting the potential for coyote predation to be the main driving factor of the observed marmot declines and extinctions.

SY57 Witten, E*; Loya, W; Smith, M; The Nature Conservancy, The Wilderness Society, Audubon Alaska; *ewitten@tnc.org*

Understanding and reducing the cumulative impacts of energy development and climate change in the Arctic; protecting important subsistence resources for Alaska Natives

Changes we can already see are putting people, economies and nature at risk. In Alaska's arctic subsistence hunting and fishing provide not only sustenance for Alaska Natives, but also form the fabric of their culture. Four decades of oil and gas development in the region has resulted in an extensive network of roads, pipelines, and other infrastructure on portions of Alaska's North Slope that will expand both on-shore and off-shore in coming decades. As the Arctic Ocean becomes increasingly ice-free, new demands for infrastructure to facilitate commerce and defense are expected. Climate change is projected to cause immense changes in the Arctic. In the absence of a comprehensive cumulative effects analysis and strategic plan that ensures adequate habitat protection and minimizes fragmentation, further piecemeal development will likely expand and result in significant environmental impacts on caribou, waterfowl, and other species Alaska Native people depend upon for subsistence. By using a suite of analytical techniques that integrate species and ecosystem values and by incorporating climate change and development scenarios, we can test hypotheses about the direct and cumulative effects of these stressors on Arctic ecosystems and on subsistence resources. By anticipating the effects of energy development and climate change in the Arctic, we can help to maintain the resilience of ecosystems that provide sustenance to - and perpetuate the traditional culture of Alaska Native people.

P1.177 Wittmer, HU*; Corti, P; Saucedo, C; Centre for Biodiversity and Ecological Restoration, School of Biological Sciences, Victoria University of Wellington, P.O Box 600, Wellington 6140, New Zealand, Instituto de ZoologÃ–a, Universidad Austral de Chile, Casilla 567, Valdivia, Chile, ConservaciÃ³n PatagÃ³nica, Patagonia Park, Cochrane, Chile; *heiko.wittmer@vuw.ac.nz*

Learning to count: adapting population monitoring for endangered species to meet conservation objectives

Considerable efforts have been invested in recent years to improve methods for both data collection and analyses required for population monitoring. Where historic or current estimates of population size are not adjusted for detection probabilities, they may be too inaccurate to provide meaningful estimates of trends and thus monitoring methods need to be adapted. Here we use data (collected over 17 years) from the endangered huemul deer (Hippocamelus bisulcus) in South America to outline a framework to develop accurate, robust estimates of detection probabilities that can be incorporated into new surveys in a cost-effective way and applied to existing survey data sets. In particular, by retroactively estimating detection probabilities for huemul surveys, we show that survey methods currently employed are inadequate to reliably determine population trends for this species. Based on these results, we propose a new monitoring method for huemul and discuss the importance of estimating accuracies of historic survey data to ensure that changes in the abundance of the species reflect real population trends and are not an artifact of variation over time in the accuracy of survey data.

16.3 Wittmer, HU*; Corti, P; Saucedo, C; Centre for Biodiversity and Ecological Restoration, School of Biological Sciences, Victoria University of Wellington, P.O Box 600, Wellington 6140, New Zealand, Instituto de ZoologÃ–a, Universidad Austral de Chile, Casilla 567, Valdivia, Chile, ConservaciÃ³n PatagÃ³nica, Patagonia Park, Cochrane, Chile; *heiko.wittmer@vuw.ac.nz*

Conservation strategies for endangered species affected by apparent competition

Predators may disproportionately depredate endangered species sympatric with alternate more abundant prey; an effect called apparent competition. Effective conservation strategies for species disadvantaged by apparent competition may include managing both predator and alternate prey abundances. No quantitative data exist to support this claim. We monitored a population of approximately 40 endangered adult huemul deer (Hippocamelus bisulcus) in Chilean Patagonia from approximately 1.5 years before to 3 years after the almost complete removal of >25,000 domestic sheep. Before their removal, sheep were an important prey species for both pumas (Puma concolor) and culpeo foxes (Lycalopex culpaeus). Using mark-recapture records from >80 deer we show that sex- and age-specific survival rates of huemul decreased substantially (e.g., up to 25% for female fawns) after sheep were removed and an increase in the number of huemul mortalities attributable to predation. Puma and fox densities remained high following the removal of sheep due to continued high alternate prey availabilities, particularly guanacos (Lama guanicoe) and European hares (Lepus europeaus). Based on our results we discuss how effort in alternate prey removal and predator control might be allocated in predator-prey systems that include endangered species affected by apparent competition.

SY61 wolfgang haider; simon fraser university; *whaider@sfu.ca*

A conceptual framework for contributions of the human dimensions research to the climate change debate in protected areas

Human dimensions research is an interdisciplinary field of inquiry in the social sciences with focus on applied research relevant to resource and environmental management issues. As such, its concepts and relevance also bridge to the natural sciences. I will present a conceptual framework that ties several crucial behavioural theories and concepts of the social sciences and economics to the research questions that are crucial in the climate change and adaptation debate. My presentation will relate to the mitigation and adaptation related research needs of protected areas management, and I will provide some case studies.

P1.60 Wondmagegne Daniel; Dawit *; Mekelle University, Woubishet; *wondu97@yahoo.com*

Assessment on the Status and Economic Potential of African Civet (Civettictis civetta) in Tigray Region, Ethiopia.

The problem of wildlife resources exploitation and subsequent threats to wildlife species survival is a matter of great concern to all conservation minded people across the glob. The African wildlife crisis has received greater attention, research and conservation education awareness in recent years throughout the world but only the negative aspects has been highlighted. In realization of this concern, this paper has proposed to do assessment on the status and economic potential of African civet (Civetticts civetta) in Tigray Region, Ethiopia. Conducting in-situ and ex-situ assessment of African civets in Tigray region where traditional civet farming and musk extraction is uncommon but African civets range freely in the wild. A well structured questionnaire was developed and the response of 350 individuals was collected form five zones of the region namely Southern Zone, Eastern Zone, Central Zone, Western Zone and South Western Zone. Direct observation was also conducted to locate the animal, identify its wild habitat, indicates communal latrine sites and marked areas. The study adopts both random and purposive sampling technique. The Zones have been identified purposively and random sampling is used to identify specific Woredas from the selected Zones. Qualitative and quantitative method of analysis used to achieve the stated objective of the study and SPSS was used to analyze the collected data. Females have (90.91%) better knowledge about African civet than males (84.31%). African civet distribution didn't encompass the eastern zone of Tigray and it was manifested by the knowledge of the people towards the animal in the area. Nobody responded positively for the knowledge of African civet in Eastern zone. Muslim religion followers (94.59%) have a better knowledge of African civet than orthodox religion followers (84.03%). The study result indicates no better farming practice thought-out the region was observed and the respondents fail to measure the actual economic benefit of African civet farming in supporting their livelihood. The perception of the society in all parts of the study area is found positive if this farming practice consider as an opportunity, it will create better interventions for government to change the livelihood of the society. Majority of the respondents clearly indicate African civet has economic value and recommended conservation activities are vital to rescue the animal and to ensure the benefit from such farming practice. Finally this study investigated that African civets are ranging freely in the wild but the farming practice is non existent in the region.

P2.17 Wood, CM*; Spence, JR; Langor, DW; University of Alberta, Canadian Forest Service; *cwood1@ualberta.ca*

Saproxylic Beetle Microhabitats Within Logs

Saproxylic (i.e. deadwood-dependent) beetles are a critical component of forest ecosystems and many species are threatened in managed forests of northern Europe due to the loss of deadwood habitats. To assess relationships between saproxylic beetles and their microhabitats, we hand collected and reared beetles from 150 trembling aspen (Populus tremuloides) logs in mature deciduous forests of NW Alberta. Beetles were recorded from microhabitats within each log: upper surface, lower surface, bark layers, under bark, wood, moss and fungus. We collected 151 species; 51% were found in only one log and 78% occurred in just one log microhabitat. Species assemblages differed significantly among log microhabitats (ANOSIM, p

SY76 Wood, CM*; Langor, DW; Spence, JR; University of Alberta, Canadian Forest Service; *cwood1@ualberta.ca*

The Saproxylic Community Requires a Deadwood Buffet

Deadwood is a critical component of forest ecosystems, particularly as habitat for hyperdiverse saproxylic communities. Many saproxylic beetle species have become threatened in the intensively managed boreal forests of Fennoscandinavia. However, we know much less about this fauna for other areas, including North America. To assess saproxylic beetle diversity in unmanaged deciduous forests of northwest Alberta, we employed a variety of collection methods on targeted deadwood habitats. We compared saproxylic assemblages across deadwood positions (standing, fallen), decay class and size. We collected 164 beetle species (4 novel, 26 new provincial records) from a wide spectrum of deadwood habitats, ranging from declining, intact trees to nearly humified wood on the forest floor. Assemblages varied greatly between deadwood habitat types and were less than 20% similar between standing and fallen wood. Three species of saproxylic beetles were significant strong indicators of large diameter (>34cm) downed wood (p

6.7 Wood, EM*; Pidgeon, AM; Radeloff, VC; University of Wisconsin-Madison; *emwood@wisc.edu*

Evidence for Karner Blue Butterfly (Lycaeides melissa samuelis) as a Surrogate Species for the Conservation of Oak Savanna Bird Community Assemblages

At Fort McCoy Military Installation in Wisconsin, USA, the federally endangered Karner blue butterfly (Lycaeides melissa samuelis) is the focal species for a conservation plan designed to create and maintain oak savanna, which is critical habitat for the butterfly. Habitat management for the Karner blue butterfly may influence the habitat of other organisms that use oak savanna. We examined whether Karner blue butterflies act as a surrogate species for the conservation of birds using oak savanna. From 2007 through 2009 breeding bird point count and vegetation data were collected at 243 sample points in six vegetation types spanning an open to closed tree canopy gradient, including Karner blue butterfly managed oak savanna. Univariate and multivariate statistical methods were used to compare vegetation and avian community assemblages. We found that vegetation features of the Karner blue butterfly managed oak savanna were similar to remnant oak savanna and significantly different from woodlands. However, our results suggest that management for Karner blue butterfly creates habitat in which both savanna and woodland associated bird species are found. Our findings indicate that the Karner blue butterfly can act as a surrogate species for the conservation of savanna associated breeding birds.

SY76 Work, Timothy*; Jacobs, Joshua; Doblas-Miranda, EnriquÃ©; Lange, Holger; UniversitÃ© du QuÃ©bec Ã MontrÃ©al, Norwegian Forest and Landscape Institute; *work.timothy@uqam.ca*

A novel approach to biological indicators for assessment of ecosystem management strategies

Natural disturbance based management in boreal forests is judged acceptable if it maintains individual species or communities consistently within an â acceptable' range of natural variability. Often land-managers seek indicators that identifies species that fall outside this range and which is easily interpreted and is consistent with the precautionary principle. Here we present such an approach based on >300 species of forest arthropods in a partial cutting experiment [RECPA] in northeastern QuÃ©bec. Unlike other approaches that rely on â group membership,' whereby large natural variability inherently reduce the potential of identifying a robust indicator, our approach relies on comparisons of response medians of species in managed stands to a specified range of acceptable natural variability defined by quantiles of species responses in reference stands. We have also incorporated elements of the precautionary principle, in the form of equivalence testing, to further identify species that may require further monitoring before they provide reliable information for management decisions. While presented specifically in the context of forest insect conservation, our current approach adopts a heuristic approach, based on IUCN criteria, that can be adapted to other organisms, management scenarios and other ecosystems as long as adequate monitoring is practiced.

P2.126 WRIGHT, DAN*; Baer, Elizabeth; Conservation International; *dwright@conservation.org*

Retrofitting monitoring and evaluation indicators to an ongoing conservation project: A case study of Miradi and the Taita Thrush

Now, more than ever, it is important for conservation projects to incorporate quantifiable monitoring and evaluation criteria to measure and adapt towards progress on the ground. Monitoring and evaluation is especially critical in projects featuring highly threatened species under severe and ongoing threat in a rapidly changing environment. There is a number of software applications designed to assist in the adaptive management of conservation projects including Miradi. Miradi is a software program based on the Open Standards for the Practice of Conservation as defined by the Conservation Measures Partnership (CMP) and is designed to help conservation practitioners design, implement, and monitor successful conservation projects. Miradi and similar tools are very useful if used from the inception of a project, but in reality many conservation projects are developed and implemented without formal consideration of such standards, creating a need to understand the difficulties and opportunities of retrofitting a real world project into the system. We apply the Miradi framework to the case of the Taita Thrush (Turdus helleri), an IUCN critically endangered species restricted to 4 forest patches in the Eastern Arc Mountains of Kenya. We highlight some of the lessons learned from applying formal monitoring standards to an existing project.

P2.106 Wulff, A.*; Fogliani B.; L'Huillier L.; Agronomic Institute of New Caledonia, University of New Caledonia; *wulff@iac.nc*

Understanding the establishment determinants of a micro-endemic flora on ultramafic soils in New Caledonia: the Scaevola (Goodeniaceae) model.

In New Caledonia the Scaevola genus is represented by nine indigenous species. Six are endemic and three of them are micro-endemic. In order to conserve the micro-endemic flora, it is essential to understand the biological and ecological parameters influencing their distribution and abundance. An integrative study is led on two Scaevola species which live in sympatry on ultramafic soils: S. montana, a common species, and S. coccinea which is restricted to the Tontouta valley. Regarding the environmental conditions, the micro-endemic species is only distributed on serpentinite soils while the common one is distributed on a broad range of substrates. Pollination of the common species is realized by hymenopterous and dipterous insects while the micro-endemic is only pollinated by passerines. These observations were correlated with floral dimensions and nectar composition. The dispersal mode of the common species is zoochory (birds) while no animal was recorded eating the fruits of the micro-endemic one. These differences come from the size and probably the sugar composition of the pulp. The restricted distribution of S. coccinea could be explained in this case by its obligation to grow and multiply on serpentinite soils and its lack to colonize other similar areas separated geographically.

P1.143 Wyborn, C; Fenner School of Environment and Society, Australian National University; *carina.wyborn@anu.edu.au*

Connecting people, connecting landscapes? Assessing the social agenda of connectivity conservation in Northern America and Australia

â Connectivity conservation' is gaining prominence around the world. Originating in response to habitat fragmentation and land use intensification, connectivity is increasingly framed within the discourse of climate change adaptation. These initiatives are shifting the players and perspectives involved in conservation management and show promise for facilitating integrated conservation management. At the heart of these initiatives is the motivation and ability of individuals, agencies and institutions to collaborate across multiple scales, land tenures and land uses. The challenge faced by bringing together players from across the public-private spectrum should not be understated as each organisation is constrained by their unique culture, objectives, values and for government, legislation. This challenge highlights the need for research into the social dimensions of connectivity initiatives. Drawing on existing theory, policy and practice, and recent qualitative social research (interviews and participant observation), this paper will place connectivity conservation within a social context. Areas for investigation include the relevance of prominent North American initiatives to Australian aspirations for connectivity, and the contested claim that connecting landscapes has both ecological and social benefits. Despite the promise offered by these initiatives, without serious consideration of the social dimensions of connectivity conservation their grand visions may remain an aspiration.

P2.64 Yarrish, LE*; Root, KV; Michaels, HJ; Bowling Green State University; *lyarris@bgsu.edu*

Assessing Factors that Influence the Success of Butterfly Communities in Oak Savanna

The federally listed Karner blue butterfly (*Lycaeides melissa samuelis*) has become a symbol for oak savanna. Efforts to restore and manage oak savanna for the Karner also benefit other species that rely on this rare ecosystem. We characterized 4 oak savanna sites in northwest Ohio focusing on lupine (*Lupinus perennis*), nectar plants, and light heterogeneity which are important for the Karner and possibly other butterfly species. Transects were established at each site and a $1m^2$ quadrat was placed every 10 meters on the transect. At each quadrat we measured: number of lupine and nectar plant stems (flowering), distance between lupine and nectar plants, canopy cover, vegetation height and density, and leaf litter. Behavioral observations of butterflies were also conducted. Higher butterfly species richness was found at sites with a larger number of lupine and nectar plant stems, smaller lupine-nectar distances, and greater light heterogeneity. Butterfly species richness varied from 4 to 9 among sites. Nectar plant species richness varied from 6 to 9. The site with the highest butterfly species richness also had the highest nectar plant species richness. Butterflies were observed nectaring most often from butterflyweed (*Asclepias tuberosa*) and scaly blazing star (*Liatris squarrosa*). These results help inform future land management decisions at these and other oak savanna sites. This type of assessment could be used instead of butterfly counts to monitor populations.

SP3.2 Yasue, M.*; Nellas, A.; Vincent, A.C.J.; Quest University Canada and Project Seahorse, Project Seahorse Foundation, Project Seahorse ; *maiyasue@gmail.com*

Seahorses helped drive creation of marine reserves, so what did the reserves do for the seahorses?

The recovery of a "flagship species" can help maintain local support for a conservation project. In the Danajon Bank, Philippines, seahorses (Hippocampus) were used as flagship species to help engender support for small, community enforced and management marine protected areas (MPAs). Here we conducted seahorse surveys inside and immediately outside eight community-based marine reserves and five distant fishing areas in the Philippines to examine the impacts of reserves on seahorse abundance, reproductive status and size. Mixed-effects models suggested that treatment (inside, immediately outside and distant fished areas) had no effect on the change in seahorse densities over time. Moreover, the number of years of protection had no effect on seahorse densities. However, our analyses suggested that there were consistently higher seahorse densities in and around MPAs compared to distant fished sites. Moreover, seahorses were larger inside than immediately outside MPAs. In summary, although MPAs do not appear to enhance seahorse populations, our study suggests that MPAs protect existing populations despite the rampant and destructive fishing outside of the MPAs. The study also warns against building community support for an MPA based on the recovery or spillover of a single species. Instead, evaluating the success of MPAs on a wider range of species could lead to long-term, stable community commitment towards the MPA.

P2.10 Yates, Gabriela*; Boyce, Mark; University of Alberta; *gyates@ualberta.ca*

Flat-lining Canadian lynx in southern Canada

During the past 30 years lynx (Lynx canadensis) populations across broad regions of southern Canada have declined in abundance with dampened population oscillations. This breakdown in population cycles may be crucially linked to the threatened status of the lynx in the United States, and periodic dispersal from the north might be essential to maintain southern populations. Further north in Canada populations continue the fundamental rhythm of the boreal ecosystem with 10-yr cycles of snowshoe hares (Lepus americanus) and lynx. Recent advances in ecological theory provide insights into alternative mechanisms for these deteriorating population cycles. Data from fur harvest records suggest that the lynx-hare cycle is a plant-herbivore-predator system driven by climatic seasonality. We present evidence that (1) the regional effect of lynx dispersal, or (2) reductions in environmental seasonality are the most probable mechanisms causing flat-lining population cycles. Changing landscapes and changing climates are having widespread consequences in the north.

P1.23 YEEMIN, THAMASAK*; Makamas Sutthacheep; Chaipichit Saenghaisuk; Sittiporn Pensakun; Wanlaya Klinthong; Kanwara Saengmanee; Watcharachai Donsomjit ; Marine Biodiversity Research Group, Department of Biology, Faculty of Science, Ramkhamhaeng University, Huamark, Bangkok 10240 THAILAND; *thamasakyeemin@yahoo.com*

A Coral Restoration for Education in Trat Province, Thailand

A simple and cheap coral restoration method was developed by Association of Marine Biodiversity Conservation and Education (AMBCE), an NGO conservation group led by marine scientists, in collaboration with local administrative officials, volunteer groups and local teachers. The concept of this method was providing additional substrates for coral recruitment and attaching coral fragments found on the coral reefs by using clusters of designed concrete blocks which were made by local people. The coral restoration sites were in shallow water of the west of Koh Kood, Trat Province, in the eastern Gulf of Thailand. It is easy for local students to study on coral biology and ecology at the coral restoration sites. This coral restoration model can raise public awareness on coral reef conservation through students as well as increase survival of natural coral fragments. Moreover, the planning and implementation activities of the project enhanced coordination among local communities, NGOs and government agencies.

P1.104 YOUNG, HC*; Reid, TG; Randall, L; Foster, DJ; Lachowsky, LE; Pengelly, C; Reid, ML; University of Calgary; *hcyoung@ucalgary.ca*

Movement Behaviour at Habitat Edges Affects Distribution

The distribution of animals relative to edges of habitat has often been interpreted as reflecting their preferences for resources. We consider an alternative possibility wherein distribution reflects changes in movement behaviour at edges. To investigate this idea, we examined a very simple system in which individual confused flour beetles, Tribolium confusum, were placed in a resource-free two dimensional arena with edges of plastic tape that they rarely crossed. For each individual, we recorded the proportion of time spent at various distances from the edge and analyzed their step lengths and turn angles at the centre and edges of the arena. We found distinct differences in individual beetles' movement paths; however, beetles' step lengths were generally larger in the centre of the arena than at the edges, while the converse was true for turn angles. Beetles spent more time in the edge and corner zones of the arena than expected based on the area of these zones. To test whether a correlated random walk could explain beetle distribution, we constructed an agent-based model that simulated movement paths using step lengths and turn angles derived from the empirically observed distribution. While the model was fairly accurate in predicting the time spent in intermediate zones, it significantly under-estimated the proportion of time beetles spent in the edge and corner zones, suggesting that movement behaviour at edges is more complex than expected. Overall, our study indicates that movement behaviour alone can explain higher density of animals at edges, and needs to be considered in the ecology of habitat heterogeneity and fragmentation.

SY14 Zangger, Adrian; Biodiversity Monitoring Switzerland, c/o Hintermann & Weber Ltd, Aarbergergasse 61, CH 3011 Bern; *zangger@hintermannweber.ch*

Focusing on Trends in the Common Landscape-the Swiss Biodiversity Monitoring Program

The primary task of Switzerland\'s state-run biodiversity monitoring program (BDM) is to survey changes over extended periods of time. BDM is embedded in a framework combining effectiveness and baseline monitoring programs as well as customized studies. As a baseline monitoring program, BDM has to cover a broad range of possible changes. Because relevant human impacts on biodiversity have different effects at various spatial scales, we collect data within habitats, landscapes, and biogeographical regions. Monitoring only rare species could create a false impression, as in our intensively used landscapes, these are often restricted to small, special patch habitats. For this reason, it is important to survey species typical of our normal landscape. That in turn means monitoring abundant and wide-spread species. Hence, the bulk of our funds is invested here. As our data shows, it is these species that have undergone significant changes in recent years. In order to reveal trends in biodiversity, we propose to collect data on whole taxonomic groups rather than focusing on a selection of predefined target species. This also provides optimum flexibility to adapt to questions emerging in the future, as has recently been shown for several issues. Apart from scientific considerations, it is important to select species groups that also appeal to the general public-an indispensable requirement to maintain interest and, thus, funding.

P1.1 Zimbler-DeLorenzo, H*; Skibiel, A; Karels, T; Dobson, FS; Alfred University, Auburn University, California State University; *zimbler@alfred.edu*

Threats to Avifauna on Oceanic Islands

Results of the study by Blackburn et al. (2004a) of avifauna on oceanic islands suggest that distance from the mainland and time since European colonization have major influences on species extinctions and that island area is a significant but secondary contributing factor. After augmenting the data of the study on geographical properties for some of the islands they examined, we used a causal analysis approach with structural equation modeling to reexamine their conclusions. In our model geographical properties of islands, such as island area and isolation, were considered constraints on biological factors, such as the number of introduced mammalian predators and existing number of avifauna, that can directly or indirectly influence extinction. Of the variables we tested, island area had the greatest total influence on the threat of extinction due to its direct and indirect effects on the size of island avifauna. Larger islands had both a greater number of threatened bird species and more avifauna, increasing the number of species that could become threatened with extinction. Island isolation also had a significant, positive, and direct effect on threats to island avifauna because islands farther from the mainland had fewer current extant avifauna. Time since European colonization had a significant negative, but relatively weaker, influence on threats compared with the traditional biogeographic factors of island area and distance to the mainland. We also tested the hypothesis that the amount of threat is proportionally lower on islands that have had more extinctions (i.e., there is a "filter effect"). Because the proportion of bird extinctions potentially explained only 2.3% of the variation in the proportion of threatened species on islands, our results did not support this hypothesis. Causal modeling provided a powerful tool for examining threat of extinction patterns of known and hypothesized pathways of influence.

SY60 Zimmerling, T.N.; Alberta Conservation Association;
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An Alberta Model of a Conservation/Carbon Offset Co-Benefits Project"

The concept of carbon offsets is relatively new in Alberta, and the linkage of carbon offsets with other co-benefits such as conservation of biodiversity, reduced soil erosion, improved water quality, or increased recreational opportunities for the public has only recently begun to be explored. The Alberta Conservation Association, Alberta Fish and Game Association and The Society for Conservation Biology have entered into an agreement to undertake the first known carbon offset/conservation project in Alberta. This presentation will provide an overview of the Alberta carbon offset market and will provide the details around the Wild Rose Conservation Site. The details will include the proposed management of the site for biodiversity and carbon sequestration, and the carbon offset program which is being used to offset this meeting. While the carbon sequestration measurements for the site may not be as rigorous as some may like, I will provide information showing that for a first time conservation/carbon offset demonstration site the assumptions used are sufficiently conservative to ensure that an appropriate amount of carbon is being sequestered, while 384 ha of grasslands are being protected for conservation purposes. The success of this co-benefits project should lead to much more biodiversity being protected in the future, in Alberta.

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Habitat quality assessment based on species rarity: case study of land snails in Hungarian forest reserves

We studied the the performance of 5 different measures of habitat quality. We used the species richness (not sensitive to species rairy), Shannon\'s diversity index (sensitive to local scale rarity), mean rarity index (mean of regional rarity scores of species), and two indices that combine the local and regional commonness/rarity of the species (regional rarity scores weighted by relative frequency or reciprocal of it). We surveyed the land snails in 3 Hungarian forest reserves. Local rarity was based on relative frequency of the species calculated from the sample counts, for regional rarity of the species we followed a conservation prioritization scheme developed for the Hungarian mollusc fauna. All indices ranked the 3 reserves similarly except for the one where regional rarity was weighted by local commonness. Range restricted (regionally rare) species tended to be locally rare, although not in each cases. We found that the regionally rare species Macrogastra plicatula was one of the most abundant species in one of the reserves. Our results generally reiterate the positive relationship between rarity measured at different spatial scales, but also provide example where this was not the case. So habitat quality assessment should rely on different and complementary indices. Incongruences of multiple indices can help in identifying potentially idiosincratic biotas.