2nd European Congress of Conservation Biology

"Conservation biology and beyond: from science to practice"

Prague, Czech Republic, 01 – 05 September 2009

ECCB

Prague 2009

CZECH UNIVERSITY OF LIFE SCIENCES PRAGUE

Society for Conservation Biology

BOOK OF ABSTRACTS

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ABSTRACTS

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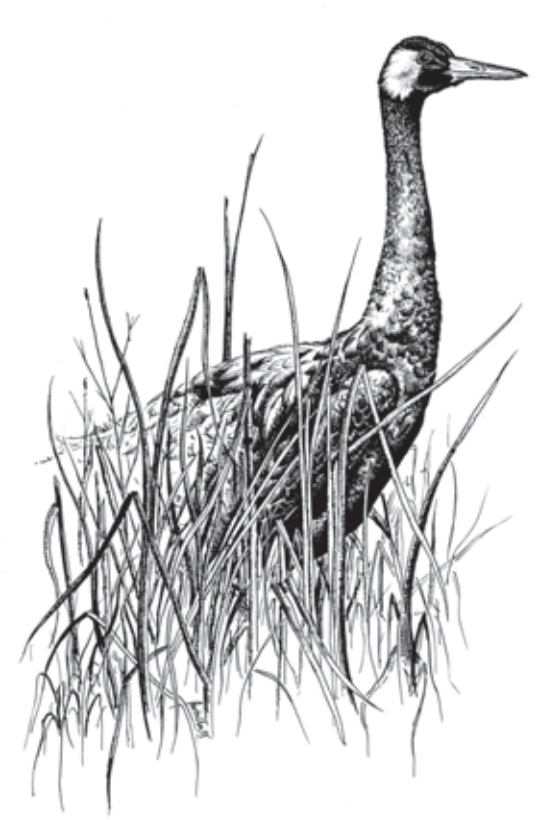
ABSTRACTS OF PLENARY LECTURES



Grus grus

Graphics by Václav Bartuška

1. ECONOMICS OF BIODIVERSITY CONSERVATION AND VALUATION ISSUES

Martinez-Alier, Joan, Universitat Autonoma de Barcelona, Spain

Ecological economics focuses on the relations between the human economy and the environment. There is a fashion in ecological economics to give economic values to environmental services, in order to emphasize the social importance of conservation. However, other authors point out that in conflicts on biodiversity conservation different social actors prefer sometimes to put more weight on non-economic values. Who has the power to impose one particular valuation language? Some examples will be analyzed.

2. A SCIENCE AND POLICY AGENDA FOR EFFECTIVE GLOBAL CONSERVATION

Sutherland, William, University of Cambridge, Department of Zoology, United Kingdom

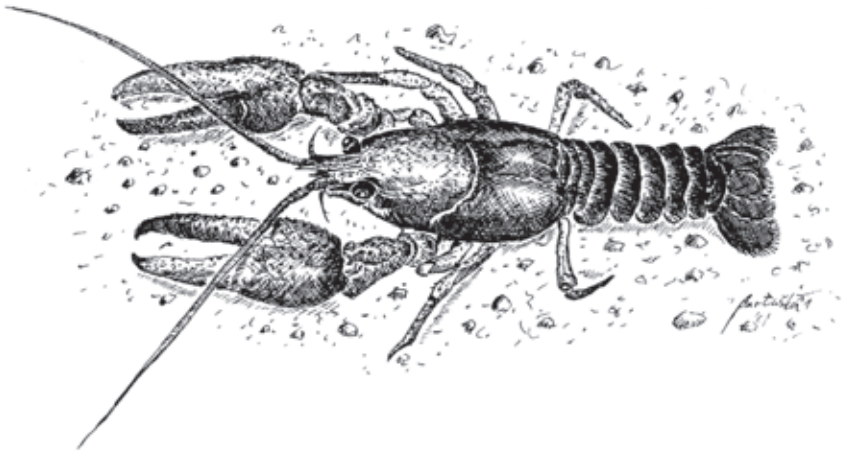
The reason for our work, and for this conference, is to enable the maintenance and restoration of biodiversity. There have been some successes but overall we are presiding over a global loss of biodiversity. Part of the reason for this is the failure to comprehensively integrate science and practice. I suggest that we need to fundamentally change how we work, especially so that evidence-based conservation underpins policy and practice. 3. Economics of biodiversity conservation and valuation issues

3. PLANT INVASIONS IN PROTECTED AREAS: A CONSERVATION CHALLENGE?

Pyšek, Petr, Institute of Botany, Academy of Sciences of the Czech Republic and Department of Ecology, Faculty of Science, Charles University in Prague, Czech Republic

Biological invasions are among major threats to biodiversity worldwide, while protected areas are the foundation of national and international conservation initiatives and targets. This creates a natural conflict between invasions and biodiversity in protected areas. Most of our data on the patterns of distribution and impact of invasive plants come from non-protected “normal landscapes”, often heavily affected by humans, since this is were invasive plants are most common and spreading. However, there are data showing that protected areas are not safe from invasions by alien plants. Studies of alien species in nature reserves located in the Czech Republic, central Europe, have shown that the degree to which a reserve is invaded, depends on the altitude, type of protected vegetation, interactions with native species, and propagule pressure manifested through density of human population in the region. Reserves surrounded by protected landscape have significantly fewer alien species than those not located inside national parks or protected landscape areas. This finding has a practical relevance for issues associated with reserve establishment and design. Protected areas posses a “self-defending potential”, in terms of intrusion of alien plants; for example, natural vegetation in nature reserves in Central Europe acted as an effective barrier against the establishment of alien species; over a time scale of more than hundred years, it was more difficult for alien species to penetrate into protected areas than to spread in a non-protected landscape. In a similar vein, recent research indicates that intrusion of alien plants into Kruger National Park, South Africa, can be predicted using a limited number of characteristics of the surrounding landscapes. It will be discussed how such knowledge can be used to diminish the problem of plant invasions in protected areas.

ABSTRACTS OF SYMPOSIA



Astacus astacus

Graphics by Václav Bartuška

5. THE VALUE OF VALUING ECOSYSTEM SERVICES?

Abson, David, Sustainability research institute, University of leeds, United Kingdom

The monetary valuation of the benefits derived from the provision of ecosystem services is increasingly seen as a key policy tool in stemming biodiversity loss (c.f. the Millennium Ecosystem Assessment, TEEB). It is proposed that placing dollar values on biodiversity assets is necessary for correcting the market failures that have led to the over-exploitation of biodiversity and biological resources. Conceptualising ecosystems as bio-physical machines that can be managed to maximise the provision of goods and services for the benefit of humanity is both a powerful and potentially dangerous proposal, raising a number of vexing questions: Given that monetary valuations of ecosystems define their value in terms of what they can be exchanged for, can this approach be reconciled with traditional conservation agendas? Can commodification of biodiversity really reduce its exploitation? And are the concepts of efficiency, utility and markets useful in the context of biodiversity conservation? This presentation will explore the positive role and potential misuse of the monetary valuation of ecosystem services from ethical, economic, and practical perspectives. The strengths, limitations, and possible pitfalls associated with ecosystem service valuation will be addressed with a particular focus on issues of scale, equity and legitimacy.

6. ALIGNING SPECIES WITH PROTECTED AREAS: A PROBABILISTIC APPROACH IN A CLIMATE CHANGE SCENARIO

Alagador, Diogo, National Museum of Natural History of Spain, Madrid, Spain**; Martins, Maria João,** Centro de Estudos Florestais and Departamento de Matematica, Inst. Superior de Agronomia, Technical University of Lisbon, Portugal**; Cerdeira, Jorge Orestes,** Centro de Estudos Florestais and Departamento de Matematica, Inst. Superior de Agronomia, Technical University of Lisbon, Portugal**; Cabeza, Mar,** National Museum of Natural History of Spain, Madrid, Spain**; Araújo, Miguel B.,** National Museum of Natural History of Spain, Madrid, Spain

Gap analysis is an established conservation procedure that identifies species, habitats or ecosystems in more urgency for in-situ protection, by crossing biological distribution with protected area cover. Whilst being straightforward in implementation it entangles some degree of arbitrariness when dealing with uncertainty behind protected area assignment: non-informed threshold values are commonly used to decide about local protection status. We suggest a probabilistic framework to deal with the problem, using a simple and intuitive protocol, based on statistical theory, to assess spatial protection levels of biological elements. We demonstrate the principles behind our approach and explore its ability to be used in a static and dynamic perspective of conservation, using consensual predictions of plant species distributions in Iberian Peninsula for present time and 2080, assuming a changing climate. We found that the estimated current representation of species in protected areas and its trend in a climatically changed future are highly affected by the mapping rules used. These results address the need to work on more robust approaches to deal with inevitable existent uncertainties in biological conservation.

7. BALANCING BIODIVERSITY AND ECOSYSTEM SERVICES IN CONSERVATION PLANNING

Anderson, Barbara, University of York, United Kingdom

Ecosystems support biodiversity and also provide goods and services that are beneficial to humans. The extent to which the locations that are most valuable for ecosystem services coincide with those that support most biodiversity is of critical importance when designing conservation and land management strategies. We investigate the spatial congruence of biodiversity and other ecosystem services and the effect of resolution and extent. We then use conservation prioritization software to investigate the tradeoffs between biodiversity and ecosystem services conservation. Rank correlations suggest that the relationship between biodiversity and various other ecosystem services is dependent on the spatial location. For example within Great Britain as a whole there is a significant negative correlation between carbon storage and biodiversity. Whilst on a regional scale this relationship holds in the north and west of Britain in the southeast there is a significant positive relationship. The combined conservation strategy showed that positive compromises are possible. The relationship between ecosystem services may differ depending on the extent and spatial location. Conservation prioritization software can manage tradeoffs between biodiversity and ecosystem services where considerable gains in biodiversity conservation are possible with relatively little loss for other ecosystem services.

8. IN 85 PRIVATE GARDENS: SCIENTIFICALLY SOUND PROPAGATION OF 75 ENDANGERED NATIVE PLANT SPECIES AND SUBSEQUENT TRANSPLANTATION IN THE FIELD NEAR ZÜRICH

Andreas, Keel, Fachstelle Naturschutz, ALN, Baudirektion Kanton Zürich, 8090 Zürich, Switzerland; **Regula, Langenauer**, topos, Idastr.24, 8003 Zürich, Switzerland; **Karin, Marti**, topos, Idastr.24, 8003 Zürich, Switzerland; **Andreas, Gigon**, Istitute of Integrative Biology ETH, Univeritätsstr 16, 8092 Zürich, Switzerland

„Help for endangered native plant species – what can my garden contribute?“ – an article published in 1998 by collaborators of the cantonal (county) nature conservation authority in a Zurich newspaper: 60 private persons started to participate (today 85)! The conservation authority provided seeds, collected according to scientific requirements, as well as written instructions for cultivation, seed production and reporting. After 1 or 2 years, the plantlets (in 2008: 2’500) or seeds (in 2008: 34 species, sometimes ≥100g/sp.) were planted or sown by biologists, sometimes with the assistance of the same person, who had cultivated the plants, at ecologically and biogeographically appropriate sites. Often the private persons annually monitored the development of “their” plantlets with a standardized scientific form. From 1998 to 2008 ~800 sets of seeds or plantlets of altogether 75 species were brought out in the field, leading to a total of ~300 viable populations. An annual meeting and field trip contribute to train the private persons and to maintain their enthusiasm. The conservation authority spends 35’000 €/year for this project, a worthwhile investment! Not to forget the snowball effect of the private persons showing to their friends what special plants they cultivate in their gardens!

9. NATURAL RANGE OF VARIABILITY, FOCAL SPECIES’ REQUIREMENTS AND FOREST CERTIFICATION STANDARDS IN EUROPE’S BOREAL FOREST

Angelstam, Per, Faculty of Forest Sciences (SLU), Sweden; **Roberge, Jean-Michel**, Faculty of Forest Sciences (SLU), Sweden

Assessment of ecological sustainability involves the monitoring of indicators and the comparison of their state with targets describing the state which is deemed sustainable. Focusing on the degree of naturalness at different spatial scales required to maintain viable populations of naturally occurring species in boreal forest this paper has three aims. First we review empirical data about the range of variability in near-natural forest landscapes of the volumes of dead wood and large trees in stands, and the proportions of deciduous

trees and old-growth forests. Second we review studies about how the amounts of these four habitat indicators are related to the presence and fitness of focal species. Third, we compare the ecological requirements of focal species with forest certification standards and other performance targets set by different actors and stakeholders involved with the implementation of biodiversity conservation policies. Forest certification standards, which focus on satisfying market access for wood products, can be viewed as interim short-term targets, which need to come closer to quantitative empirical long-term targets to secure ecological sustainability. To conclude, if the desire is to maintain biodiversity, there is a need to communicate that politically-derived targets do not always satisfy ecological requirements for population viability.

10. IMPLEMENTATION OF EUROPEAN NATURA 2000 CONSERVATION POLICY: THE CASE OF GREECE

Apostolopoulou, Evangelia, Aristotle University of Thessaloniki, Greece; **Pantis, John, D.**, Aristotle University of Thessaloniki, Greece

The Habitats Directive purpose, maintaining biodiversity through sustainable natural resource use, requires national strategies capable of specifying clear goals and effective means of implementation. The Greek state responded to the Habitats Directive by establishing a network of protected areas to conserve and manage the most important Natura sites. Despite the establishment of 27 management agencies in 61 Natura sites, implementation has failed without a national strategy. By conducting 91 semi-structured interviews and following grounded theory approach we revealed national strategy as compromised by absence of conservation policy history, state incapacity, uncommunicated biological knowledge and lack of public participation. This strategy gap became apparent when we appraised the decision making process in establishing a network of protected areas in terms of its interrelated activities. Lack of clear goals and divergences between stated and actual goals led to mechanistic interpretations of conservation objectives and allowed distortion of decision process by the need to satisfy economic and development interests, leading to break downs in prescription and implementation. Given the high degree of Greek biodiversity and failure to confront this policy hiatus, we argue for the establishment of independent institutions staffed by qualified reviewers to evaluate and monitor member-states conservation policies.

11. INTEGRATED DISTURBANCE ECOLOGY: FROM THE IMPACT OF OUTDOOR WINTER SPORTS ON ALPINE WILDLIFE TO THE CREATION OF WINTER PRESERVES

Arlettaz, Raphaël, University of Bern - Conservation Biology, Switzerland; **Patthey, Patrick**, University of Bern - Conservation Biology, Switzerland; **Baltic, Marjana**, University of Bern - Conservation Biology, Switzerland; **Thiel, Dominik**, Swiss Ornithological Institute, Switzerland; **Jenni-Eiermann, Susanne**, wiss Ornithological Institute, Switzerland

The spreading of recreation represents a novel threat to wildlife. Still in its infancy, disturbance ecology tries to understand the consequences of anthropogenic disturbance upon biodiversity so as to propose mitigation measures. A promising conceptual framework to disturbance ecology is the allostastic theory. It predicts the reaction terms of an organism facing various environmental factors, either natural or anthropogenic, subject to its own condition. Behavioural and physiological adjustments to changes in extrinsic and intrinsic factors are neither detrimental nor maladaptive insofar as energy reserves (food, fat stores) suffice to adapt. Above a certain threshold, however, these allostatic adjustments become impossible (allostatic overload), leading to a suppression of certain vital functions (stress) in an attempt to return to homeostasis. We investigated the behavioural and physiological responses of black grouse to winter recreation. Comparative analyses and disturbance experiments showed that black grouse modulate excretion of stress hormone in response to anthropogenic disturbance, in accordance with the predictions of the allostatic theory. Compensatory foraging enabled the birds to cope with the incurred extra energy expenditures. Yet, birds in disturbed areas may suffer from chronic stress, which could explain low population densities near ski resorts. Winter refuges must be created to limit human-wildlife conflicts.

12. COMMUNITY-LEVEL APPROACHES TO CONSERVATION PLANNING

Arponen, Anni, University of Helsinki, Finland

Effectiveness of conservation planning depends largely on data availability and quality. Often data are not adequate for modelling species distributions individually, and limited to only a few species groups. In such situations it is helpful to model instead (or in addition) higher level diversity attributes – beta-diversity and species richness – that can be used for conservation planning with modern site selection techniques. Traditional community-level surrogate approaches include the use of simple classification techniques as well as continuous ordinations. I present the latest advances in community-level approaches to conservation planning. These include for example a novel, promising strategy that outperforms previously used techniques, called Maximization of Complementary Richness. I also discuss directions for future work: how community level approaches can be developed to address more complex and more realistic conservation planning problems.

13. NATIONAL REPORTING – THE STATUS OF THE NATURA 2000 NETWORK IN GERMANY AND CURRENT ACTIVITIES

Axel, Ssymank, BfN, Federal Agency for Nature Conservation, Germany; **Sandra, Balzer**, BfN, Federal Agency for Nature Conservation, Germany

The Natura 2000-network in Germany established, the CBD and European Minister Council “2010” target to stop the loss of biodiversity approaching, however the Ger-man National report according to Art. 17 Habitats Directive resulted in a number of habitats and species of European importance with unfavourable conservation status. This is a fact in most Member States and a network of delimited sites on maps alone is certainly not sufficient to maintain or even restore biodiversity where necessary. Based on the German National report, an overview of management and options for future actions will be given, especially for habitats and selected species of annex I of the Habitats Directive. At the same time data needs and standardization processes at European level aim at making Natura 2000 more efficient and get a better under-standing of assessing conservation status and managing Natura 2000. An overview of current activities as well as future developments will be given.

14. EMERGED CONFLICTS OVER INTRODUCING SET-ASIDE INTO HUNGARY

Báldi, András, Animal Ecology Research Group of the Hungarian Academy of Sciences, Hungarian Natural History Museum, Hungary; **Tóth, László**, Bükk National Park, Hungary; **Kovács, Anikó**, School of Environmental Sciences, Szent István University, Hungary

Subsidising set-aside is a relatively new instrument in Hungarian agriculture. We use our experiences in the Heves Environmentally Sensitive Area to highlight the emerged

problems. There were uncertainties around introduction of set-aside. It was unclear what a set-aside is, and different parties interpreted set-aside in different ways. Finally, set-aside fields in the Heves ESA are seeded, grinding or mowing is allowed once per year, and setting-aside last for maximum 3 years. This is, however, not the type, which was aimed by nature conservation, who wanted longer set-asides. In addition to this nature conservation – agri-environment conflict, there is a within agriculture conflict. Set-aside is arable field, thus regulations on arable field management should be applied. These, however, prohibit weed infection, and leave a narrow edge between set-aside and weed infection. A third level of problems is that farmers hardly accept this new system: to leave the field without production is against their tradition. Therefore, successful implementation of set-aside needs (i) further improvements for the benefit of biodiversity; (ii) to eliminate within agriculture, and agriculture – nature conservation conflicts; and (iii) to educate farmers on the indirect benefits of set-asides (like promoting biodiversity).

15. HOW DOES GRASSLAND MANAGEMENT AFFECT THE ARTHROPOD DIVERSITY AT DIFFERENT SCALES? – EXAMPLES FROM AN EASTERN AND A WESTERN EUROPEAN COUNTRY

Batáry, Péter, Agroecology, Georg-August University, Germany; **Báldi, András**, Animal Ecology Research Group of the Hungarian Academy of Sciences and the Hungarian Natural History Museum, Hungary; **Tscharntke, Teja**, Agroecology, Georg-August University, Germany

Modern agriculture is one of the main anthropogenic threats to biodiversity. The decline of grassland species diversity due to management intensity was shown in several taxa both at local and landscape scales. In 2003 we made pitfall trapping for carabids and spiders and sweep-netting for grasshoppers on 21 pairs of extensively (max. 0.5 cow/ha) and intensively (min. 1 cow/ha) grazed semi-natural grasslands in Hungary. In 2008 we compared the same taxa sampled with the same methods of 10 pairs of organic (pesticide and fertilizer free) and conventional fertile mown meadows in Central Germany. In Hungary the local scale management generally did not affect the species richness and abundance of arthropods (exception: grasshopper abundance was higher on extensive fields), however, it had a significant impact on the community structure. At landscape scale, the semi-natural area % negatively affected the carabid abundance and had a significant effect on carabid and spider communities. In Germany, no effects at any scales were shown on the impoverished grasshopper fauna, which had very low frequencies due to the frequent mowing on both management types. (The other taxa are under identification). These results support the view that management effects should be studied at different spatial scales.

16. WHERE TO CONSERVE WHAT: A NEW METHOD TO PRIORITIZE SPECIES CONSERVATION

Bauch, Bianca, Department of Conservation Biology, Helmholtz Centre for Environmental Research, Germany; **Schmeller, Dirk**, National Center for Scientific Research, France; **Gruber, Bernd**, Department of Computational Landscape Ecology, Helmholtz Centre for Environmental Research, Germany; **Lanno, Kaire**, Institute of Agricultural and Environmental Sciences, Estonian University of Life Sciences, Estonia; **Budrys, Eduardas**, Institute of Ecology of Vilnius University, Lithuania; **Babij, Valerija**, Institute of Biology, Scientific Research Centre of the Slovenian Academy of Sciences and Arts, Slovenia; **Juskaitis, Rimvydas**, Institute of Ecology of Vilnius University, Lithuania; **Sammul, Marek**, Institute of Agricultural and Environmental Sciences, Estonian University of Life Sciences, Estonia; **Varga, Zoltan**, Department of Zoology and Evolution, Kossut Lajos University of Debrecen, Hungary; **Henle, Klaus**, Department of Conservation Biology, Helmholtz Centre for Environmental Researc, Germany

Here we present a new method to prioritize species conservation based on the concepts of national responsibilities and conservation priorities. National responsibilities are crucial to pinpoint action plans in the different EU Member states on a legal basis and to meet the NATURA 2000 requirements. The concept of national responsibilities has been introduced in the late 1990ies to overcome some of the short-comings of using Red Lists setting conservation priorities. Several countries have developed independently their own method for determining national responsibilities. EuMon reviewed these methods and derived a new one that overcomes limitations of the existing methods and, most importantly, is freely scalable, i.e., can be applied to countries or regions of any size in a standardized way. The method is based on the distribution pattern and distribution range of species. Most importantly, the method clearly distinguishes between the national responsibilities of countries and the conservation priority a species receives within a certain country. Conservation priorities are given by the combination of national responsibilities and the threat status of a species (Annexes of the Birds and Habitats Directives, IUCN Red list, national red lists).

17. VOLUNTEER INVOLVEMENT IN BIODIVERSITY MONITORING

Bell, Sandra, Durham University, United Kingdom

There is a pressing need for volunteer amateur naturalists to participate in data collection for biodiversity monitoring programmes in Europe. It is being addressed in some countries, but less so in others. This paper discusses the results from qualitative research using semi-structured interviews, focus groups and participant observation within nine Participatory Monitoring Network (PMN) organisations in six European countries. The paper examines the features that facilitate recruitment, retention and motivations of volunteers to participate in biodiversity monitoring, including the social and cultural milieus in which they operate. The paper concludes that volunteers place a high degree of significance on their social experience within PMNs. Successful creation and management of PMNs thus requires that similar levels of attention be paid to social aspects of the organisation as are paid to the generation and management of data.

18. INTRODUCTIONS OF AMPHIPOD CRUSTACEANS AND CONSEQUENCES FOR NATIVE COMMUNITIES IN THE NORTH-WESTERN RUSSIA

Berezina, Nadezhda, Zoological Instituteof Russian Academy of Sciences, Russia

The paper focuses on history of large-scale intentional introductions of amphipod crustaceans (above 30 species were introduced) in former USSR with the aim of fish production improvement. This study aims to illustrate what consequences of this man-made experiment for native communities and natural biodiversity on example of lakes in North-western Russia. Several most successful invaders (Baikalian amphipod *Gmelinoides fasciatus*, Ponto-caspian *Pontogammarus robustoides* and North Atlantic *Gammarus tigrinus*) occurred highly tolerant to pollution and other destructions of aquatic ecosystems and reached a high abundance over short period becoming key stone species in most benthic communities. The destruction of natural habitats (pollution and climatic changes) increases native ecosystem invasivibility and facilitate the successful invasion

of the invaders, as a rule euryoecious species (opportunistic or r-strategic) species. The spread of the invasive amphipods in aquatic ecosystems of Russia has had a high ecological impact, leading to changes in pre-existing native biota and losses of species diversity. The threatened (or endangered) native species are at risk due to competition with the invasive species and under their predation. Natural conservation of native habitats and biota are the main preposition for increase stability and decrease invasibility of aquatic ecosystems and necessary issue for further restoration management

19. THE ECONOMICS OF ECOSYSTEMS AND BIODIVERSITY (TEEB) – CONCEPT AND STRUCTURE

Berghöfer, Augustin, Helmholtz Centre for Environmental Research, Germany

TEEB is an international initiative to draw attention to the global economic benefits of biodiversity, to highlight the growing cost of biodiversity loss and ecosystem degradation and to draw together expertise from the fields of science, economics and policy to enable practical actions moving forward. The TEEB study was launched by Germany and the European Commission in response to a proposal by the G8+5 Environment Ministers (Potsdam, Germany 2007) to develop a global study on the economics of biodiversity loss. The Interim Report of TEEB, released in May 2008 provided strong evidence for significant global and local economic losses and human welfare impacts attributable to the ongoing losses of biodiversity and degradation of ecosystems. Phase II of the study will be completed in 2010 and presented in Nagoya, at the 10th Conference of parties of the Convention for Biological Diversity (CDB COP-10). Some conceptual underpinnings of TEEB will be discussed e.g. with regard to monetary valuation. Furthermore, the structure of the TEEB process will be explored and its characteristics at the interface between science and politics.

20. USING MITIGATION AND ADAPTATION ACTIONS TO PROMOTE BIODIVERSITY CONSERVATION

Berry, Pam, Environmental Change Institute, University of Oxford, United Kingdom; **Paterson, James**, Environmental Change Institute, University of Oxford, United Kingdom

Climate change mitigation and adaptation measures are being implemented in a number of sectors, such as agriculture, forestry and food control. These measures can interact synergistically or antagonistically with conservation objectives. This paper will present a synthesis of measures which are compatible with biodiversity and show how such measures can be implemented to achieve win-win-win situations for mitigation, adaptation and biodiversity. It will use a case study from wetlands to show how flood control measures, such as wetland re-creation and drainage, can be implemented to the benefit of both flood management and biodiversity. Thus it will identify how climate change and biodiversity policies can be brought together and to ensure that opportunities for conservation are realised.

21. DYNAMIC RESERVE SELECTION UNDER CLIMATIC UNCERTAINTY

Bladt, Jesper, Aarhus University, Denmark; **Strange, Niels**, University of Copenhagen, Denmark; **Thorsen, Bo Jellesmark**, University of Copenhagen, Denmark

Climate change is becoming an increasingly important driver for changes in species distributional ranges. In a conceptual model we explore a dynamic reserve selection problem where areas with valuable biodiversity cannot all be protected immediately due to budget restrictions and where there is a probability of species going extinct on non-reserved as well as reserved sites. Additionally, due to climate change induced migration of (threatened) species, there is a probability that new species will immigrate into the sites of the potential reserve system. In this model the planner is provided with the option to sell reserved and potentially degraded sites in order to be able to buy other non-reserved sites with higher expected biodiversity value. This is referred to as the swapping option. In the present study we explore to what extent such flexibility options improve conservation effectiveness under a climate change scenario where species may move in and out of potential reserve areas and hence may change optimal priorities.

22. DEVELOPMENT OF PLANT COMMUNITIES ON SET-ASIDE IN ENGLAND

Boatman, Nigel, Food & Environment Research Agency, United Kingdom; **Jones, Naomi**, Food & Environment Research Agency, United Kingdom; **Conyers, Simon**, Food & Environment Research Agency, United Kingdom; **Pietravalle, Stephane**, Food & Environment Research Agency, United Kingdom

A botanical survey of set-aside in England was carried out in 2008, to record plant communities in set-aside of different ages. In total, 287 fields were surveyed on 85 farms. In each field, transects were established at 1, 4, 9 and 50m from the edge. Ten quadrats were assessed in each transect, and 20 pin hits recorded as a measure of cover. Plant communities were classified using the Countryside Vegetation System, National Vegetation Classification, Ellenberg indicators and Grime CSR strategy. Cover and species richness of perennials increased and species richness of annuals declined, with age of set-aside. Most transects fell into CVS aggregate classes 'tall grassland/herb' and 'fertile grassland'. Around 10% were in the 'infertile grassland' aggregate class. Plant communities were mostly classified as NVC mesotrophic grassland or open habitats but with some swamp or tall-herb fen communities. Ellenberg fertility values decreased, Competitor species increased, and ruderals declined, with age. The proportion of food plants for birds and butterflies increased with age of set-aside. It is concluded that the greatest value of set-aside is in terms of habitat value for higher trophic groups. However, under certain conditions, there is the potential for plant communities of conservation interest to develop.

23. USE REGULATIONS AND THEIR COMPLIANCE IN THE BIOSPHERE RESERVE WIENERWALD

Brandenburg, Christiane, University of Natural Resources and Applied Life Sciences, Department of Spatial-, Landscape-, and Infrastructure-Sciences Institute for Landscape Development, Recreation and Environmental Planning, Austria; **Lexer, Wolfgang**, Umweltbundesamt GmbH Wien, Austria; **Reimoser, Friedrich**, Research Institute of Wildlife Ecology University of Veterinary Medicine Vienna, Austria; **Muhar, Andreas**, University of Natural Resources and Applied Life Sciences, Department of Spatial-, Landscape-, and Infrastructure-Sciences Institute for Landscape Development, Recreation and Environmental Planning, Austria; **Zink, Richard**, Research Institute of Wildlife Ecology University of Veterinary Medicine Vienna, Austria; **Heckl, Felix**, Umweltbundesamt GmbH Wien, Austria

The Biosphere Reserve Wienerwald lying next to the agglomeration area of Vienna possesses high biodiversity and conservation values, due to the mosaic-like landscape composed of large forest areas and grass lands, major large-scale wildlife habitat and part of a supra-regional ecological corridor. Its ecological integrity is threatened by high recreational use intensities, urban sprawl, abandonment of traditional agriculture and land use conflicts. In order to reduce negative impacts on wildlife caused by various forms of land use, management organisations and landholders

developed various regulations aimed at sustainable use of the Wienerwald area. Within a research project the familiarity and compliance with those rules was investigated with on-site interviews and mailing surveys using standardised questionnaires. 1334 land users stated that they were aware of the problems and conflicts caused to wildlife by certain modes of behaviour such as off-trail use, off-leash dog walking and others. However, awareness of the problems caused by unwanted behaviour did not result in adequate observance of existing rules, which appeared to be due to a lack of knowledge about the further-reaching implications of the disturbance of wildlife. To improve management aims and rules as well as conforming behaviour, self-evaluation sets for different user groups have been elaborated.

24. SPATIALLY-EXPLICIT MODELLING OF CONFLICT ZONES BETWEEN OUTDOOR WINTER RECREATION AND WILDLIFE IN THE EUROPEAN ALPS

Braunisch, Veronika, Institute of Ecology and Evolution, Division of Conservation Biology, University of Bern, Switzerland; Forest Research Institute of Baden-Wuerttemberg FVA, Division of Wildlife Ecology, Germany; **Patthey, Patrick**, Institute of Ecology and Evolution, Division of Conservation Biology, University of Bern, Switzerland; **Raphael, Arlettaz**, Institute of Ecology and Evolution, Division of Conservation Biology, University of Bern; Swiss Ornithological Institute, Valais Field Station, Nature Centre, Switzerland

Outdoor winter recreation is a major source of stress for wildlife in mountain ecosystems. Measures for mitigating disturbance effects require spatial prediction of both human activities and wildlife key habitats so as to locate conflict zones with critical interferences and delineate adequate winter refuges. We used spatial modelling to localise conflict zones between wintering black grouse (*Tetrao tetrix*) and two free-ranging winter sport activities (off-piste skiing and snowshoeing) in the Swiss Alps. Track data (snow-sports and birds' traces) recorded by aerial photographs along with a maximum entropy algorithm were used to predict snow-sports and black grouse probability of co-occurrence as a function of landscape characteristics. Modelling black grouse presence in theoretical absence of ski lifts enabled identifying potentially suitable but currently abandoned wintering sites within ski resorts. Skiers' occurrence was mainly determined by ski lift presence and a smooth terrain, snowshoe walkers' occurrence by hiking or skiing routes and moderate slopes. Black grouse avoidance of ski infrastructure resulted in a 12% reduction of suitable habitat. There was a >10% probability of human-wildlife encounters on >50% of the remaining habitat. Spatially-explicit maps showing the probability of human-wildlife conflicts will enable effective planning of wildlife winter refuges and visitor steering concepts.

25. THE FARMCAT PROJECT: THE SOCIAL AND ECOLOGICAL CONSTRAINTS ON THE SUCCESSFUL DELIVERY OF AGRI-ENVIRONMENT SCHEMES

Bullock, James, Centre for Ecology and Hydrology, United Kingdom

Agri-environment schemes (AES) are the pre-dominant strategy in Europe to counteract the decline in farmland biodiversity. Their success has been measured in terms of farmer uptake and biodiversity increases and both suggest major constraints on the performance of AES. A lack of training means many farmers show limited engagement with AES and do not carry out best management practices. Secondly, colonisation of AES farms by target species is limited by small source populations and barriers to dispersal. A multidisciplinary consortium is addressing these social and ecological constraints in an integrated fashion. We are comparing structured samples of farms in different landscapes to determine how AES management, farmer attitude and training affect biodiversity change. We are studying the impact of training on attitudes and knowledge of AES management and the process by which attitudinal shifts occur. Measures of distribution and colonisation by target species are being used to determine how landscape context interacts with farm habitat quality to determine biodiversity responses to AES. By this combined approach we are aiming to produce new advice on how farmer engagement and biodiversity responses in AES may be enhanced by new policies.

26. 20 YEARS OF EX SITU PLANT CONSERVATION AND SPECIES RECOVERY PROJECTS IN BERLIN

Bunde, Daniela, Botanic Garden and Botanical Museum Berlin-Dahlem, Germany; **Luthardt, Vera**, The University of Applied Sciences in Eberswalde, Germany; **Stevens, Albert-Dieter**, Botanic Garden and Botanical Museum Berlin-Dahlem, Germany

During the early 1990s, nature conservation authorities in Berlin initiated several reintroduction and re-enforcement projects for 15 locally endangered species. Plants were cultivated and propagated in the botanic garden, and re-introduced to several wet and dry grassland communities in the Berlin area. The re-enforced populations were monitored for a period of four years. In 2008 the populations were revisited and their status evaluated. The main problems encountered during the re-evaluation 15 years later, were incomplete data and maps from the first phase. The re-evaluation showed that most of the re-introduction measures were not successful because of inappropriate choice of sites, discontinuous site management and missing protection against damage from wild animals. Only a few species had developed stable populations. The only really successful measure was the re-enforcement of a *Silene chlorantha* population in the north of Berlin, which today counts more than 9000 individuals. This study illustrates the importance of thoroughly planned re-introduction measures, including appropriate choice and preparation of sites as well as long-term management and monitoring. Successful projects will only be possible if all stakeholders – such as nature conservation authorities, NGO´s and botanic gardens, scientists and volunteers – communicate and cooperate.

27. THE POLITICS OF ECOLOGICAL DISSERVICES: TOWARDS A CRITIQUE OF NEOLIBERAL BIODIVERSITY CONSERVATION

Büscher, Bram, Institute of Social Studies, Netherlands

During the last decade, the field of conservation biology has rapidly adapted itself to the currently dominant political ideology of neoliberalism. Variations on payments for ecological services models are promoted to reach the multiple 'wins' so desired: improved biodiversity conservation, economic development, (international) cooperation, etc. This paper aims to provide a critique of neoliberal biodiversity conservation. This critique will commence with the assertion that there has been a conflation between economics and neoliberalism in conservation biology – the latter being a political ideology geared towards (eternal) growth and creating social inequalities. By spelling out the reasons for this conflation, the paper argues that it becomes easier to see the various negative impacts of neoliberal win-win models biodiversity conservation. The paper concludes by exploring the spaces around which alternative ideas about economics and biodiversity conservation could be construed.

28. A PRACTICAL METHOD FOR CONSERVATION PLANNING ACCOUNTING FOR UNCERTAIN CLIMATE CHANGE

Cabeza, Mar, MNCN, CSIC, Spain; **Kujala, Heini**, University of Helsinki, Finland; **Araújo, Miguel**, MNCN, CSIC, Spain; **Moilanen, Atte**, University of Helsinki, Finland

Conservation planning is facing new challenges as species shift their ranges due to climate change. Recent developments in the field of systematic conservation planning have resulted in tools for solving conservation resource allocation problems accounting for such range shifts. These approaches incorporate projected future species distributions. Yet an issue of major concern is the uncertainty associated with both climate change and resulting species responses. Knowing that climate change is a reality, we must find ways to move forward despite uncertain futures, not by delaying action or by ignoring uncertainty, but by embracing it. Here we suggest a practical approach to conservation planning using uncertain climate change projections, to identify regions that robustly allow the local persistence of species and make dispersal between present and future areas plausible. This is done by discounting those locations for which there is high variation in the predictions, and by giving varying weights to future sources, stepping stones and future core areas without much compromising conservation achievements for the present. We also perform a sensitivity analysis to evaluate for which climate change scenario we should be planning for. We apply the proposed approach to the identification of conservation priorities for European amphibians and reptiles.

29. THE KINDRED OF SPECIES: BEYOND BIO-EXCEPTIONALISM

Campbell, Ben, Durham University, United Kingdom

Conservation comes in many guises, but in prioritising the concerns of the non-human world over immediate or accumulatory human wants, it caught the attention of anthropologists for making foundational the Great Divide it seeks to cross. In the dialectic of ideas, the enlightenment's discovery of the universal human, and the application of science for human society to overcome the constraints of nature, made logically possible the subsequent reverse empowering of the non-human cause as a legitimate concern, once the ecologically degrading effects of human domination became apparent from the mid-nineteenth century. Rather than promote conservation as the welfare of the non-human, this paper argues that relationships between the human and non-human, as manifest in many non-western cultures (examples from South Asia and South America), offer a means for imagining a reflexive ethics of conservation, giving voice to non-humans in ways that the culture of science will typically not admit. As environmentalism spreads in popularity, and conservation undergoes its own de-colonising process, the diversity of relationships to the non-human is becoming an area for creative anthropological work. This questions the standard response to indigenous people's speaking of their kinship to non-humans as being either irrational or metaphoric.

30. INCORPORATING CONNECTIVITY AND RESILIENCE TO CLIMATE CHANGE INTO REGIONAL-SCALE CONSERVATION PLANNING IN THE US PACIFIC NORTHWEST

Carroll, Carlos, KCCR, United States; **Dunk, Jeffrey**, Humboldt State Univ., United States; **Moilanen, Atte**, Univ. of Helsinki, Finland

The effectiveness of a reserve network may be compromised under climate change as species' habitat shifts to non-reserved areas, a problem that may be compounded when well-studied vertebrate species are used as conservation umbrellas for other taxa. We used the program Maxent to develop habitat models for the Northern Spotted Owl and 130 localized species in the US Pacific Northwest, and evaluated how effectively the owl acts as an umbrella for localized species under current and projected future climates. We used the program Zonation to identify a system of areas that efficiently captures habitat for both the owl and localized species and prioritizes refugial areas of climatic and topographic heterogeneity where current and future habitat for dispersal-limited species is in proximity. Reserve solutions based on the owl overlap areas of high localized-species richness but poorly capture core areas of localized species' distribution. Congruence between priority areas across taxa increases when refugial areas are prioritized. Although core-area selection strategies can potentially increase the conservation value and resilience of regional reserve systems, they accentuate contrasts in priority areas between species and over time, and should be combined with a broadened taxonomic scope and increased attention to potential effects of climate change.

31. GENE-BANKS AND CLIMATE CHANGE, PERSPECTIVES FROM THE FROZEN ARK PROJECT

Clarke, Ann, The Frozen Ark Project, United Kingdom

Climate change over the last 30 years is known to have produced large alterations in number and distribution of animal species globally. It is predicted that future warming of the climate alone will cause the extinction of 15-37% of species by 2050. The growing number of successful conservation efforts can only save a small percentage of the total 5-10 million species believed currently to exist worldwide. The Frozen Ark Project has been set up to collect, preserve and store the genetic material of the world's endangered animals before they go extinct so these resources are not lost to future generations. The project has been set up as a charity and is being co-ordinated from The University of Nottingham in the UK. Consortium Members from academic, zoo, aquarium and museum communities around the world are involved in creating this 'back-up' to the conservation movement. The project aims to insure that the scientific information of millions of years of evolution is not lost, that future scientists will have the knowledge of the world's past animals and that genetic material will be available to aid conservation breeding programmes around the world.

32. ENHANCING THE ECOLOGICAL DIVERSITY OF *CARABIDAE* (COLEOPTERA) IN RIPARIAN MARGINS

Cole, Lorna, Scottish Agricultural College, United Kingdom; **McCracken, Davy**, Scottish Agricultural College, United Kingdom; **Robertson, Duncan**, Scottish Agricultural College, United Kingdom; **Harrison, Billy**, Scottish Agricultural College, United Kingdom

Erecting fences along riparian field margins in intensively managed grasslands not only helps to mitigate diffuse pollution but also has the potential to enhance farmland biodiversity. This study surveyed a range of riparian margins and analysed carabid assemblages to determine the influence of riparian management on carabid ecological structure. While the ecological composition of wide riparian margins (>4m) was distinct from unfenced margins and the adjacent field, the composition of narrow margins (<2m) was not. Wide margins had a higher proportion of flightless carabids and species that overwinter as adults indicating that wide margins provide more stable habitats with greater refuge potential for overwintering beetles. Wide margins therefore appear to have greater potential than narrow margins at enhancing the ecological diversity of carabids at the farm level.

33. BIODIVERSITY AND CLIMATE CHANGE: INFORMING ADAPTATION MEASURES FOR IRELAND

Coll, John, Department of Geography, NUI Maynooth, Maynooth, Co Kildare., Ireland; **Bourke, David**, Applied Ecology Unit, Centre for Environmental Science, NUI, Galway, Galway., Ireland; **Sweeney, John**, Department of Geography, NUI Maynooth, Maynooth, Co Kildare., Ireland; **Gormally, Michael**, Applied Ecology Unit, Centre for Environmental Science, NUI, Galway, Galway., Ireland; **Sheehy-Skeffington, Micheline**, 3 Department of Botany, NUI, Galway, Galway., Ireland

Ireland's biodiversity is currently subject to a multitude of pressures, these include; land-use change, habitat fragmentation and loss, soil, air and water pollution, and the introduction of non-native species. Consequently a number of Ireland's priority habitats have been identified as being of poor or bad conservation status, and there is an increasing need for conservation strategies to consider the potential impacts of climate change. Here we report on a project exploring how predictive modeling techniques may be used to assess some of the potential impacts of climate change on Ireland's biodiversity. A number of Ireland's species and habitats of high conservation value (e.g. turloughs and peatlands) are protected under European legislation, the Habitats Directive in particular. There is a need therefore to assess not only what the likely impacts of climate change will be, but to provide recommendations on adaptation and mitigation measures to policy-makers on how to best manage Ireland's natural resources as climate change impacts are superimposed on contemporary pressures. Consequently, ongoing compliance with the Habitats Directive in maintaining the "favourable" conservation status of vulnerable species and habitats necessitates greater integration of the predicted impacts of climate change in future conservation strategies.

34. PROSPECTS FOR RECONCILING THE CONFLICT BETWEEN ECONOMIC GROWTH AND BIODIVERSITY CONSERVATION WITH TECHNOLOGICAL PROGRESS

Czech, Brian, Center for the Advancement of the Steady State Economy, United States

The basic conflict between economic growth and biodiversity conservation is becoming widely understood. The biggest remaining question is whether or not that conflict may be resolved with technological progress. Here, I review the conflict in the absence of technological progress, explore the prospects for technological progress to reconcile the conflict, and provide linguistic suggestions for describing the relationships among economic growth, technological progress, and biodiversity conservation. The conflict between economic growth and biodiversity conservation is based upon ecological principles in the context of thermodynamics, with the human economy growing at the competitive exclusion of non-human species in the aggregate. Reconciling the conflict via technological progress is infeasible because of the tight linkage between technological progress and economic growth at current levels of technology. Surplus production in existing sectors is required for conducting the research and development necessary for bringing new technology to market. Technology also reflects macroeconomic goals; when the goal is growth, reconciliatory technological regimes are unlikely. As the economy grows, biodiversity loss may be partly mitigated with end-use innovation that increases technical efficiency, but this type of technological progress requires policies that are unlikely if the conflict between economic growth and biodiversity conservation is not acknowledged.

35. THE HISTORY OF MOOSE CONSERVATION IN SWEDEN DURING 800 YEARS– ADAPTIVE MANAGEMENT OR NOT?

Danell, Kjell, Swedish University of Agricultral Sciences, Umeå, Sweden; **Bergström, Roger**, Forest Research Institute, Uppsala, Sweden

Our aim is to give an overview over moose conservation in Sweden during the last 800 years and to analyze the management efforts in relation to the adaptive management theory. The moose conservation drama includes moose, large predators, forest trees and man. The history of moose management is illustrative because moose has undergone dramatic population changes from almost extinction to "over-abundance" during 200 years. During the first part of these 200 years the large predators were reduced in numbers and the predation pressure on moose were released. With increased economic value of forestry moose and men started to compete for Scots pine. Recently the large predators are allowed to increase and the predation pressure on moose increases. For the different time periods we have analyzed the management procedure and its efficiency for moose conservation. Who formulated the conservation goals? How did the increase in scientific knowledge effect the management? Which was the role of ethics? Which were the actions taken and how efficient were they? How did the hunters and moose population respond? When started monitoring programs and discussions with stakeholders? Which was the most efficient management strategy for an increase in the moose population?

36. RELATIONS BETWEEN LANDSCAPE STRUCTURE, HUMAN IMPACT AND INSECT DIVERSITY

Diaz Forero, Isabel, Estonian University of Life Sciences, Estonia; **Liivamägi, Ave**, Estonian University of Life Sciences, Estonia; **Luig, Jaan**, Estonian University of Life Sciences, Estonia; **Kuusemets, Valdo**, Estonian University of Life Sciences, Estonia

We studied diversity of butterflies, bumblebees and day-flying moths in grasslands in conditions of different landscape structure and with different human impact. Key areas were chosen in North-East Estonia with grasslands situating in coastal area, in the forested landscapes, in flooded meadows. Part of study areas were situating under impact of oil-shale mining and air pollution (dust, sulphur and nitrogen compounds, higher pH) by electrical power plants. The number of butterfly and day-flying moth species was lower in the coastal zone where open and windy landscapes appear. Slightly higher diversity of all species was in mosaic landscape with lakes and forest patches. The impact of air pollution by power stations had some negative impact to the number of day-flying moth species, the number of butterfly species in these conditions was in average level and number of bumblebee species even slightly higher.

37. DEFICIENCIES OF NATURA 2000 IMPLEMENTATION IN THE FEDERAL STATE OF BADEN-WUERTTEMBERG (GERMANY)

Dieterich, Martin, Institute of Landscape Ecology and Nature Conservation, Germany

The designation of Natura 2000 sites is only a first step towards effective preservation of the European natural heritage. More complex and challenging is the subsequent implementation of management plans directed at the maintenance or restoration of favourable conservation status of annex habitat types and species. A state wide survey

was conducted in the Federal State of Baden-Württemberg (Germany). Approximately local groups of an NGO were surveyed (questionnaires and telephone interviews). Subsequently, interviews with administrations were conducted (ministry, regional administrations, county administrations) and case examples selected based on the interviews were visited on site. Main deficiencies with the implementation of Natura 2000 include inappropriate impact assessment and assessments for exemption in particular, complete lack of implementation of cross compliance regulations as they relate to habitat types of community importance (e.g. lowland hay meadows), and lack of personal to implement management plans and supervise implementation in general. In theory, European conservation law is among the most progressive approaches to nature conservation. However, successful and effective implementation will require control schemes beyond the monitoring requirements described in the directives.

38. INTRODUCTION - AN ECOLOGICAL PERSPECTIVE ON ECONOMICS AND SUSTAINABILITY

Dieterich, Martin, University of Hohenheim, Germany

Ecology has been termed the science studying the distribution and abundance of populations. The sigmoid growth curve as an ecological paradigm is an expression of limited resource availability determining the extraction potentials for populations in a given environment. This includes human populations. The focus on population and limited resources is in sharp contrast to socio-economic paradigms governing mainstream economics and sustainability concepts (e.g. growth economics, Brundtland type sustainability). The function of biodiversity in a sustainability context is to grant adaptability of ecosystem capacities to varying environments and to long-term environmental change. While with respect to short-term adaptability this function continues to raise controversy among ecologists, the function of biodiversity as the currency to grant opportunities for selection in the evolutionary process is undisputed. In the light of climate change, it is obvious that adaptability is indispensable to provide long term benefits from ecosystem functions. Loss of biodiversity translates into decreasing future carrying capacity for humans, in particular. The conservation of biodiversity becomes a pre-condition for the future well-being of human societies. This talk will introduce the symposium and expose some of the basic problems ecologists and conservation biologists face, when trying to extrapolate their scientific facts to socio-economic realities.

39. SCAVENGER GUILD STRUCTURE AND PREDICTABLE RESOURCES: THE EFFECTS OF CARCASS AGGREGATION AT VULTURE RESTAURANTS

Donázar, José Antonio, Doñana Biological Station, Spanish Council for Scientific Research, Spain; **Cortés-Avizanda, Ainara**, Doñana Biological Station, Spanish Council for Scientific Research, Spain; **Carrete, Martina**, Doñana Biological Station, Spanish Council for Scientific Research, Spain

Avian scavengers are a classical example of guilds: interdependent species exploiting a common resource (carcasses) in an organized way based on eco-morphological interespecific segregation. However, bird's foraging behaviour at carcasses suggest that interspecific relationships are poorly structured and local abundances, social organizations and body sizes are important determinants of resource exploitation. Within this scenario, resource unpredictability could be decisive. But human transformation, agro-grazing systems and EU legal constraints have promoted that carcasses only become available at vulture restaurants. Our research, conducted both in the New and Old World, have shown that predictable resources triggered substantial changes in spatial structure, sociability and probability of feeding. Vulture restaurants attract larger numbers of carrion-eaters than randomly distributed carcasses. Moreover, in vulture restaurants resources are monopolized by few dominant species with larger body sizes, social habits and aggressive behaviour. The main issue is that subordinate species are usually more endangered species. Therefore, vulture restaurants do not seem to be an adequate strategy to maintain well-structured scavenger guilds and the related ecological processes. We propose to promote that scavengers depend on random ungulate carcasses supplied by extensive farming, something that would require changes in legal dispositions.

40. LAND-USE AND SOCIOECONOMICS: THE CURRENT SITUATION AND PROSPECTS FOR BUTTERFLIES IN THE HAY AND GRAZING MEADOWS OF THE PICOS DE EUROPA, NORTHERN SPAIN

Dover, John, Staffordshire University, United Kingdom; **Rescia, Alejandro**, Complutense University Madrid, Spain; **Fungarino, Sara**, Complutense University Madrid, Spain; **Fairburn, Jon**, Staffordshire University, United Kingdom; **Carey, Peter**, Centre for Ecology & Hydrology, United Kingdom; **Lunt, Paul**, University of Plymouth, United Kingdom; **Arnot, Charlie**, RPS Group, United Kingdom; **Lang, Andreas**, University of Basel, Switzerland

Agricultural policy and economics combine to threaten biodiversity in mountain landscapes: intensification of easily accessible meadows and abandonment of smaller, less accessible, meadows. We examined land-use change in the Picos de Europa, Cantabria, from 1951-2004, in a 1.5x1.6km study area. We carried out butterfly transects around 47 meadows and investigated the impact of landscape, biotic and abiotic parameters on species richness and abundance. Mark-recapture studies were used to assess the impact of the current landscape configuration on dispersal. Shrinkage of meadows was evident; 58% of grazing meadows and 5% of hay meadows were completely lost. In 2004 15,000+ butterflies of 75 species were recorded. Species richness was affected by altitude, presence of water, scrub, aspect and slope; hay meadow management was positive for satyrid butterflies but negative for violet-feeding fritillaries. Total abundance was negatively affected by summer grazing, but hay meadow management was positive for satyrids. Water, scrub, altitude, and slope positively affected abundance of family groupings, with density of *Plantago lanceolata* and distance to nearest meadow being negative. Dispersal was strong for some species, but more restricted in others. The prospects for butterflies in this mountain landscape are likely to worsen if loss and shrinkage trends are not halted.

41. THE ROLE OF THE PLANT GERMPLASM BANK-UPM (TECHNICAL UNIVERSITY OF MADRID) TO THE GLOBAL STRATEGY FOR PLANT CONSERVATION AND GLOBAL TARGETS FOR 2010

Draper, David, Technical University of Madrid, Spain; **Martínez-Laborde, Juan B.**, Technical University of Madrid, Spain; **Pérez-García, Félix**, Technical University of Madrid, Spain; **González-Benito, M. Elena**, Technical University of Madrid, Spain

Three objectives of the Global Strategy for Plant Conservation are related to ex situ conservation: first, the development of protocols for plant conservation and sustainable use, based on research and practical experience (objective III); second, 60% of threatened plant species should be stored in accessible ex situ collections, preferably in the country of origin (objective VIII); and 70% of the genetic diversity of crops and other socioeconomically valuable species should be conserved (objective IX). The Plant Germplasm Bank of the Technical University of Madrid (UPM) is an ex situ facility that, for the last

forty years, has been devoted to the conservation of threaten Iberian flora and wild species of *Brassicaceae*, an important crop family in the Mediterranean basin. The main objective of this facility is the long-term conservation of plant germplasm but also to ensure the availability of the material to be used in conservation programs or research. The viability of samples of 14 Vulnerable (VU) Spanish species was evaluated after 32-34 years of storage; final germination percentages ranged from 90% to 55%. Currently, the Plant Germplasm Bank-UPM stores 23.7% of the threatened Spanish flora (objectives III and VIII). Besides, 1027 taxa of wild *Brassicaceae* are preserved (objective IX).

42. SPATIAL AND TEMPORAL TRADE-OFFS IN COST-EFFECTIVE HABITAT NETWORK DESIGN

Drechsler, Martin, Helmholtz Centre for Environmental Research, Germany

Since conservation budgets are generally limited, the design of cost-effective habitat networks that aim at maximising species survival at a given budget involves trade-offs. An example is the well-known SLOSS problem which essentially combines an economic trade-off – the larger the habitats the fewer of them can be financed – with an ecological trade-off – the larger the habitats the fewer are needed for a given conservation objective. The optimal number of reserves in this network design problem depends on the particular shapes of these trade-offs, which in turn depend on the ecological and economic characteristics of the problem. Such ecological and economic trade-offs, however, exist not only between the number and size of habitats. In the SLOSS problem it is implicitly assumed that conservation costs are spatially homogenous and constant in time. In the real world, however, these costs are generally spatially heterogeneous and they change in time. This creates new trade-offs between the total amount of habitat, its spatial distribution and its temporal dynamics, and raises questions like: “What is the cost-effective level of spatial network connectivity?” and “What is the cost-effective level of habitat dynamics?” This presentation analyses these spatial and temporal trade-offs with the help of generic ecological-economic models.

43. MULTI-AGENTS MODELLING OF THE ECOLOGICAL SERVICE PROVIDED BY VULTURES

Dupont, Hélène, UMR 5173 MNHN, France; **Bobbé, Sophie**, CETSAH CNRS, France; **Sarrazin, François**, UMR 5173 MNHN, France

Vulture’s conservation partly relies on the management of their trophic resources, that are, in Europe, largely linked to farming activities. In the south of France, a population of griffon vultures (*Gyps fulvus*) reintroduced in the eighties, still shows a high growth rate. The resources were first managed by conservation agencies, i.e. NGO and national park. Nowadays, the farmers contribute directly to the feeding of the vulture population, choosing a natural system of quartering by putting carrions on individual feeding places. In order to better identify the efficiency of this ecosystem service provided by scavengers and to grasp its possible evolutions, we are carrying out a multi-agents modelling approach. It involves on one hand the study of the local stakeholder’s motivations and decisions and, on the other hand, the formalisation of animal responses to the change of their practices. The working out of these models is driven in collaboration with the conservation agencies and the other local stakeholders. We will report on the theoretical and methodological aspects of this approach, including data collections, and the theoretical expects on both resources management and vulture population dynamics.

44. DEFENDING THE BOUNDARIES: THE THREAT TO COASTAL DUNES OF INVASIVE EXOTICS FROM ADJACENT GARDENS

Edmondson, Sally, Liverpool Hope University, United Kingdom

The high diversity of exotic plant species in residential gardens, together with enhanced fertility resulting from gardening activities, creates a sharp environmental gradient if housing is immediately adjacent to nature reserves conserving natural ecosystems with typically low fertility. There is thus a potential for nutrients and exotic species to flow down this gradient and impact on the adjacent nature reserve. Survey results from the Sefton Coast sand dune system, northwest England, and evidence from other dune sites is used to illustrate this phenomenon, to investigate the significance of residents’ behaviour in affecting the flow, and to evaluate the potential of exotic plant species invasion onto the dunes from this source. On the Sefton Coast there is a high concentration of exotic species and garden waste tips on the adjacent dunes, although the modified vegetation is currently largely confined to a relatively narrow boundary zone, resulting in the impact being minor in comparison to the extensive problems caused by past planting of exotic species for dune stabilisation works. Given the scale of inoculation however, probability of invasion of some species onto the dunes is sufficiently high to demand a coordinated management response.

45. MANAGEMENT OF THE BLACK CHERRY (*PRUNUS SEROTINA*) IN THE DUNAL REGION IN THE NETHERLANDS

Ehrenburg, Antje, Waternet, Netherlands; **Oosterbaan, Bernard**, Van der Goes & Groot, ecologisch onderzoeksen adviesbureau, Netherlands; **Mourik, Joop**, Waternet, Netherlands; **Van der Hagen, Harrie**, Dunea, Netherlands; **Terlouw, Leon**, North-Holland Waterworks-PWN, Netherlands

In the coastal dunes of the Netherlands invasive non-indigenous plants are proliferating at an alarming rate, especially during the last 10 years, one of them is *Prunus serotina* (Black Cherry). From *P. serotina* survey of the dune reserve Amsterdamse Waterleidingduinen (AWD) in 2004 and partly in 2006, an increase of 25% in cover was found especially in seabuckthorn scrub and dune-grasslands. So due to its invasiveness Black Cherry is threatening Natura 2000 dune habitats, and therefore it is urgent to find effective management practices. Once *P. serotina* is established, management is labour intensive, costly and needs to be continued over many years. Hence, it is of the utmost importance that management practices come into effect as soon as possible after first sightings of *P. serotina*! A *Prunus* survey in the AWD in 2008 revealed that management of *P. serotina* from 2005 onwards has been effective: increase in cover is now turned into a decline in cover of 4.5% per year. Nevertheless there are still more hectares with an increase than with a decrease in cover of *P. serotina*. Management practises of *P. serotina* will be shown, not only from the AWD, but also from other dune reserves in the Netherlands.

46. CONSEQUENCES OF EX SITU CULTIVATION FOR GENETIC DIVERSITY AND FITNESS OF *CYNOGLOSSUM OFFICINALE* L. IN BOTANIC GARDENS

Enßlin, Andreas, Philipps University Marburg, Germany; **Sandner, Tobias**, Philipps University Marburg, Germany; **Matthies, Diethart**, Philipps University Marburg, Germany

Ex situ conservation of endangered plant species in botanic gardens faces a number of problems. Due to their small size, populations may be affected by genetic drift and inbreeding. This may lead to genetic erosion and reduce viability of the plants. Also, adaptation of the plants to the artificial environmental conditions could influence live-history traits and complicate reintroductions. We investigated the genetic variability and fitness of the rare, monocarpic perennial *Cynoglossum officinale* L. (*Boraginaceae*) from twelve botanic gardens and five natural populations in Germany. Plants were grown in a common garden and genetic variability was assessed with eight nuclear microsatellites. We found a strong reduction of seed dormancy in botanic garden populations and a higher performance of plants from natural populations in the common garden. Genetic analysis revealed no overall differences in genetic diversity between natural and botanic garden populations, but four garden populations exhibited no genetic variability. The genetic diversity of garden populations decreased with their age. The results indicate that genetic drift and inbreeding affect botanic garden populations, and the reduction of seed dormancy indicates genetic changes due to unconscious selection. This could seriously reduce the suitability of botanic garden populations as a source for reintroductions.

47. ADAPTIVE MANAGEMENT APPLIED TO AN INTEGRATED CONSERVATION AND DEVELOPMENT PROJECT IN MOROCCO

Ernoul, Lisa, Tour du Valat, France

This article builds on ten years of adaptive management experience in wetland conservation from two Integrated Conservation and Development Projects in the Moulouya estuary in the north east of Morocco. The methodology for these projects has evolved over time through the use of a science-based adaptive management approach, incorporating valuable lessons learned in function of the changing pressures and dynamics. The evolutions and improvements made over the years include project dimension, project organization, integrated management techniques, and evaluation tools. Despite the changes, continual adaptive management is necessary to overcome the new challenges that arise. There are no recipes that can be duplicated for conservation projects, but the experiences learned within the project and from other projects must be shared to avoid repeating the same mistakes and to produce successful actions on the field. The conclusions and recommendations from this analysis can serve in the adaptive management of other Mediterranean wetland conservation and development projects.

48. SCIENCE IN THE POLICY PROCESS-- ENSURING QUALITY, UNDERSTANDING AND ACCURATE USE

Fitzgerald, John, Society for Conservation Biology, United States

Fitzgerald will describe the “political” and legally established requirements of different legislative and executive policy makers and judges for scientific evidence of problems, causes and potential solutions, exploring: two ends of the spectrum of policy makers -- a “Rational Policy Maker” who seeks to achieve a solution that is in the public interest (as she sees it) and a “power broker”, who sometimes fails to understand or intentionally manipulates science in order to appear to address a problem while actually advancing the interests of his backers over those of the public; and the role of mass media and sources of expertise, from government agencies, trade and professional associations, “think tanks”, conservation groups and university professors. We will discuss ways to prevent policy processes from being subverted: designing procedures for elucidating the best policy prescription for a particular problem, adopting that, and regularly refining that prescription or regulation over time as the scientific understanding of it evolves; setting objectives, procedures, and limits and delegating the details of implementation to expert agencies, and revisiting the legislation as needed; and the difference between degrees of evidence-based recommendations and other means of providing factual records for decisions.

49. SURROGACY AND PERSISTENCE IN RESERVE SELECTION: LANDSCAPE PRIORITIZATION FOR MULTIPLE TAXA IN BRITAIN

Franco, Aldina M. A., University of York, United Kingdom; **Anderson, Barbara J.**, University of York, United Kingdom; **Roy, David B.**, Natural Environment Research Council, Centre for Ecology and Hydrology, United Kingdom; **Gillings, Simon**, British Trust for Ornithology, United Kingdom; **Fox, Richard**, Butterfly Conservation, United Kingdom; **Moilanen, Atte**, University of Helsinki, Finland; **Thomas, Chris D.**, University of York, United Kingdom

This study identifies landscape-scale priority areas for conservation for the UK priority species (Biodiversity Action Plan species) of mammals, birds, herptiles, butterflies and plants, using the Zonation software, an area-prioritization algorithm. Zonation was used to identify the locations where species occur in concentrated populations with high connectivity. The results indicate that a high proportion of the connectivity of narrow-range species, and large total amounts of the connectivity of wider-range species are concentrated over 10% of the land surface of Great Britain. We also found that the taxonomic groups included in the analyses were only partially successful as predictors of priority areas for other taxonomic groups, indicating that priority areas for biodiversity conservation should include information from all taxonomic groups available. Larger areas should be protected to account for species not included in the analyses. Conservation solutions based on data for many different species, and particularly those species with narrowly defined ranges, appear to be most effective at protecting other rare taxa.

50. IMPACT OF GENETIC CHANGES IN CAPTIVITY ON REINTRODUCTION SUCCESS

FRANKHAM, Richard, Macquarie University, Australia

As wild environments are often inhospitable, many species have to be captive bred to save them from extinction, with the aim often being to reintroducing them into the wild. However, inbreeding depression, loss of genetic diversity, mutation accumulation and genetic adaptation to captivity may reduce the success of reintroductions. I will review the impacts of these factors. Inbreeding has deleterious impacts on reproductive fitness. Loss of genetic diversity is expected to reduce the ability of populations to evolve in response to environmental changes, but actual examples of impacts on reintroductions are few. Impacts of mutational accumulations are probably minor in naturally outbreeding species. Genetic adaptation to captivity is overwhelmingly deleterious when long-term captive populations are translocated to the wild. We have found substantial impacts of selective sweeps of initial rare fitness alleles upon linked neutral microsatellite loci - 12% faster than neutral declines in heterozygosity, 33% greater than neutral changes in allele frequencies and 29% greater than neutral allele frequency variation among replicate populations. Clearly, captive populations are not having their evolution frozen as intended, but are undergoing ‘genetic

revolutions.' Current recommended captive management for threatened species needs to be modified to minimize genetic adaptation to captivity.

51. RESHAPING RIVERS: POLICIES OF ECOLOGICAL RESTORATION IN THE FRAMEWORK OF CATCHMENT MANAGEMENT PLANS

Frascaroli, Fabrizio, University of Iceland, Iceland; **Pálsson, Gísli**, University of Iceland, Iceland

Over the last years, ecological restoration has proven a valuable means for increasing biodiversity, rehabilitating ecosystemic functions and promoting hydraulic security along degraded rivers, often in the perspective of the catchment-level planning promoted by EU's directives. By implying changes in land tenure and usage, however, ecological restoration is also prone to trigger economic tension and identity conflicts in the affected areas. It has even been suggested, in effect, that ecological restoration requires constant interaction between science, values and local perspectives, perhaps to a larger extent than other environmental practices. Social science and policy analysis, I argue, can provide relevant assets to this multidisciplinary character of the practice of ecological restoration. In particular, by highlighting local heritage, strategies of fruition, identity and negotiation, and by emphasizing the concept of "multifunctional landscape", they can contribute to turning restoration projects into multivocal and consensual enterprises. Preliminary steps in this direction can for example be identified, as I will show, in the management and restoration policies of the Po catchment, North Italy, from which instances will be drawn and discussed.

52. HISTORIC RANGE OF VARIABILITY: LESSONS FROM BOREAL OLD-GROWTH FORESTS

Fraver, Shawn, United States Forest Service, Northern Research Station, United States

Practitioners in North America and Australia frequently use the Natural Range of Variability concept (NRV; also known as Historical Range of Variability) to guide forest management decisions. However, until recently this concept has received less attention in European forest management. Retrospective studies from old-growth forests – combining several methods and conducted at various temporal and spatial scales – provide the information needed to assess historical ranges of variability. Drawing on a number of case studies from boreal or near-boreal old-growth forests, I demonstrate how to estimate the bounds of historic variability, particularly as it applies to disturbance rates and forest structure, including the abundance of down woody debris. These results provide benchmarks to gauge the sustainability of current management practices. They also emphasize the scientific value of old-growth forests as references.

53. LESSONS LEARNED FROM THE NORTHERN SPOTTED OWL SAGA ON THE CONNECTION BETWEEN RESEARCH AND MANAGEMENT IN CONSERVATION BIOLOGY

Frédéric, Gosselin, Cemagref, France

The case of the Northern spotted owl (*Strix occidentalis caurina*) has now become a classic case study in conservation biology, characterized by a harsh social battle but also by the quantity and quality of the research performed. Based on this example, I study the way the research-management interface was organized. The main lessons I have learned were: 1. laws that involve science in management are crucial but should be more precise; 2. scientific ad-hoc groups are useful reviewers of management plans and interpreters of the best scientific data available, even if more transparent scientific argumentation is needed on some points; 3. in such applied cases, even science that has not been strongly integrated with management can produce results that are useful for management; 4. stronger links between science and management appear necessary, but difficult to implement. This last point makes me wonder whether environmental laws should not more frequently target the incorporation of science into the management process itself rather than "only" basing management on the best scientific data available.

54. FIRE, WIND AND NATURAL RANGE OF VARIABILITY IN BOREAL FORESTS OF CENTRAL NORTH AMERICA

Frelich, Lee, University of Minnesota, United States

Northeastern Minnesota, USA, has boreal forests of *Pinus banksiana*, *P. resinosa*, *Picea mariana*, *Populus tremuloides*, *Thuja occidentalis*, and *Abies balsamifera*, and includes the 400,000 ha Boundary Water Canoe Area Wilderness (BWCAW), a federally designated wilderness area where mainly natural forces have shaped the forest. Historically (1600-1900), the boreal forests were characterized by disturbance regimes with severe crown fires at rotation periods of 50-70 years, which occur at random with respect to stand age, and canopy leveling windstorms with longer rotations of ca 1000 years. After settlement by Europeans, fire frequency decreased inside and outside the BWCAW, and forest management for timber production began outside the wilderness. RNV analyses indicate that early-successional forests in the initiation and stem exclusion phases of stand development were the common during the 1600-1900 period. However, due to the random nature of fires, a significant proportion of the landscape was skipped by fires for 100-300 years, allowing a significant representation of multi-aged, late-successional forests. Outside the wilderness the forest condition is far from RNV; due to human management practices aspen has become much more common, and there are fewer young and old forests than there were during the historic 1600-1900 period.

55. CLIMATE CHANGE-PROOF NATURE CONSERVATION – A COOPERATIVE POSTGRADUATE RESEARCH PROGRAMME

Geyer, Juliane, University of Applied Sciences Eberswalde, Faculty of Forest and Environment, Germany; **Freudenberger, Lisa**, University of Applied Sciences Eberswalde, Faculty of Forest and Environment, Germany; **Ibisch, Pierre L.**, University of Applied Sciences Eberswalde, Faculty of Forest and Environment, Germany; **Epp, Laura**, University of Potsdam, Faculty of Mathematics and Natural Sciences, Germany; **Tiedemann, Ralph**, University of Potsdam, Faculty of Mathematics and Natural Sciences, Germany

Nature conservation has evolved as a discipline of more or less reactive crisis and emergency management. As climate change is becoming an overarching stressor threatening the functionality of our planet's biodiversity, researchers and practitioners are challenged to adopt new concepts and measures in nature conservation taking global (environmental) change into account and develop proactive and precautionary conservation management strategies. In recognition of these challenges, the University of Potsdam and the University of Applied Sciences Eberswalde, Germany, have recently initiated the innovative cooperative postgraduate program "Climate change-proof nature conservation". Nine Ph.D. students are studying the adaptation of conservation to climate change comprising various aspects from molecular biology and landscape ecology to management sciences at different spatial scales, within and outside protected areas.

56. IS THE DECLINE IN EUROPEAN BUMBLEBEE DIVERSITY DRIVEN BY LOSS OF SPECIES-RICH GRASSLANDS?

Goulson, Dave, University of Striling, United Kingdom

Many bumblebee species have undergone significant range declines. Evidence is accumulating that the species in decline are mainly those dependent upon unimproved legume-rich grasslands, and that their decline is thus largely a response to the massive loss of this habitat in Europe. The social nature of bumblebees renders their effective population size low, since most individuals are sterile workers and each nest contains just one breeding female. Genetic studies reveal that many surviving bumblebee populations on unimproved grassland fragments are isolated and becoming inbred. Hence it seems that most surviving patches of species-rich grassland are too small to support many bumblebee species. This poses a challenge to conservationists, since preserving a diverse bee community is necessary to maintain plant diversity. Targeted agri-environment schemes may provide a mechanism by which populations of rare bumblebees can be both increased and linked to one another.

57. AN INDICATOR OF THE IMPACT OF CLIMATIC CHANGE ON EUROPEAN BIRD POPULATIONS

Grergory, Richard D., European Bird Census Council; Royal Society for the Protection of Birds, United Kingdom; **Willis, Stephen G.**, University of Durham, United Kingdom; **Jiguet, Frédéric**, National Museum of Natural History in Paris, France; **Voříšek, Petr**, Czech Society for Ornithology, Czech Republic; **Klvaňová, Alena**, Czech Society for Ornithology, Czech Republic; **van Strien, Arco**, Statistics Netherlands, Netherlands; **Huntley, Brian**, University of Durham, United Kingdom; **Collingham, Yvonne C.**, University of Durham, United Kingdom; **Couvet, Denis**, National Museum of Natural History in Paris, France; **Green, Rhys E.**, University of Cambridge; Royal Society for the Protection of Birds, United Kingdom

Rapid climatic change poses a threat to global biodiversity. Evidence is accumulating that climatic change in recent decades has altered many biological phenomena across the globe. Scientists and policy makers have called for the development of indicators of the impacts of climatic change on biodiversity that summarise such impacts over many species and large areas. We have developed a biological indicator of climatic change impacts in two steps. First, we tested the performance of projections of change in the extent of species' geographical range (based upon climatic envelope models) as predictors of interspecific variation in long-term change in population size of land bird species in Europe. Having found a robust relationship of this kind, our second step was to construct a "Climatic Impact Indicator" (CII) based upon the divergence in population trends between species expected to be positively and negatively affected by projected climatic change. We found a significant positive relationship between interspecific variation in population trend and the change in potential range extent between the late 20th and late 21st centuries, forecast by climatic envelope models. Our derived CII has increased strongly in the past twenty years, coinciding with a period of rapid warming in Europe.

58. REPRESENTATIVENESS OF ENDANGERED SPECIES IN THE EUROPEAN NATURA 2000 NETWORK

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Designating protected areas is widely recognized as most effective to prevent species from extinction. Accordingly, there has been a tremendous effort worldwide to achieve the 10% target proposed at the Fourth World-Park-Congress in 1992 in Caracas. The main European effort to achieve this target is the so called "Natura2000" network of protected areas, comprising presently 12.8 % of the area of the 27 member states of the European Union in over 20000 sites. Designation of Natura2000 sites was based mainly on species listed in the Annexes of the Habitats Directive. Our analysis shows that the Natura2000 network is effective in avoiding gap species (only 15/905 species), but the representativeness of Annex species is very skewed. Representations vary considerable between species groups with mammals, amphibians, reptiles and fishes being well covered, but plants and invertebrates still insufficiently protected. The long-term survival of a species protected in a country profits from Natura2000 sites designated in other countries. This benefit was low for countries located at the geographic margins of Europe, due to their higher proportion of endemic species, which by definition, cannot be protected in other countries. We argue that representativeness can be used to determine gaps in the network, and to provide efficient allocation of future conservation efforts.

59. BIOMASS USE, HANPP AND BIODIVERSITY: TOWARDS A BIOPHYSICAL INDICATOR OF SOCIOECONOMIC PRESSURES ON BIODIVERSITY

Haberl, Helmut, Institute of Social Ecology, Alpen-Adria University Klagenfurt, Austria

Effective Policies to slow the rate of anthropogenic biodiversity loss will have to reduce socioeconomic pressures on biodiversity directly or by modifying underlying socioeconomic driving forces. In order to support this goal, this paper discusses the "human appropriation of net primary production" (HANPP) as an indicator of pressures on biodiversity. HANPP indicates land-use intensity by measuring the human impact on trophic energy flows in ecosystems. HANPP is defined as the sum of the biomass humans extract from ecosystems (NPPh) and the alteration of productivity resulting from land use(ΔNPPLC). Globally, HANPP in terrestrial ecosystems amounted to approximately 24% of the NPP of potential vegetation in 2000. The paper gives an overview of empirical work on the interrelations between HANPP and biodiversity. The empirical evidence from several in-depth statistical case studies on the interrelation between HANPP and species richness is discussed. The paper analyzes the interrelations between HANPP, socioeconomic biomass use (food, fibre, energy) and the land-use system. It reviews a national-level analysis of global socioeconomic biomass flows, recent cross-country analyses of the determinants of HANPP and studies of the potential impact of bio-energy development plans on future HANPP.

60. FRAMEWORK FOR INTEGRATION OF BIODIVERSITY MONITORING IN EUROPE

Henry, Pierre-Yves, Muséum National d'Histoire Naturelle, France; **Lengyel, Szabolcs**, University of Debrecen, Hungary; **NOWICKI, Piotr**, Jagiellonian University, Poland; **GRUBER, Bernd**, UFZ, Germany; **Clobert, Jean**, Centre National de la Recherche Scientifique, France; **Celik, Tatjana**, Slovenian Academy of Science and Arts, Slovenia; **Schmeller, Dirk S.**, Centre National de la Recherche Scientifique, France; **Babij, Valerija**, Slovenian Academy of Science and Arts, Slovenia; **Julliard, Romain**, Muséum National d'Histoire Naturelle, France; **Henle, Klaus**, UFZ, Germany

Halting the loss of biodiversity comes along with the need to quantify biodiversity composition and dynamics at large spatial and temporal scales. Highly standardized, international monitoring networks would be ideal… but they are still lacking ! Hence, if we want to quantify states and trends of biodiversity now, we have to combine existing monitoring data across schemes. We outline practical issues to be considered when planning the combination of monitoring output. First, we provide suggestions of integrations along the four dimensions of a monitoring design: sample size, biological coverage, spatial coverage and temporal coverage. We also emphasize how complementarity in monitoring targets across schemes can enable us to describe more complex processes than with data from single schemes, e.g. through relating species traits to the impacts of environmental changes. Second, we review general methods to overcome differences in monitoring designs among schemes, such as site selection, post-stratification and measurement error. Finally, we illustrate how common statistical methods can be used to combine data or estimates among schemes, with a special emphasis on meta-analyses, weighted analyses and cross-validation. This contribution aims to bolster the practice and use of integration of ongoing monitoring initiatives for biodiversity assessment.

61. ON A BUMPY ROAD TO ENVIRONMENTAL SET-ASIDE: EXPERIENCE FROM FINLAND

Herzon, Irina, University of Helsinki, Finland; **Kuussaari, Mikko**, Finnish Environment Institute, Finland; **Helenius, Juha**, University of Helsinki, Finland

As soon as a process of abolishing an obligatory set-aside requirement under the CAP began, an international pressure on replacing it with a special environmental fallow started. Concurrently, some governments initiated development of national agri-environment support measures for environmental fallow. The final decision of the Council of Minister failed expectation, and the CAP set-aside was abolished without a due replacement at the EU level. In Finland, the national process brought its fruit though of a questionable quality. Here we review the national process of retaining set-aside with reference to the international pressures, and pinpoint important lessons for science-policy interaction. Our main conclusion is that as long as in a political process scientists are perceived as an "interest group", their efforts can easily be overrun by the rule of majority. Scientific knowledge should be given a separate forum from the policy negotiations, and the compromises resulting from the negotiations may need a further scientific scrutiny for their ability to deliver the objectives. Second lesson is that in order to enhance the environmental policy, the very policy process should be understood better and improved. One way forward would be to develop social learning practices in the process of the policy development.

62. FORECASTED VEGETATION CHANGES IN EUROPEAN NATURA 2000 AREAS

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The suitability of existing and planned protected areas for the conservation of species and habitats could be critically affected by climate change. We assessed implications of climate change for the European Natura 2000 protected area network, using a dynamic vegetation model. The model projects considerable transient shifts in vegetation types in most areas: 31–42% of the total area of Europe, 30-44% of the area protected by Natura 2000, and 25-39% of the protected forest area is projected to be covered by a different vegetation type by the year 2085. Still, even intermediate greenhouse gas stabilization might cast a shadow much further into the future. Simulated equilibrium vegetation responses are substantially larger, suggesting that 76-80% of the European land surface might exist within another equilibrium vegetation zone by the end of the century. 'Hotspots' of change include arctic and alpine ecosystems, where trees replace tundra and alpine vegetation, and southern Europe, where the model projects widespread forest dieback as a result of drought. We conclude that conservation aims have to be redefined in order to account for changing climatic conditions and associated vegetation types.

63. WHAT TYPE OF GROWTH IS SUSTAINABLE? AN ARGUMENTARY

Hinterberger, Friedrich, Sustainable Europe Research Institute, Austria; **Harald, Hutterer**, Karuna Consult, Austria; **Ines, Omann**, Sustainable Europe Research Institute, Austria; **Elke, Pirgmaier**, Sustainable Europe Research Institute, Austria; **Stefan, Giljum**, Sustainable Europe Research Institute, Austria; **Andrea, Stocker**, Sustainable Europe Research Institute, Austria; **Andreas, Teufel**, Sustainable Europe Research Institute, Austria

Is economic growth solving our problems or is it rather their cause? If we call for an absolute reduction of global resource consumption, we will have to face this issue because: although we use resources and energy more and more efficiently we continue to use more and more of them. The need for everlasting economic growth not only boosts resource consumption, but may also lead to addictive behavior. As a result, a permanent state of dissatisfaction is created, which cannot yield sustainable happiness. The possibilities of an alternative (viz. qualitative growth) are in the center of this paper. After presenting growth advocates' arguments for the need for economic growth in section 1, section 2 highlights the question why growth in its present form is problematic. Following, section 3 deals with driving forces of growth and section 4 illustrates factors that could potentially constrain growth. Finally, and as a synthesis of the preceding, section 5 depicts which (other) growth society needs. The paper concludes that our present growth-accustomed society does not result in increased quality of life and that the economy might go into decline as a consequence of increasing pressures from nature. In order to face these challenges sustainable alternatives have to be developed.

64. HETEROGENEITY MATTERS: RESILIENCE TO EXTREME MICROCLIMATIC CONDITIONS INFERRED FROM VEGETATION STRUCTURE IN FREE-WILLED AND MANAGED FORESTS

Hobson, Peter, Writtle college, United Kingdom; **Mickleburgh, Peter**, Writtle college, United Kingdom

Although biodiversity persistence has been linked to ecosystem resilience, there are fewer studies on the importance of spatial heterogeneity and dynamic processes in this context. The present study states that vegetation architecture, particularly in free-willed landscapes, promotes resilience, and that a better understanding of this relationship may help inform strategies in conservation, and the wider use of the landscape. This research carried out in free-willed and managed forest landscapes in both boreal and north temperate deciduous zones has revealed that forest temperature regimes appear to be effected by the impacts of disturbance on vegetation structure. Analysis of the data suggests that the more complex vegetation architecture in manage-release sites moderates against more extreme microclimatic conditions at different scales. Furthermore, human-induced change to forest structure appears to promote more extreme temperature conditions than natural disturbance regimes, including that of wildfire events. Finally, microclimatic conditions in open landscapes immediately adjacent to forest patches appear to be less extreme. This paper advocates a strategy that encourages the retention of 'islets of wilderness' in the landscape matrix, the appropriate use of land management models that mimic natural dynamics, and to help inform conservation and landscape management in the context of changing global climate regimes.

65. STRESS ECOLOGY AND CONSERVATION POLICIES

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There is a strong sense that advances in conservation physiology are too slowly translated into conservation policies. We argue that the successful solution of this problem requires the combination of two perspectives. The first argues that stress ecologists need to do sound science. Disagreements as to what constitutes an anthropogenic "disturbance" of wildlife could be solved by using a rigorous criterion for its consequences, such as a reduction in Darwinian fitness of affected individuals. Because wildlife populations experiencing anthropogenic stressors may show subtle changes, the burden of proof requires measuring changes in Darwinian fitness in affected populations and its comparison with similar measures in control populations. This is rarely done. The second perspective takes the view that anthropogenic disturbances are expressions of wildlife land-use conflicts and require the active involvement of key interest groups from the outset of research projects. This requires political skills to manage a complex social process as part of the research and a willingness to be subjected to non-peer review by interest groups. Our experience of wildlife land-use conflicts in three continents demonstrates that acceptance of results and translation into conservation policies and actions are more likely if conservation research is conducted in this way.

66. EURECA, THE EUROPEAN ECOSYSTEM ASSESSMENT

Hoogeveen, Ybele, European Environment Agency, Denmark; **Schutyser, Frederik**, European Environment Agency, Denmark; **Jaeger, Annekathrin**, European Environment Agency, Denmark; **Vos, Hans**, European Environment Agency, Denmark; **Gelabert, Eva**, European Environment Agency, Denmark; **Winograd, Manuel**, European Environment Agency, Denmark; **Weber, Jean-Louis**, European Environment Agency, Denmark; **Richard, Dominique**, Action Group on Erosion, Technology and Concentration, Biological Diversity, France

EURECA, the European Ecosystem Assessment, will assess the state of ecosystems in Europe in 2010 and their possible development beyond 2010. It will include an assessment of the stocks, flows and value of selected ecosystem goods and services under different policy-relevant scenarios. The Pathfinder module will consist of a comprehensive spatial analysis of ecosystems and a vulnerabilty assessment to socio-economic and climate change. Spotmeter modules will explore selected issues and areas. The findings will be integrated in a final analysis (the Integrator module), foreseen to be published in 2012. One of the proposed spotmeters concerns the competition for agricultural land in order to meet demands for food, feed, fuel as well as regulating and cultural services. Hot topics are the tension between intensification and maintenance of traditional farming systems and the 'global footprint' of European agriculture. A second spotmeter will address the ecosystem services delivered by the Natura2000 network of protected areas in view of inter alia climate change. Other spotmeter topics considered are the marine environment, coastal zones, mountain ranges, the Mediterranean and the Arctic.

67. THE INFLUENCE OF HAY PRODUCTION PRACTICES ON THE BUTTERFLY FAUNA OF ROMANIAN SUBALPINE MEADOWS

Huband, Sally, The Macaulay Institute, United Kingdom; **McCracken, Davy**, Scottish Agricultural College, United Kingdom

Low-intensity farming maintains large areas of semi-natural grasslands in the Romanian uplands but there are few examples of studies considering the relationship between land-use practices and the biodiversity of these habitats. This research investigated the relationship between hay meadow management around a mountain village and the temporal and spatial patterns of butterfly assemblages on those meadows. Standard butterfly transects were used and 46 species were recorded during the course of two summers in a transect corridor area equating to 1.7 hectares. This confirmed the high nature value of Romanian hay meadow management. Ordination of the butterfly data confirmed the destructive impact of mowing for adult butterflies at the level of the meadow but also revealed the importance for later emerging species of having late mown meadows and unmanaged grassland in the landscape. The presence of many small meadows, their idiosyncratic management by smallholders and variations in the natural environment all combine to produce heterogeneity in the hay meadow habitat. This heterogeneity is important for maintaining the diversity of butterflies and other semi-natural grassland species, but it is likely to lessen as the already evident trend of land abandonment accelerates.

68. THE DRAFT TEEB D2 REPORT – THE ECONOMICS OF ECOSYSTEMS AND BIODIVERSITY AT LOCAL AND REGIONAL POLICY LEVELS

Hussain, Salman, Scottish Agricultural College, United Kingdom

This session focuses on first results of D2 within the TEEB framework: the Report for Policy and Public Management at Local and Regional Levels. The aim of the D2 Report is to provide a source of inspiration for local and regional actors to 'operationalise' the growing concern for biodiversity conservation. The Report presents an overview of approaches and instruments (including valuation) to assess ecosystem services. In an action-oriented manner D2 seeks to provide orientation as regards the selection, application and interpretation of the approaches adopted. The Report pinpoints their respective characteristics and illustrates them in a range of examples from different policy tasks and contexts. In this session we aim to stimulate discussion and elicit feedback about (i) the structure and key messages of the draft report, about (ii) the choice of case studies, and about (iii) the stakeholder review process by which D2 recommendations might be 'field tested' for relevance and applicability.

69. USING BUTTERFLY COUNTS FOR BIODIVERSITY INDICATORS

Chris A.M., Van Swaay, De Vlinderstichting, Butterfly Conservation Europe, Netherlands

Biodiversity indicators are needed for assessing, reporting on and communicating the achievements of the 2010 target to halt biodiversity loss. Butterfly Monitoring Schemes offer the possibility to produce such indicators, based on 40000 km of transect walks annually in a growing number of European countries (see EuMon and SEBI2010 projects). So far two indicators have been developed using these counts: a European Grassland Butterfly Indicator and a European Butterfly Climate Change Indicator. The method for the Grassland Butterfly Indicator is based on the aggregation of national trends of selected species. Since 1990 the European Grassland Butterfly Indicator shows a strong negative trend and has declined by almost 60%. As the majority of grasslands in Europe require active management by humans or their livestock, butterflies also depend on the continuation of these activities. The Butterfly Climate Change Indicator builds on the concept of the Community Temperature Index (CTI), calculated following the method of Devictor et al. (2008). An increase in CTI would reflect butterfly communities becoming increasingly composed of species associated with warmer temperatures. The speed of increase shows how fast butterfly communities adapt. The results show a clear upward trend over the 18 years from 1990 to 2007, with an annual change in the CTI of 0.0142 oC.

70. THE ROSPUDA CASE – THE THEORY AND PRACTICE OF IMPLEMENTING NATURA 2000 IN POLAND

Chylarecki, Przemek, Museum & Institute of Zoology, Polish Academy of Sciences; Polish Society for the Protection of Birds/BirdLife, Poland; **Wiśniewska, Marta**, Central and Eastern Europe Bankwatch Network; Polish Green Network, Poland; **Górska, Małgorzata**, Polish Society for the Protection of Birds/BirdLife, Poland; **Cyglicki, Robert**, Greenpeace Poland, Poland

The Rospuda case has been a breakthrough for understanding the requirements of the Habitats Directive by domestic decision makers. Eventually, after a 7-year long battle, the decision to have a road by-passing rather than transecting the valuable fen-valley was taken. This was possible due to a combination of several factors: (1) concerted action of a coalition of the major domestic NGOs supported by international partners, leading to favorable rulings in 3 cases in domestic courts; (2) support by European authorities (European Commission, European Parliament and Bern Convention Standing Committee); (3) wide support from the public, generated by main media in Poland, and even in other European countries; and (4) strong scientific evidence and advocacy. Good regulations alone are not sufficient in a world of growing pressure for economic development, that usually is rather unsustainable. We need dedicated and highly professional watchdogs, scientific data, media support and a strong effort to change minds of authorities in relation to Natura 2000, especially in Eastern European countries. Suggested updating of EU biodiversity directives and regulations seems of secondary importance. Having more restrictive regulations is just of academic value if we are unable to successfully enforce the existing ones.

71. ADAPTATION TO CLIMATE CHANGE: A SYSTEMATIC ANALYSIS OF OPTIONS FOR ACTION FOR NATURE CONSERVATION

Ibisch, Pierre L., University of Applied Sciences Eberswalde, Germany; **Kreft, Stefan**, University of Applied Sciences Eberswalde, Germany

Conservation to date has been largely reactive and deterministic-static. As climate change is beginning to affect biodiversity, it is perceived as a prime task of conservation to enhance its targets' viability and adaptive capacity. Nevertheless, climate change is only one aspect of global change, and climate change requires mitigation in combination with adaptation. Additionally, new conflicts with other sectors may arise in the context of their efforts to adapt to global change. Within this increasingly complex context, conservation finds itself in growing competition for space and resources. It is thus vital to conservation to develop ever more powerful and versatile strategies. Options for action follow a hierarchical classification of the consecutive elements of biodiversity conservation: 1. Goal matrices, 2. implementation concepts and planning, 3. political and legislative framework, 4. concrete conservation measures and interventions, 5. monitoring and controll of success, 6. communication. Deterministic-static or prescriptive approaches are to be replaced by adaptive strategies. Unavoidable biodiversity changes must be anticipated, accepted and sometimes maybe even promoted. A "climate change-proof" conservation strategy shall be proactive, precautionary and adaptive. It shall be founded on a risk management approach. Apart from being as evidence-based as possible, adaptive conservation must be also non-knowledge and scenario-oriented.

72. ROBUST GLOBAL PRIORITISATION FOR BIODIVERSITY CONSERVATION IN THE FACE OF UNCERTAIN IMPACTS FROM CLIMATE CHANGE

Iwamura, Takuya, The Ecology Centre, School of Biological Sciences, The University of Queensland, Australia; **Salomon, Yacov**, Applied Environmental Decision Analysis, School of Botany, University of Melbourne, Australia; **Elmhirst, Toby**, Australian Research Council, Centre of Excellence for Coral Reef Studies, James Cook University, Australia; **Wilson, Kerrie**, The Ecology Centre, School of Biological Sciences, The University of Queensland, Australia; **Possingham, Hugh**, The Ecology Centre, School of Biological Sciences, The University of Queensland, Australia

Climate change is expected to affect the cost-effectiveness of global conservation prioritisation. A recently developed prioritization method incorporates the impact of climate change as a probability of investment failure (Iwamura et al. in prep.). Analyses using this method advise that conservation resources be diverted to areas with less prospect of investment failure. However, uncertainty in the impact of climate change

can impair such efforts. Here, we present a approach for global prioritisation that is robust to uncertainty. We prioritised the world's 825 ecoregions for conservation investment to minimize species loss based on endemic species richness, the opportunity costs of conservation, land conversion rates, and probabilities of investment failure. Investment failure was defined as the percentage of areas negatively impacted from climate change within protected areas. We applied Info-Gap theory (Ben-Haim 1996) to identify a set of priorities which perform sufficiently well with severe errors in the probability of investment failure. Our results show significant shifts in global conservation investment from existing global priorities if we consider the uncertain impacts from climate change. We discover that the prioritisation of conservation investments in the context of uncertainty reflects a trade-off between robustness and cost-efficiency.

73. INTERACTION BETWEEN HABITAT SELECTION AND STRESS SENSITIVITY

Jenni-Eiermann, Susanne, Swiss Ornithological Institute, Switzerland; **Thiel, Dominik**, Department of construction, traffic and environment, Section hunt and fishing, Switzerland; **Homberger, Benjamin**, Swiss Ornithological Institute, Switzerland

In a densely populated country, such as Switzerland, wildlife and humans often co-occur in the same habitat. Human recreation activities can lead to deteriorations of the habitat quality. Thus, human disturbance can either result in a decrease of wildlife's habitat quality or in a relocation to less suited habitats. A habitat of diminished quality however might raise physiological stress, reflected by an increase of the glucocorticoid hormone. On a short term such an increase helps to overcome life-threatening situations by redirecting energy. In contrast, long-lasting (chronic) stress and therewith constantly elevated glucocorticoid concentrations can have adverse effects on the fitness of an individual. Often it is difficult to judge at which point habitat quality has deteriorated to such an extent, that it causes stress, because the behaviour of an individual does not cogently reflect its physiological state. In this talk, the interaction between habitat selection and stress sensitivity will be presented for capercaillie and grey partridge, both species with rapidly declining populations. We measured stress by analysing the concentration of the metabolites of the avian stress hormone corticosterone (CMC) in droppings and compared habitats of different quality. The advantages and limits of this approach will also be discussed.

74. VALUING BIODIVERSITY, ECOSYSTEMS, AND THEIR SERVICES – A CRITICAL REVIEW AND ITS IMPLICATIONS

Joachim, Spangenberg, UFZ-Helmholtz Centre for Environmental Research; SERI Sustainable, Europe Research Institute Germany e.V., Germany

The current conservation policy discourse emphasises the role of economics, arguing: 1. allocating a monetary value makes the real, currently neglected value of nature visible to decision maskers and the public at large, and 2. using these prices to monetise biodiversity loss or ecosystem services degradation makes it possible to internalise the cost incurred into the market mechanism and thus to achieve optimal results in a most efficient manner. The paper shows that according to the logic of economics, the economic optimum achieved this way, even with damage costs and other costs included, is not necessarily the same as an ecological or social optimum. It may even include the loss of "useless and thus not valuable" ecosystems or species. Even more basically, due to the philosophy of values and the theory of science, economic valuation can only be selective, and due to economic theory, it can only be partial. Thus economics can only measure certain value aspects in a method and context dependent way. Economic information is one relevant, but not decisive and all-encompassing contribution to conservation policy decision making. Conservation biology and policy arguments carry more weight, and Ecosystem Management offers a more comprehensive framework.

75. SEARCHING FOR THE HISTORY OF FENNOSCANDIAN BOREAL FORESTS

Jonsson, Bengt Gunnar Jonsson, Mid Sweden University, Sweden; **Axelsson, Anna-lena Axelsson**, Swedish University of Agricultural Sciences, Sweden; **Hytteborn, Håkan Hytteborn**, Norwegian University of Science and Technology, Norway; **Keto-Tokoi, Petri Keto-Tokoi**, Tampere Polytechnic, Finland; **Kuuluvainen, Timo Kuuluvainen**, University of Helsinki, Finland; **Lindbladh, Matts Lindbladh**, Swedish University of Agricultural Sciences, Sweden; **Östlund, Lars Östlund**, Swedish University of Agricultural Sciences, Sweden

Due to increasingly more intensive forest utilization and management during the last centuries and especially since the early 20th century, much of the natural forests of Fennoscandia have been replaced by man-modified managed forests. Thus, when studying the natural forest dynamics we are forced to utilize a small fraction of still natural stands, which tend to occur in marginal habitats. To overcome this limitation we should also use historical methods and return to old studies performed during time periods when the landscape was to a larger extent governed by natural processes. In a recent workshop the research network PRIFOR reviewed a set of such older studies. To some extent these studies opens a window in time and provide glimpses of the past forest landscape. Works by Swedish and Finnish researchers (Aaltonen, Arnborg, Malmström, Sernander, Sirén and Tirén) do have certain relevance for contemporary research. It is however, also notable that the historical context influenced approaches and interpretations done by these early researchers. In the presentation we briefly point to their main contribution and discuss the extent to which their data is relevant today.

76. FROM VOLUNTEERS COUNTING BIRDS TO A EUROPEAN BIODIVERSITY INDICATOR, AND BACK

Julliard, Romain, National Museum of Natural History, France

Amateur ornithologists have long been interested in monitoring bird populations. National monitoring schemes have been established throughout Europe since the sixties. Over the last decade, this loosely organised network have gained considerable importance in the context of evaluating the impact of global changes on biodiversity. To a large extent, the driving force of this evolution has been the production of indicators. Produced in the first place almost as a trial, these indicators had immediately a great political success. But they also stimulated many research interests among monitoring schemes, rising the scientific profile of the whole network. Today, monitoring schemes face new challenges, one of which being to deal with their success, which was to a large extent not anticipated.

77. PROTECTED AREA MANAGEMENT EFFECTIVENESS EVALUATION AND THE APPLICATION OF METRICS TO IMPROVE UNDERSTANDING OF EVALUATION DATA

Kelman, Josie, University of Queensland, Australia

Management effectiveness evaluations of protected areas are increasing in response to a need to understand the contribution that protected areas make to biological conservation. Protected area evaluation studies typically

produce complex datasets, which are inherently difficult to analyse and communicate. This difficulty comes from both the information complexity and the need to succinctly communicate complex findings to stakeholders. In an attempt to address this need many score-card systems have been developed, however these systems are often limited by a loss of information richness. The loss of information richness is associated with data amalgamation, particularly where averages and arbitrary weighting systems are applied. In this paper, I explain how a multivariate statistical technique can be used to ameliorate information loss from metrics. The example provided is a case study of protected area management effectiveness evaluation from New South Wales, Australia. The management effectiveness metrics developed in this study are presented by park management service themes, as well as a combined overall score. The utility of metrics for communicating complex ideas will be discussed with the use of GIS. Spatial representation of program evaluation data in this study has been found to improve understanding of the evaluation data and its potential application.

78. TEPLA VLTAVA RIVER ECOSYSTEME TREAT BY EXCESSIVE CANOEING - TOLERABLE STRESS DETERMINATING

Kladivová, Věra, T.G.M. Water Research Institute, Czech Republic; **Simon, Ondřej**, T.G.M. Water Research Institute, Czech Republic

In the 1st zone of Šumava National Park, there is an unique ecosystem of mountain winding stream Teplá Vltava river c.15m wide. Park visitors are atracted by the natural beauty and easy canoeing. 10 000 boats pass through this stream per season (max 380 boats/day, 120 boats/hour). Regulations issued by Park management (sezone limitation, minimal water level 45cm) are not sufficient. To tighten up the rules, Park management holds unending negotiations with local administration. Impact of excessive canoeing was evaluated. To the monitoring there was selected the most sensitive part of ecosystem – submerged macrophytes ass. Myriophylletum alterniflori (Steusloff 1939). The floating plant fragments were counted in relation to number of boats and water level. There was found a significant relation between increasing number of boats and decreasing water level, as well as the fragments. The water level was established on 58cm, when the damage was not considerable. When both the boats number (10 boats/hour) and the fragments number was very low, the water level was unimportant. The Park management has several means against the commercial forces: time limitation, water level limitation, quantity control; guided tours. Unfortunately, interests of several local boat rentals are immoderately supported by local administration.

79. HOW DOES EUROPE MONITOR ITS BIODIVERSITY? A SURVEY FROM THE EUMON PROJECT

Klaus, Henle, Helmholtz Center of Environmental Research-UFZ, Department of Conservation Biology, Germany; **Pierre-Yves, Henry**, National Museum of Natural History, France; **Szabolcs, Lengyel**, Department of Ecology, University of Debrecen, Hungary; **Dirk, Schmeller**, National Center for Scientific Research, France

The presentation provides an introduction to the symposium Biodiversity Monitoring at European Scale with an overview of biodiversity monitoring activities in Europe. The symposium will focus on a general framework for combining existing monitoring data with the aim of increasing biological, spatial, or temporal coverage. 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 monitoring schemes for biodiversity in Europe. Currently 612 schemes (444 for species and 168 for habitats) that monitor species or habitat are described in a meta-database available online (DaEuMon). 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.

80. LINKING FARMLAND CONSERVATION MANAGEMENT TO POPULATION TRENDS

Kleijn, David, Alterra, Wageningen University and Research Centre, Netherlands

The most important forms of conservation management on farmland in Europe are agri-environment schemes. In Europe at least € 4 billion is spent annually on agri-environment schemes. More and more studies become available showing how effective these studies are in delivering biodiversity benefits. Most studies compare species richness or abundance on sites with agri-environment schemes with that in a control situation without schemes. Although insightful, such studies do not address the key aspect of conservation management: Does it contribute to the sustainable conservation of the target species at the population level? Here I summarize results of recent studies on black-tailed godwits *Limosa limosa limosa* breeding in Dutch agricultural grasslands. I use this case study to show the limitations of traditional evaluation methods and the potentials and pitfalls of more ambitious studies examining the impact of agri-environment schemes on the population dynamics of species.

81. CONTRIBUTION OF EARLY POST-DISTURBANCE STAGES TO BOREAL FOREST BIODIVERSITY: PERSPECTIVES ON CONSERVATION AND MANAGEMENT

Kouki, Jari, University of Joensuu, Finland

The decline of intact old-growth forests is generally regarded as a major threat to species in boreal forests. However, since large-scale disturbances are typical in natural boreal forests, also the (early) post-disturbance forests, or young successional stages have valuable ecological characteristics. When comparing managed and natural boreal forests in each age-class, the highest differences in their structure can often been seen in young post-disturbance forests. Young, natural forests seem to host a high number of species, too, and thus their importance for conserving boreal forest biodiversity is obvious. The contribution of younger forests in preserving forest biodiversity may have been underestimated as compared with old-growth areas. This finding has far-reaching consequences: it urges on maintenance of natural disturbance in managed and protected areas, and, even more importantly, emphasizes the underexploited potentials that early successional forests may have in the protection of boreal forest biodiversity. Some recently observed consequences of global change - such as the effects of drought on large-scale dieback of forests - may influence the occurrence of natural young forests, too, and they may shift the balance between different age classes in natural forests. The consequences that this has on biodiversity are quite unclear at the moment.

82. POTENTIALS OF SET-ASIDES IN PROVIDING OF FARMLAND BIRDS AND PLANTS IN HUNGARY

Kovács, Anikó, Szent István University, School of Environmental Sciences, Hungary; **Báldi, András**, Animal Ecology Research Group of the Hungarian Academy of Sciences and the Hungarian Natural History Museum, Hungary

The area of semi-natural habitats decreases in Europe largely due to land conversion into cropland, and more recently into energy crop plantations. In Hungary those agri-environment schemes, which were found to provide the Great Bustard (*Otis tarda*) require the resting of 20% of the total area of farmers during the 5 years of the contract period. These set-asides could be beneficial areas for farmland species. We compared the birds and plants of 1, 2 and 3 years old set-asides, winter cereal fields and semi-natural grasslands in 39 sampling sites in the Heves Environmentally Sensitive Area in 2008. Bird census was conducted in spring in 176 points. Plants were registered in each site in 10 quadrates. 1347 individuals of 51 bird species were detected. The wheat fields were the poorest. The species richness and abundance in set-asides increased with time of resting. The grasslands were richer in species than the 1 and 2 years old set-asides, and in abundance also than the 1 year old set-asides. Weed species richness was the highest in the set-asides. The cover data were similar as grasslands. Therefore, birds and weeds prefer the set-asides, which management should be maintained against competitive land uses, like energy crops.

83. NEW STRATEGIC ALIGNMENT OF PRIORITY AND TARGET SETTING IN CONSERVATION

Kreft, Stefan, University of Applied Sciences Eberswalde, Germany; **Ibisch, Pierre L.**, University of Applied Sciences Eberswalde, Germany

A critical review reveals that conservation in the EU largely follows the paradigm of maintaining the status quo of snapshot biodiversity patterns and tangible conservation targets. Moreover, a large percentage of the Natura 2000 sites established during the last decade might simply be too small and too isolated to guarantee a long-term survival of species and communities within their borders. A further conceptual development of target setting is called for. This shall shift away from species and life communities towards consideration of ecosystem functions and services as target. In order to ensure long-term viability of conservation strategies, target selection should be based on sensitivity analyses of potential targets as well as on scenarios of changes of climate and land-use, among others. Rather than the existing fragmented patchwork of mainly small protected areas exposed to strong and, through climate change, enhanced edge effects, the conservation of areas as large and undisturbed as possible is recommended. We suggest that conservation priorities shall finally move away substantially from the conservation of single species and discrete, azonal life communities in numerous small reserves, towards the conservation of large blocks of forests and wetlands in a matrix where a minimum ecosystemic quality is ensured.

84. SCAVENGERS OF LYNX PREY: FROM BEETLES TO BEARS

Krofel, Miha, University of Ljubljana, Slovenia

Scavenging is an important ecosystem process, and often a factor influencing the prey utilization success of large predators. We studied scavenger activity on prey remains of Eurasian lynx (*Lynx lynx*) in Northern Dinaric Mountains using video surveillance and survey of kill sites. Prolonged time of consumption, usually lasting several days, makes Eurasian lynx very vulnerable to kleptoparasitism. We recorded 16 vertebrate and several invertebrate scavengers feeding on 68 lynx prey remains. The most common visitor of lynx kills was red fox (*Vulpes vulpes*). However, we observed that brown bears (*Ursus arctos*) have the largest impact on lynx' prey utilization success, as they usually consume the entire carcass whenever they find it. Scavenging by bears considerably decreases prey utilization success of lynx and we estimated the overall loss due to bear kleptoparasitism at approximately 12 %. Besides the prey loss caused by animals, some prey is also lost to humans that remove it from the forest. Although kleptoparasitism is probably not the major reason for the recent decline of the Dinaric lynx population, it affects the lynx' prey utilization and might become an important factor if combined with a depleted prey base due to inappropriate management.

85. MISLEADING RESULTS FROM CONVENTIONAL GAP ANALYSIS – MESSAGES FROM THE WARMING NORTH

Kujala, Heini, Metapopulation Research Group, University of Helsinki, Finland; **Cabeza, Mar**, Biodiversity and Global Change Lab, National Museum on Natural Sciences of Madrid, CSIC, Spain

Gap analysis has been widely used to assess the performance of protected areas. But what is the relevance of the method in a warming world? The Finnish reserve network offers an interesting setting with an extensively protected North and a poorly protected South. Here, the results of Gap analysis for breeding birds disagree with population trends: species best covered are declining, while poorly covered species are faring well. Although there are several reasons for this contradicting pattern, the polarized distribution of protected areas suggests that climate change may be an important driver: species of northern habitats are declining despite having most of their distribution protected and projections done with several climate change scenarios indicate that these species are the ones losing climatic suitability in the near future. Our study shows that Gap analysis fails to capture these trends, regardless how targets are set. It is evident that existing conservation areas will not be able to protect all species in a future of warmer climate. However we call for caution when performing Gap analyses, because they cannot detect changes already taking place, and may provide misleading evidence of which species are well protected and which not.

86. POTENTIALS AND PROBLEMS FOR LINKING CONSERVATION BIOLOGY AND "SOCIETAL CHOICES"

Kurt, Jax, Helmholtz-Centre for Environmental Research, Germany; **Uta, Berghöfer**, Helmholtz-Centre for Environmental Research, Germany;

The process of evaluating biodiversity and ecosystems is not just a matter of experts alone. In particular if it aims at developing options for natural resource management, it requires including and assessing local people's knowledge, preferences and values. Management decisions are, or at least should be, always a matter of societal choices. The routes scientists from ecology, conservation biology, and the social sciences can follow a) to cooperate with each other and b) to interact with stakeholders, to support or even facilitate this process, are far from obvious. The paper presents our experiences from a project on the island of Navarino (Cape Horn Biosphere Reserve, Chile), aiming at the evaluation of biodiversity and the provision of development options for this remote and sparsely settled area. We report on the inter- and transdisciplinary methodologies developed during the course of the project and on lessons learned with respect to problems of a systematic character as encountered by us. These lessons relate to: a) the specific tasks and challenges of social and natural scientists in providing both analyses of

local conditions and facilitation of social choice processes and b) different and conflicting perspectives on the general role(s) of scientists within conservation projects.

87. NATURAL VARIABILITY OF BOREAL FOREST IN NORTH-EASTERN FENNOSCANDIA: IMPLICATIONS FOR MANAGEMENT

Kuuluvainen, Timo, University of Helsinki, Finland

Recent research in north-eastern Fennoscandia has revised many long-held conceptions of the natural variability of forest ecosystem structure and dynamics. In particular, the myth of boreal forest dynamics dominated by fierce stand-replacing disturbances, leading to dominance of even-aged stand successions, has been revised. The unveiling picture of natural variability in forest structure and dynamics in northern Europe is much more complex than the traditional one, highlighting the importance non-stand-replacing disturbances and the associated complex and dynamic stand and landscape structures. The results indicate that the currently dominating forest management model in the North-European boreal forests, which is based on clear cut harvesting of timber and growing even-aged stands, contradicts with the variability of forest structure and dynamics observed in the natural forest. As a consequence, in many areas the structure of the boreal forest under management is brought far outside its natural range of variatiability.

88. SIGNIFICANCE OF ROTATIONAL FALLOWS AND LONG-TERM SET-ASIDES FOR BUTTERFLIES AND BUMBLEBEES

Kuussaari, Mikko, Finnish Environment Institute, Finland; **Alanen, Eeva-Liisa**, Finnish Environment Institute, Finland; **Hyvönen, Terho**, Agrifood Research Finland, Finland

We examined the significance of establishing method, seed mixture, age and management of rotational fallows and long-term set-asides for insect pollinators. In the rotational fallow experiment seed mixture and age of fallow had greater effect on species richness than establishing method. Seed mixtures did not differ during the first year but in the second year species richness was higher in fallows sown with less competitive than with competitive grasses. Stubble fields reached as high pollinator species richness already during the first year as fallows with less competitive grasses in the second year. In the long-term set-aside experiment pollinator species richness increased during the first five years of the six-year experiment. Pollinator species richness and abundance were highest during the whole experiment in those seed mixture treatments containing meadow plants, but the difference to the other seed mixtures decreased during the last years. Comparison with field margins showed that bumblebee abundance in set-asides in relation to field margins increased faster than butterfly abundance. The experiments showed that the benefits of rotational fallows and set-asides for pollinators increase when set-asides are established using seeds of less competitive grasses and seed mixtures including nectar plants, as well as with increasing duration of set-asides.

89. ESTABLISHING EX-SITU CONSERVATION STRATEGIES BY EXAMINING GENETIC DIVERSITY IN *SILENE CHLORANTHA* L. (*CARYOPHYLLACEAE*)

Lauterbach, Daniel, Botanic Garden and Botanical Museum Berlin-Dahlem, Germany; **Gemeinholzer, Birgit**, Botanic Garden and Botanical Museum Berlin-Dahlem, Germany

Ex-situ conservation is successful if genetic diversity and the potential for evolution of populations can be preserved. However, it is poorly understood to what extend genetic diversity declines during cultivation. AFLP analysis was applied to investigate genetic variation within and between populations of different size and varying levels of fragmentation; as well as an ex-situ population from the 1980s at the Berlin Botanic Garden. As model group served the endangered dry grassland species *Silene chlorantha*. In-situ it currently occurs in only 15 isolated populations in north-east Germany while many populations got extinct recently. Three applied primer combinations provided 134 polymorphic bands among 144 analysed individuals. Low levels of genetic variation were revealed between the ex-situ and the associated in-situ population with genetic diversity being higher in the ex-situ population most likely as result of bottle neck effects in the wild. Positive correlations for all analyzed populations exist between population size and genetic diversity. Genetic variability and differentiation can be detected within and among the investigated populations. At present the ex-situ population represents the genetic variation of the associated in-situ but not of all investigated wild populations. Implications for the cultivation of endangered plant species in Botanic Gardens are discussed.

90. CLIMATE CHANGE IMPACTS ON *CEANOTHUS VERRUCOSUS*; DELAYED EFFECTS AND FUTURE PROJECTIONS

Lawson, Dawn M., San Diego State University, United States; **Regan, Helen M.**, University of California, United States; **Zedler, Paul H.**, University of Madison, United States; **Franklin, Janet**, Arizona State University, United States

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. Infrequent recruitment under climate change scenarios may render habitat unsuitable before extirpation because changes in survival rates will likely affect juveniles disproportionately. We consider two future scenarios, a warmer and wetter climate and a warmer and drier climate, and evaluate 20th century climate change with hindcasts. Because fire patterns in this habitat are controlled more by the availability of fine fuels than fuel flammability, fire risk increases with moisture. We link spatially-explicit population models with dynamic habitat suitability models to evaluate the effects of climate change on populations of *C. verrucosus*. Our models predict 1) a negative effect of 20th century climate change 2) higher impacts from warmer, wetter climate projections due to a reduction in fire return interval and 3) that natural dispersal is insufficient to allow this species to follow shifts in suitable habitat, all of which jeopardize long-term persistence.

91. HABITAT MONITORING IN EUROPE: CURRENT SITUATION AND FUTURE PERSPECTIVES

Lengyel, Szabolcs, University of Debrecen, Hungary; **Seliskar, Andrej**, Scientific Research Centre of the Slovenian Academy of Sciences and Arts, Slovenia

The monitoring of habitats is becoming essential in addressing global climate change, in implementing of the Habitats Directive and the Natura 2000 network, and in evaluating national/regional conservation activities. In the FP6 project "EuMon" (http://eumon.ckff.si), we surveyed ongoing habitat monitoring schemes, covering almost all European countries (n = 170 schemes total). Here we describe current practices and evaluate the scientific quality and cost-effectiveness of current habitat monitoring. The most frequently monitored habitats are forests, coastal habitats and grasslands. Although there are several positive developments (e.g. monitoring habitat quality, environmental parameters and potential causes of changes, applying an experimental design), many

schemes are isolated, local or regional in scale, and both sampling effort and data analysis vary greatly across schemes. Our survey also shows a large variation in scientific quality and cost-effectiveness, which can be improved by increasing spatial coverage and precision using modern technology (remote sensing), by better sampling in field mapping and by advanced data analysis to draw inferences. Future monitoring should become more standardised and thus more suitable for integration to assess changes and trends in biodiversity for Natura 2000 reporting and for judging the achievement of the 2010 target.

92. EURASIAN LYNX AS A PROVIDER OF CARRION IN SOUTHEASTERN NORWAY: QUANTIFYING INPUTS AND EXPLORING IMPACTS

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There has been a recent focus on the ecological role of predator provided carrion, with a special focus on bear predation on Pacific salmon and wolf predation on red deer and moose. In order to put these studies into perspective we have studied lynx predation on roe deer with a view to assess their role as carrion providers. Data on lynx kill rate and survival of radio-collared roe deer illustrate that lynx ensure a more uniform provision of carrion compared to other mortality sources that tend to be seasonally clumped. However, the low density of carrion provided, and the modest amount of meat left by the lynx indicate that the resource available for scavengers is rather limited. Experiments using dead roe deer as simulated lynx kills have allowed a detailed assessment of the rates at which different species utilize carrion and an assessment of the cascading transfer of nutrients into soil and vegetation.

93. GRAZING MANAGEMENT INFLUENCES MOTH COMMUNITY STRUCTURE ON A SCOTTISH UPLAND ESTATE

Littlewood, Nick A., Macaulay Institute, United Kingdom

Ongoing changes to grazing regimes in the Scottish uplands, especially the removal of sheep, are likely to have significant impacts on biodiversity. To investigate cascading multi-trophic interactions, a grazing experiment with four grazing treatments and six replicates was established on an upland acid grassland site in Perthshire, Scotland. Nocturnal adult moths were sampled by light-trapping in the fifth and sixth years after establishment of treatments. Moth abundance and species richness were lowest in the most intensely sheep-grazed treatment and highest in low-intensity sheep grazing and ungrazed treatments. Grazing impacts on community structure were investigated by assigning moth species to a number of groupings. Grazing treatment interacted significantly with larval foodplant preference with a disproportionately high number of graminoid-feeding species being present in the ungrazed treatment. There was also a significant interaction with the moths' over-wintering life stage. Species overwintering as eggs were well-represented in the low-intensity sheep grazed treatment whilst those overwintering as caterpillars were well represented in the ungrazed treatment. A continued reduction in livestock grazing levels on the Scottish uplands may lead to a general increase in moth abundance but a decline for species within some functional groups.

94. EFFECTS OF COUNTRYSIDE POLICY MEASURES ON SET-ASIDES IN GERMAN

Luick, Rainer, University of Rottenburg, Schadenweilerhof, Germany

Set-aside has been introduced as policy instrument of the common agricultural policy (cap) in 1988/1989 to challenge overproduction. From 1993/1994 set-aside became obligatory for specified farmland cultures; certain percentages of the farmland (5-15 %) had to be taken out of production. Set-aside was eligible for compensation payments and farmers were also allowed to produce biomass for renewable energy sources or for fibre. In Germany, set-aside and its importance for conservation is different due to differences of farming systems across the country. Set-aside became major issue for improving biodiversity. In arable ecosystems, policy aims such as the EU 2010 strategy are based on the existence of a matrix of set-aside areas. Various researches highlighted the correlation between farmland biodiversity and thresholds, spatial distribution and quality of set-aside. But land use policy is changing. Since last year set-aside no longer belongs to the strategic equipment of the first pillar of the cap. In Germany and with the back-up of policy and public opinion biomass production is causing increasing competition for agricultural land. Therefore, even possibilities within cap pillar 2 measurements, such as agri-environment schemes are of no interest any more. New concepts are needed to look for alternatives as functional replacements.

95. DEVELOPMENT OF NEAR-NATURAL MIRES IN THE BIOSPHERE RESERVE SCHORFHEIDE-CHORIN (GERMANY) IN THE LAST 16 YEARS: CONCLUSIONS FOR CONSERVATION MANAGEMENT

Luthardt, Vera, University of Applied Sciences Eberswalde, Faculty of Landscape Management & Nature Conservation, Germany; **Meier-Uhlherr, Ron**, University of Applied Sciences Eberswalde, Faculty of Landscape Management & Nature Conservation, Germany; **Schulz, Corinna**, University of Applied Sciences Eberswalde, Faculty of Landscape Management & Nature Conservation, Germany

Northeast Brandenburg is a part of Germany which is considerably affected by climate change. For these reasons it is a region that demonstrates its effects. Especially affected are water-dependant, near-natural mires as habitats for specific, mostly boreal species. As a typical feature of the landscape influenced by the Upper Pleistocene, the BR SC offers a high amount of these very specific and highly endangered ecosystems in a wide range. However, some of these mires obviously react to the change of weather already. Nine mires which had been classified as growing, completely intact and oligotrophic „treasures" in the 1990s and had not been affected directly ever since, serve as an example which demonstrates the effects of this meteorological period. These mires experienced a very different development since the early 1990s depending on their landscape embedment. The reasons for this different development are discussed. As a conclusion, the high importance of giving top priority to the maintenance and conservation of mires "with future" will be outlined. Long-term options for action to preserve mires characterized by a long-lasting water deficit are also mentioned. A decision support system for the management of mires with forest-dominated catchment areas has been developed.

96. SELLING BIODIVERSITY TO FARMERS - A VIEW FROM THE FARM

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The Author is Senior Farm Conservation Adviser with FWAG – the Farming & Wildlife Advisory Group – and is based in North Yorkshire, the largest County in England (803,000 hectares) with a diverse range of landscapes (upland, lowland and protected areas) and a similar wide diversity of farming systems, traditional and modern. The views expressed will be based on the author's experience of working with farmers and in the UK for over 22 years, including delivering agri-environment schemes - what works and what doesn't. FWAG (www.fwag.org.uk) is a farmer-led NGO established in 1969, and is the only independent and dedicated provider of environmental and conservation advice and consultancy to farmers and other land managers in the UK. FWAG has grown into a network of 120 highly skilled Farm Conservation Advisers located within 55 groups across the UK who make around 9000 advisory visits to farms per annum. FWAG seeks to support and enthuse farmers to secure environmental benefits on their land alongside sustainable businesses, and farmers are receptive to FWAG because we recognise the priority of farm business needs.

97. EMBEDDING ADAPTIVE MANAGEMENT PRINCIPLES IN SITE MANAGEMENT ORGANISATIONS

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In Europe, there are long traditions of establishing and managing sites for nature conservation purposes. They have been developed independently based on natural and cultural differences. Natura 2000 network is established to cover the entire EU and aims to protect selected habitats and species of European importance. Their management is still largely based on national and organisational traditions. Metsähallitus Natural Heritage Services (NHS) manages all state protected sites in Finland, about 7 million hectares of land and water. They form a national network with joint principles and tools. An international Management Effectiveness Evaluation of Finland's Protected Areas (MEE) was conducted in 2004. All national parks (35) and other significant sites have management plans. A major revision of network and site planning and management methods is being carried out. The aim is to increasingly use Adaptive Management principles in conservation and visitor management for improved focus, effectiveness and efficiency. An information system for management and monitoring information is developed. NHS is actively participating in international site management networks to share knowledge and participate in development efforts. Jointly agreed European Open Standards would significantly assist in improving and harmonising management methods and systems, and contribute to better implementation of EU nature directives.

98. *ROSA RUGOSA*, AN INVASIVE SPECIES IN THE COASTAL DUNES OF GERMANY

Maike, Isermann, Vegetation Ecology and Conservation Biology, Bremen University, Germany; **Anna, Jürgens**, Department of Ecology, Technical University Berlin, Germany; **Martin, Diekmann**, Vegetation Ecology and Conservation Biology, Bremen University, Germany; **Ingo, Kowarik**, Department of Ecology, Technical University Berlin, Germany

In coastal regions of NW Germany, the non-native shrub *Rosa rugosa* was planted since the beginning of the last century in gardens and for coastal protection. From these plantations the shrub invaded adjacent dune ecosystems and established large populations due to clonally growth. *R. rugosa* out-competes, mainly by shading, many herbaceous species typical for coastal dunes and thereby decreases species diversity. Shading effects are much stronger than in shrub species with less dense growth forms, e.g. *Hippophaë rhamnoides*. Invasions by *R. rugosa* also strongly affect habitats protected by the FFH-directive and areas within the Waddensea National Park. We used aerial photographs and vegetation maps of the East Frisian Islands to investigate the invasibility of various habitat types. Relationships between landscape structures, for example proportion of other shrubs, and distribution patterns of *R. rugosa* were analysed. Furthermore, we examined how the spatial distribution of *R. rugosa* depends on the density of paths or the distance to paths or buildings as proxy for propagule pressure. Patch density of *R. rugosa* generally declined with increasing distance to urban areas. Both landscape structure and propagule pressure appear to affect the distribution patterns of *R. rugosa.*

99. CONSERVATION OF GRASSLAND INSECT DIVERSITY AT MULTIPLE SCALES

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The mechanisms underlying the observed decline in insect diversity in managed grasslands act at different spatial scales. Here, we present a multi-scale study investigating the impact of local management, landscape composition, and transformation of farm structure on orthopteran and butterfly diversity in Alpine grasslands. At the local scale, management intensity (cutting regime and fertilization) reduced species diversity due to direct mortality and alteration of sward structure, host plant abundance, and food quality. At the landscape scale, the presence of undisturbed woody vegetation in the close surrounding landscape (95 m) was positively related to species richness probably due to a rescue effect. At the whole-farm scale, we found a strong positive effect of slope and a negative influence of farm specialization. Thus, local stakeholders should consider targeted agri-environment schemes to reduce the ongoing substitution of small traditional farms with large intensive farms. In our Alpine region, reduced nutrient output per area, preservation of grassland–forest mosaics at the landscape scale, and maintenance of low-intensity management of steep areas should be promoted, therewith reducing the negative impact on insect diversity of the current transformation of grassland marginal systems.

100. ON THE ROLE OF POPULATION GENETICS FOR EX-SITU PLANT CONSERVATION

Markus, Fischer, Institute of Plant Sciences, University of Bern, Switzerland;

Ex-situ conservation is an important element of the Global Strategy for Plant Conservation. However, while ex-situ plant conservation seems to be simple and straightforward from a demographic point of view – take seeds or vegetative propagules, store or propagate them, and as long as there is at least as much material as at start it is successful – turns out highly complex as soon as genetic considerations come into play. Such considerations matter throughout the process of any ex-situ conservation project. Where should we sample which material? How much of it? How should we store seeds and propagules? Which environment should we provide for germination and growth? With whom should we allow plants

to cross ex-situ? In which environment should offspring be grown? Should plants of different provenances be grown together? What is the role of hybridisation? How should we use ex-situ material for successful transfer back in-situ? The lecture provides background information and examples on the roles of genetic drift, inbreeding, selection, and inbreeding and outbreeding depression for answering these questions, derives simple guidelines for ex-situ plant conservation and reintroduction, and outlines avenues for future research.

101. USING OF SCIENTIFIC DATA FOR DESIGNATION AND PROTECTION OF NATURA 2000 – BULGARIAN CASE

Mateeva, Irina, Bulgarian Society for the Protection of Birds, Bulgaria

One of the main challenges in front of Bulgaria prior the accession to EU was the establishment of Natura 2000, in order to ensure its proper and on-time protection. The BSPB, as an NGO, had to identify and propose to the government the coherent network of Special Protection Areas (SPA) under the Bird Directive. The government had to ensure their designation as Natura 2000 sites. A strategy for establishment of the network was implemented, including analysis of existing scientific data, extensive field work for filling the gaps and also involvement of all the experts in the discussion on identification of the best sites. Standard criteria of BirdLife International for identification of Important Bird Areas were applied to choose SPAs. Despite the efforts of many experts the government postponed significantly the approval and designation of SPAs. In the mean time many of them are threatened by damaging projects and some SPAs are already deteriorated. Both the institutions and the investors did not take seriously scientific arguments for saving the Natura 2000 sites. The EU Commission, as a guardian of the Treaty, opened recently two infringement procedures against Bulgaria for not complying of Nature legislation, using both facts and scientific arguments.

102. THE ROLE OF HUNTING ACTIVITY IN THE CONSERVATION AT THE TOP-LEVEL OF THE ECOSYSTEM: GAME SPECIES AND VULTURES

Mateo-Tomás, Patricia, University of León, Spain; **P. Olea, Pedro**, IE University, Spain

We analysed the influence of ungulate hunting on the management and conservation of Griffon Vulture (*Gyps fulvus*) in NW Spain. Use of the area by vultures was addressed by looking for cliffs used as roosts or colonies, and consumption of game species by vultures was evaluated through questionnaires to hunters and field surveys. Results revealed a strong spatiotemporal adjustment in the use of the area by vultures and hunting, especially of red deer and wild boar. Vultures occupied roosting sites very close to the main hunting sectors of these two game species and often were seen consuming their carcasses. Number of both red deer and wild boar captures within 3.5 km around the roosts were the best predictors of vulture occurrence and number. Our estimates show that hunting could feed around 1,807 vultures during half a year, i.e. a higher population than that existing in the area (1,100). Griffon Vulture is a scavenger with a relevant function in the ecosystem. Hunting can thus influences at the top of the ecosystem (scavengers) and could aid to sustainably manage griffon vulture populations, reconciling hunting and conservation. However, both negative and positive impacts of hunting on ecosystem conservation should be assessed and taken into account.

103. PROTECTED AREA MANAGEMENT IN CHANGING CLIMATE - THE FINNISH APPROACH

Matti, Hovi, Metsähallitus, Finland

In the context of protected area management, climate change can be seen as another changing factor which shapes the management regime (values and threats) of a single protected area. In a recent Finnish desktop study on the effects of climate change, and the means of adapting to it, a number of expected effects have been outlined. This scenario has been made on a general level, and is clearly inadequate when it comes to the anticipation of the values and threats in a management planning process of a single area. While it is generally recognised that the changes in physical environment means a) problems for several threatened species and habitats, b) new challenges for habitat management, and c) unpredictable changes in visitor behaviour, each management plan should review the site-specific values and threats along with the estimation of local effects. Oulanka National park in northern Finland will have a renewed management plan in 2010, and the first step of this work, already in 2009, will include a scenario of the likely and possible effects that are locally relevant.

104. BUILDING THE REQUIRED CAPACITY TO PRACTICE ADAPTIVE SITE MANAGEMENT

McIntosh, Neil, Eurosite, Netherlands

Increasingly, site managers and nature conservation organisations across Europe need to share practical experience to inform their work. Sites require to be managed not only for their intrinsic natural values, but also as components of an ecologically connected landscape. It is essential that site managers are equipped with the skills necessary to manage their sites effectively and adaptively in response to challenges such as climate change. Making the right decisions is an increasingly complex and pressurised process: it demands knowledge and significant resources from every country in Europe. Eurosite works with members and partners to build capacity within functional site teams of 6 to 8 people. During 5-day workshops, working in tandem with other teams, they apply learning to develop adaptive management plans for their sites. The teams peer-review each others work, compare approaches and share experience and ideas. Each team is supported by a dedicated coach, drawn from a growing network of coaches. This support continues beyond the workshops. In this way, through the Eurosite network, good practices and approaches can be harvested to improve experience-based learning and spark cross fertilisation of ideas. This is vital for the continuous development of best adaptive management practices and peer reviewed standards.

105. THE ARCTIC'S CHANGING CLIMATE: USING VERTEBRATE POPULATION TRENDS TO MONITOR THE HEALTH OF THIS RAPIDLY SHIFTING ECOSYSTEM

McRae, Louise, Institute of Zoology, United Kingdom; **Collen, Ben**, Institute of Zoology, United Kingdom; **Loh, Jonathan**, Institute of Zoology/World Wildlife Fund International, United Kingdom; **Zockler, Christoph**, United Nations Environment Programme - World Conservation Monitoring Centre, United Kingdom; **Gill, Mike**, Circumpolar Biodiversity Monitoring Program/Environment Canada, Canada

The Arctic is a globally important region for biodiversity. It provides essential services such as key breeding sites for migratory species, climate regulation and the provision of livelihoods both locally and globally. However, the Arctic is undergoing stark changes due to the direct impact of human activity and the global threat of climate change. In order to gauge the health of this ecosystem and the rate at which

it is changing under these pressures, population trends for vertebrate species were modelled to produce an index of change in abundance for the Arctic over the last 40 years. The results demonstrate how trends in abundance differ regionally and taxonomically due to a number of factors including the level and type of threat, sea ice dependency and mode of life history. Evidence for early signs of the impacts of climate change in light of the results is presented. This study highlights where gaps in current knowledge remain and advocates the need for future monitoring of animal populations in order to accurately detect trends in this rapidly changing environment.

106. META-ANALYSIS AS A TOOL FOR EXPLORING AND COMMUNICATING UNCERTAINTY

Mengersen, Kerrie, University of Queensland, Australia; **Stewart, Gavin**, University of Bangor, United Kingdom

As in many areas of ecology, meta-analysis is a respected statistical tool for increasing the power to make informed inferences about conservation based on all of the available information. Importantly, the approach enables not only point estimates and predictions, but a formal statement about the uncertainty of such values. This uncertainty may range from a description of the heterogeneity between information sources with respect to sampling design, quality, response etc), to possible alternatives in the statistical model structure itself. It can be entered through the levels of a hierarchical model and/or priors in a Bayesian context. The formal inclusion of this uncertainty in the meta-analysis induces a range of estimates and predictions, which provides a much richer decision base for conservation experts. Through a series of case studies, this presentation identifies a variety of sources of uncertainty encountered in conservation meta-analyses, describes the statistical models that can be used to describe and accommodate this uncertainty, and reports on the differences in conservation decisions based on first ignoring and then acknowledging the uncertainty.

107. SOLVING THE CONSERVATION RESOURCE ALLOCATION PROBLEM: ACHIEVEMENTS AND FUTURE CHALLENGES

Moilanen, Atte, University of Helsinki, Finland

The aim of conservation resource allocation (CRA) is efficient use of limited conservation resources. I summarize the state of CRA methodology, based on literature and a survey between authors of a recent book about conservation prioritization. Much effort has been expended on investigating the optimality characteristics of solution methods (heuristics, integer programming, stochastic global search, etc.) for relatively simple reserve selection problems, a subset of CRA. These problems, including their extensions with connectivity, are presently well understood. Challenges include dealing with threats and processes (including climate change) in the spatial context, development of community level prioritization approaches, and development of large-scale high-resolution planning capacity. Increased effort should also be used for improved understanding about how conservation action converts to landscape-scale conservation value. Solution suboptimality in CRA problems can arise from two different sources; from suboptimal (heuristic) solution methodology, or from extensive problem simplification required to allow mathematically exact solution. Literature suggests that suboptimality from heuristic solution is only a few percent for good heuristics, whereas suboptimality from simplifying away ecologically important factors or costs could be much more, even >50%. This suggests that increased research effort should be allocated to CRA problem definition rather than problem solution.

108. ZERO RATE OF SET-ASIDE: EVALUATING THE POTENTIAL IMPACT ON FARMLAND BIRDS IN ENGLAND

Morris, Tony, The Royal Society for the Protection of Birds, United Kingdom; **Henderson, Ian**, British Trust for Ornithology, United Kingdom; **Siriwardena, Gavin**, British Trust for Ornithology, United Kingdom; **Vickery, Juliet**, RSPB, United Kingdom

There is concern that loss of set-aside will have detrimental impacts on bird populations and compromise the ability to meet targets of reversing farmland bird declines. Understanding the scale and nature of measures required to mitigate against this loss requires knowledge of the value of set-aside in relation to other farmland habitats. Four key objectives were assessed: (i) for multiple species, to estimate the relative bird densities on different types of set-aside compared with cropped habitats and land under agri-environment scheme (AES) options in summer and winter; (ii) to estimate the uptake of key measures required to mitigate the loss of set-aside; (iii) for Skylark, to use population modelling to estimate the additional uptake of AES options (and/or changes in cropping) required to increase populations in the absence of set-aside; (iv) to identify key information gaps and research requirements to enhance the accuracy of estimates. The results were used to make broad predictions about the impact of set-aside loss. A scenario of set-aside loss and AES option uptake similar to that currently observed in England, could result in the reduction in the density of a suite of farmland birds by 30% in summer and 65% in winter.

109. NATURA 2000 IN THE CARPATHIANS–LESSONS TO BE LEARNT ...

Mroz, Wojciech, Institute of Nature Conservation. Polish Academy of Sciences, Poland

The main project purpose of the project “Optimization of the use of the resources of the Natura 2000 network for sustainable development in the Carpathians (2007-2011)” is to involve local communities in the process of bringing Natura 2000 concepts into their real life and to implement a number of pilot conservation, planning and education activities. The project goals are focused on the following questions: (1) where and how do we want to maintain biodiversity in the Carpathians; (2) how to protect what shall be maintained and not to impede local development; (3) how to help local people to take advantage of the natural values of their mountains; and (4) how to improve the flow of information between stakeholders, scientists and local people. The interim project experiences will be discussed, e.g.: data gathering systems, active conservation measures, cooperation with the authorities, stakeholder involvement and how to overcome obstacles at the local level. This project represents a good example and starting point for a wider discussion on the further development of the Natura 2000 network in Europe.

110. ECOLOGICAL SUCCESS OF FIELD MARGINS AND FARMER’S COMMITMENT

Musters, C. J. M., Institute of Environmental Sciences, Leiden University, Netherlands; **Noordijk, Jinze**, Institute of Environmental Sciences, Leiden University, Netherlands; **van Dijk, Jerry**, Institute of Environmental Sciences, Leiden University, Netherlands; **de Snoo, Geert R.**, Institute of Environmental Sciences, Leiden University, Netherlands

To study the effect of tailored information and public commitment of farmers on the ecological success of nature friendly management, we first studied the effects of Dutch agri-environmental schemes on the biodiversity of semi-natural field margins on arable land. We found that the diversity of plant species is increasing in the years after the implementation of grass field margins that where mown every year, that the diversity of plant species strongly

increased in the ditch banks next to the grass field margins, and that invertebrate species group richness increased in flower field margins, but that predators decreased and insect biomass did not change, although plant species diversity did decrease. In a second analysis, we studied whether farmer's commitment affected the change in diversity of the field margins. For that we assessed the quality of management performances of farmers based on interviews, and correlated scores of this variable with plant and invertebrate richness in flower field margins as well as with the speed of change in diversity.

111. PRECISION OF MONITORING DATA AND ITS IMPLICATIONS FOR DETECTING TRENDS

Nowicki, Piotr, Institute of Environmental Sciences, Jagiellonian University, Poland; **Hovestadt, Thomas**, University of Würzburg, Germany

Detecting trends in species abundance is among primary objectives of monitoring programmes, and for this purpose population time series data are collected. However, the time series are subject to: (i) process noise, i.e. fluctuations due to environmental stochasticity, and (ii) measurement error, i.e. deviation of recorded values from true ones. Our aim was to assess, using numerical simulations, the impact of both sources of error and time series length on population trend parameters. Measurement error and time series length were found to introduce substantial bias on population growth estimates, and (to a less extent) on carrying capacity estimates, while process noise had little effect on the parameter bias. More importantly, both process noise and measurement error, even at a moderate level of 0.1, together with short time series (<15 years) strongly reduced the ability to detect a significant population trend unless the trend itself was very pronounced (> 5% per year). Consequently, the EU requirement for its member states to detect within a 6-year reporting period even a 1% decline per year for the species of Community Interest appears unachievable in most cases. Details of the study can be found in Hovestadt and Nowicki (2008) Biodiversity & Conservation.

112. THE EFFECTS OF SCAVENGING ON DECOMPOSITION RATES AND THE IMPLICATIONS FOR FORENSIC SCIENCE

O'Brien, R. Christopher, University of Ontario, Institute of Technology, Canada; **Forbes, Shari**, University of Ontario, Institute of Technology, Canada; **Meyer, Jan**, University of Western Australia, Australia; **Dadour, Ian**, University of Western Australia, Australia

The decomposition rate of human remains is an important measure of time since death estimations. This is especially applicable when the remains have passed the initial stages of decay. This rate is affected by several intrinsic and extrinsic factors including but not limited to temperature, rainfall, humidity, location, trauma, accessibility by insects, and disturbance by scavengers. This presentation will discuss research conducted in southern Western Australia to investigate the scavenging guilds feeding patterns and their effects on decomposition rates. Pig carcasses were imaged continuously using infrared cameras and time-lapse video recorder. The images were viewed to determine the type of species feeding, the time of day each feeding event occurred, the material being fed upon, and whether there was any disturbance to the carcass. The most destructive scavengers were mammalian however the most abundant scavengers were avian species. The feeding patterns of the animals demonstrated significant differences with respect to the material being fed upon and the disturbances to the body. Although insectivores were observed during every decompositional stage and every location they did not appear to affect the decomposition rate. This data is valuable in determining time since death of bodies that have been exposed to animal scavenging.

113. EMPLOYMENT, BIODIVERSITY CONSERVATION, AND THE STEADY STATE ECONOMY

O'Neill, Daniel, University of Leeds, United Kingdom

There is a fundamental conflict between economic growth and biodiversity conservation. As the economy grows, more natural resources are consumed, and more wastes are produced, resulting in less ecological space for other species. Given that we live on a finite planet, economic growth cannot continue forever: we must move towards a steady state economy in which population and per capita consumption remain roughly constant over time, at a level the environment can support. However, the concept of economic growth, as measured by increasing GDP, is deeply engrained in our society. In particular, there is a widespread belief that high rates of economic growth are necessary to prevent rising unemployment. This belief may represent the largest obstacle to achieving a steady state economy, and hence biodiversity conservation. In order to investigate the accuracy of this belief, I use a dynamic model and empirical data to test whether full employment is possible in a steady state economy. I explore the role that various policies might have on unemployment, including shorter working hours, a basic income, and a shift towards "green jobs". In general I find that full employment is possible in a steady state economy, although very different macroeconomic conditions are required.

114. AN INTEGER PROGRAMMING-BASED MODEL TO INCLUDE ECOSYSTEM SERVICES INTO THE PRIORITIZATION OF FOREST RESTORATION AREAS

Orsi, Francesco, University of Trento, Italy; **Church, Richard L.**, University of California, Santa Barbara, United States; **Geneletti, Davide**, University of Trento, Italy

The identification of forest restoration priorities is a major issue in conservation science due to its potential for the recovery of ecosystems and eventually the protection of biodiversity. Nevertheless, such a process cannot exclude humans living within or relying on the forested environment. Current models often include socioeconomic aspects merely as criteria for an ex-post assessment of the restoration plans. Further, they rarely apply a cell-based approach, which is instead fundamental to actually give restoration patches a shape. We propose a model, based on integer programming, that allocates restoration cells, by taking into account the ecological suitability to restoration, the shape of the clusters of cells allocated to restoration and the presence and needs of human settlements. We present the results of an application to dry forest landscapes in southern Mexico. This shows that the provision of ecosystem services, when properly included in the model, is able to improve the overall design in terms of ecosystem functionality, while guaranteeing people with an adequate amount of forest goods and services. Our long term objective is to develop a plan that is sustainable ecologically and economically.

115. AUDIT OF NATURA 2000 IMPLEMENTATION

Pannier, Dominique, Supreme Audit institution, France

Seven European supreme institutions have agreed in February 2007 to perform a parallel audit of Natura 2000 network implementation in their respective countries (Austria, Czech Republic, Estonia, Finland, France, Hungary, United Kingdom). To ensure comparability, an agreement was reached on audit questions. The audit objectives were to analyze (i) compliance issues, including main problems in transposing and complying with the Natura Directives, and reasons for delays; (ii) governance issues, including the assesment of efficiency of national scheme for managing the implementation and capacity for resolving difficulties; (iii)

cost efficiency issues, including assesment of performance of the financial incentives and establishment of audit criteria and indicators. The common findings are: Most of the audited countries were not able to implement the Directives within appropriate timescales. This led to numerous infringement processes. The audit identifies the reasons for these delays. The diversity of governance approaches is allowed by the Directives and eases their adaptation to the local context. Costs of implementing this policy could not be precisely identified, indicators had not been developed to compare the cost and efficiency of the different methods used. The general finding was that the Natura policy has strengthened nature conservation and in some countries has created more stability.

116. NATURA 2000 – ACHIEVEMENTS AND CHALLENGES

Papoulias, Fotios, European Commission, Belgium

The European ecological network Natura 2000 is the centrepiece of EU nature & biodiversity policy. Currently covering 17% of the EU land territory it is the largest network of protected areas in the world and has already significantly contributed to maintaining or restoring many of our most precious natural areas. While the land part of the Natura 2000 network is in the final stages of completion, considerable work still has to be done to complete the network in the marine environment. The main challenge is now to ensure the effective management of the network. This involves sound implementation and enforcement of relevant legislation, development of appropriate conservation measures for the sites including sufficient financial support, promotion of good practices and integration of nature conservation with other policies. Efforts have to be undertaken both at EU and national and regional scale and their success largely relies on closely associating local communities and different land-users and working in partnership with them. The Commission is actively engaged in an array of activities along these lines, in close cooperation with the Member States and stakeholders.

117. IMPACT OF OUTDOOR WINTER SPORTS ON THE ABUNDANCE OF A KEY INDICATOR SPECIES OF ALPINE ECOSYSTEMS

Patrick, Patthey, Conservation Biology, University of Bern, Switzerland; **Sven, Wirthner**, Conservation Biology, University of Bern, Switzerland; **Natalina, Signorell**, Conservation Biology, University of Bern, Switzerland; **Raphaël, Arlettaz**, Conservation Biology, University of Bern, Switzerland

Tourism and leisure activities have increased continuously over the past decades, representing a novel source of source of stress for wildlife. This may affect its abundance, although we still lack quantitative evidence. We tested the effect of winter recreation on the abundance of the black grouse *Tetrao tetrix*, a declining indicator species of the timberline ecosystem, which, in the European Alps, shares the same habitat as winter sports. We modelled the number of displaying cocks, as a function of habitat characteristics, ski lift density and hunting pressure at 15 natural sites and 15 ski resorts in the south-western Swiss Alps. Ski lift density and habitat typology were the principal determinants of black grouse abundance, whereas hunting pressure had no discernable effect. Ski lifts and related winter sport activities exerted a strong negative impact on the number of displaying cocks, with a predicted 36% reduction of population size within ski resorts. The negative effects generated by winter sports could be mitigated by the creation of winter refuges in the areas where major conflicts between wildlife and humans arise.

118. IMPACT OF ALIEN CRAYFISH SPECIES ON CONSERVATION OF NATIVE CRAYFISH IN THE CZECH REPUBLIC

Petrusek, Adam, Department of Ecology, Charles University in Prague, Czech Republic; **Kozák, Pavel**, Research Institute of Fish Culture and Hydrobiology, University of South Bohemia, Czech Republic; **Ďuriš, Zdeněk**, Department of Biology and Ecology, University of Ostrava, Czech Republic; **Horká, Ivona**, Department of Biology and Ecology, University of Ostrava, Czech Republic; **Buřič, Miloš**, Research Institute of Fish Culture and Hydrobiology, University of South Bohemia, Czech Republic; **Kozubíková, Eva**, Department of Ecology, Charles University in Prague, Czech Republic

Alien American crayfishes in Europe cause various negative impacts on invaded aquatic environments. Conservationally most important issue in Central Europe is their ability to host the pathogen of crayfish plague and transfer it to populations of endangered native species. We proved by molecular methods that this disease caused at least seven crayfish mass mortalities in the Czech Republic since 2004, with actual number of outbreaks probably being higher. Local populations of the two American crayfish species markedly differ in prevalence of the pathogen. Spiny-cheek crayfish *Orconectes limosus* shows a high, habitat-dependent, variation of infected individuals. Conversely, local populations of signal crayfish *Pacifastacus leniusculus* seem to be less serious threat at present. Crayfish are usually dispersed among localities by humans but the direct transfer of plague from American to European crayfish highly depends on their migratory activity. *O. limosus*, mainly present in larger rivers or standing waters, penetrates to lower reaches of small-order streams which may host native species. Radiotelemetry has shown its tendency for seasonal migrations from a reservoir to adjacent small stream and back, and an ability of rapid downstream movements. Despite among-species differences, all populations of alien American crayfish should be regarded as potential plague reservoirs.

119. AN AXIOMATIC THEORY OF TARGET-BASED SITE PRIORITIZATION PRODUCES A SIMPLE AND EFFECTIVE NEW INDEX

Phillips, Steven, AT&T;Labs-Research, United States; **Torknornoo, Desmond**, University of California at Berkeley, United States; **Applegate, David**, AT&T;Labs-Research, United States; **Archer, Aaron**, AT&T;Labs-Research, United States; **Johnson, David**, AT&T;Labs-Research, United States; **Pressey, Robert**, James Cook University, Australia

Indices for site prioritization are widely used as a means of addressing the question: which sites are the most important for conservation of biodiversity? We investigate the theoretical underpinnings of target-based prioritization indices, which prioritize sites according to their contribution to achieving a set of predetermined conservation targets. We show a strong connection between existing work on site prioritization and the mathematical theory of voting power. Some well-known paradoxes of voting power afflict commonly-used site prioritization indices; by negating such paradoxes, we develop a set of intuitive axioms that we would like a single-species site prioritization index to obey. We introduce an extremely simple new index, called fraction-of-spare, that satisfies all the axioms. As an experimental evaluation, we study the multi-year scheduling of site acquisitions for conservation of forest types in New South Wales, under specified assumptions about clearing rates. We find that for this application, the fraction-of-spare index outperforms 52 existing prioritization indices. We are also able to compute the optimal schedule of acquisitions (under the assumed clearing rates) using mathematical programming techniques, which allows us to conclude that there is still further potential for improvement in the use of site prioritization indices for conservation scheduling.

120. DO POLICY MAKERS FOLLOW CLIMATE CHANGE ADAPTATIONS RECOMMENDED BY SCIENTISTS?

Plesník, Jan, Agency for Nature Conservation and Landscape Protection of the Czech Republic, Czech Republic

Global climate change threatens global biodiversity, ecosystem functioning, and human wellbeing, with thousands of publications demonstrating impacts across a wide diversity of taxonomic/functional groups, ecosystems, economics, and social structure. For implementing timely appropriate and effective adaptation measures within the landscape, ecosystem-based adaptations can be applied. Ecosystem-based adaptation is the use of sustainable ecosystem management activities to support planned adaptation. Ecosystem-based adaptation, inter alia, identifies and implements a range of strategies for the management, conservation and restoration of ecosystems to provide services that enable people to adapt to the impacts of climate change. HELLER & ZAVALLETA (2009) reviewed the scientific articles recommending measures to adapt conservation to climate change and published from 1972 to 2007. The most often raised recommendations were (1) increasing landscape connectivity (2) integrating climate change into planning and (3) mitigating other threats to biological diversity. We have reviewed 21 policy documents on climate change adaptations worldwide, from global to local, from general to sectorial, published in 1992–2009. They followed the recommendations from scientists: Top Three are the same. The serious problem has been a real implementation of such documents in practice.

121. LOCAL AND REGIONAL FACTORS AFFECTING INSECT DIVERSITY IN FINNISH GRASSLANDS

Pöyry, Juha, Finnish Environment Institute, Finland

The significance of factors affecting the diversity of insect communities inhabiting semi-natural grasslands were studied in SW Finland. Maximum species richness of insect groups peaked at taller vegetation (ca. 30 cm) compared to vascular plants (ca. 20 cm). While plants had benefited from resumed grazing, highest species richness of butterflies and moths occurred in abandoned grasslands. The difference between plants and insects in relation to the effects of management can be understood in two ways: (1) more suitable niches for herbivorous insects occur in structurally diverse tall unmanaged vegetation compared to low vegetation maintained by management, and (2) species in higher trophic position (e.g. herbivorous insects) are less tolerant to disturbances compared to species in lower trophic position (e.g. plants) as suggested by Huston's "dynamic equilibrium model". However, species differed in their responses to management, and declining butterflies and moths exhibited highest abundances in old pastures. In addition to the local factors, regional habitat connectivity exhibited a strong impact on total abundance of the declining butterflies and moths. Therefore, management of grassland insect communities should be implemented on regional scale, and varying management intensities are recommended in order to take into account the differing requirements of different taxa.

122. A REVIEW OF ALIEN SPECIES IN THE NATIONAL PARKS OF AUSTRIA

Rabitsch, Wolfgang, Austrian Federal Environment Agency, Austria; **Essl, Franz**, Austrian Federal Environment Agency, Austria

The six declared National Parks of Austria cover 2,350 km^2 or about 3 % of the national territory. In this presentation a review on the distribution, impact, eradication, monitoring, perception and awareness of alien species in the National Parks of Austria is given. Habitat preferences of alien species follow a clear pattern, shaped by resource dynamics: whereas highly dynamic ecosystems in the lowlands are rich in alien species, their numbers and impact decrease with increasing altitude. Highest numbers of alien plant and animal species are recorded for the Danube Floodplain National Park and the Thaya Valley National Park. Based on selected case studies a first estimate on the monetary costs for management (eradication and monitoring) is provided. National Park authorities are well-aware of actual and potential problems posed by alien species and counter-strategies are implemented in management plans. However, protection status and financial restrictions limit actions and render successful removal of alien species difficult or impossible. More research is needed to better understand the impact of alien species in the National Parks of Austria. Climate change will further change species composition and interactions and accentuate the alien species issue in protected areas of Austria.

123. ECONOMICS OF BIODIVERSITY CONSERVATION

Ralf, Döring, University of Greifswald, Germany

Discussing biodiversity conservation among economists leads often to the conclusion that this must be very expensive. However, this conclusion comes in many cases from a narrow basis of empirical results. Economists more or less 'believe' that biodiversity conservation needs a huge change in economic activities. True in many cases for the tropics, with the necessity to ban more or less all harvest activities (wood, oil, metals etc.), this is not the case in Western Europe. Biodiversity in Europe's landscapes depends not on a non-use strategy but a segregation of agricultural practices. In the paper I outline the strategy of a differentiated land use with three main use categories: nature conservation areas, low input agricultural areas and areas with intensive agricultural practices. Calculations of costs for nature conservation measures and low input agricultural practices show that costs for the preservation of biodiversity are often relatively low. Problem is more the overall practice of agricultural subsidies in the European Union instead of possible costs for measures. As a second example I use the cod fishery in the Baltic Sea and nature conservation in marine environments to show ways to combine biodiversity conservation with sustainable use of a renewable resource.

124. GENETIC ASSESSMENT OF THE IBERIAN WOLF (*CANIS LUPUS SIGNATUS*) CAPTIVE BREEDING PROGRAM OF THE EEP (EUROPEAN BREEDING OF ENDANGERED SPECIES PROGRAMME)

Ramírez, Oscar, Institut de Biologia Evolutiva (UPF-CSIC), Spain; **Sastre, Natalia**, Autonomous University of Barcelona, Spain

The Iberian wolf population decline during the 19th and 20th centuries. Although in recent years the range of the Iberian wolf may have been expanding, isolated nuclei south of the Duero river may have disappeared and have been declared of priority concern. In 1994, the European Breeding of Endangered Species Programme (EEP) started a breeding program for the Iberian wolf. In this study we evaluate the genetic diversity (joint analysis of mitochondrial, autosomal and Y-chromosome microsatellites) in wild and captive populations of the Iberian wolf, in order to (i) assess how much genetic diversity is being preserved in the ongoing ex situ conservation program for this subspecies and (ii) study the relationships within the EEP population including animals with unknown ancestry and estimate the effective number of founders. The results show that genetic diversity in Iberian wolves is comparable in magnitude to that of other wild populations of gray wolf. Both the wild and the EEP populations have a similarly high genetic diversity indicating

that no substantial loss of diversity has occurred in the EEP program. The effective number of founders of the program was estimated as 16, suggesting that all founders in the studbook pedigree were genetically independent.

125. RESTORATION OF MACHAIR GRASSLAND FOR THE CONSERVATION OF RARE BUMBLEBEE SPECIES

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The great yellow bumblebee, *Bombus distinguendus*, is the UK's rarest Bombus species. The decline of this species in recent decades has been largely attributed to agricultural intensification and *B. distinguendus* is now typically associated with the florally rich machair grasslands of north and west Scotland. However, the small agricultural units or crofts which maintain machair are becoming increasingly economically unviable and consequently the abandonment of traditional management techniques is a relatively common occurrence. In April 2007 a field trial was established on the island of Oronsay, situated off the west coast of Scotland. Five treatments which included wildflower mixtures, a bird and bee conservation mixture already in use in Scotland and an inexpensive grass and clover mixture were distributed on an area of degraded machair. Each treatment plot was surveyed for bumblebee abundance and inflorescence availability throughout the bumblebee flight period in 2008 and their suitability as a machair restoration prescription was assessed. Results from 2008 indicate that the wildflower treatments containing white clover, self heal and red clover attracted significantly more foraging bumblebees than all other treatments in August. In order to test the longevity of each treatment this monitoring process will be repeated in 2009 and 2010.

126. RELATIONSHIPS BETWEEN HUMAN DISTURBANCE AND WILDLIFE LAND USE IN URBAN HABITAT FRAGMENTS

Regan, Helen, University of California Riverside, United States; **Markovchick-Nicholls, Lisa**, San Diego State University, United States; **Deutschman, Doug**, San Diego State University, United States; **Martin, Barry**, San Diego Tracking Team, United States; **Noreke, Lani**, San Diego Tracking Team, United States; **Hunt, Timothy Ann**, San Diego Tracking Team, United States

Habitat remnants in urbanized areas typically conserve biodiversity and serve the recreation and urban open-space needs of human populations. However, these goals can conflict if human activity negatively impinges on wildlife. When considering habitat remnants as conservation refuges it is crucial to understand how human activities and land uses affect wildlife use of those areas. We used tracking data on 10 animal species and information on human activity and environmental factors associated with anthropogenic disturbance in habitat fragments across San Diego County, California, USA, to examine the relationships among habitat fragment characteristics, human activity, and wildlife presence. Woodrats were positively associated, and cougars negatively associated, with the presence and prominence of utilities. Woodrats were also negatively associated with horses. Raccoons were negatively, and coyotes positively, associated with plant bulk and permanence. Cougars and gray foxes were negatively associated with roads. Roadrunners were positively associated with litter and opossums preferred areas with intensive development. Bobcat tracks were observed more often than gray foxes and bobcats correlated significantly only with water availability. Our results indicate that maintenance of habitat fragments in urban areas is of conservation benefit to some animal species despite human activity and disturbance, as long as fragments are large.

127. SEA LEVEL RISE AND COASTAL SUSTAINABILITY

Reise, Karsten, Alfred Wegener Institute for Polar and Marine Research, Germany

Human modified landscapes are often constrained in adapting to consequences of global warming. This applies to coastal lowlands which are defended by seawalls and storm surge barriers against higher floods and shoreline erosion. A wide and dynamic natural transition zone between land and sea has been converted into cultural land with an abrupt boundary to the sea. This brought safety for human life and property but also a tremendous loss in coastal biodiversity. With an accelerating rise in sea level, further loss of natural habitats would be inevitable unless coastal defence stops confronting the sea. Instead, it is recommended to augment natural processes in maintaining the coastal environment, including sediment transports from sea to coast, facilitating dune migrations across islands or trapping suspended particles in artificial lagoons. Also needed are innovations such as houses and roads on hydraulic pilings to tolerate flooding or to construct floating offshore ports for large vessels to let shipping canals reverting into estuaries. Sea level rise caused by climate change constitutes a chance to rebuild sedimentary coasts with a profile that grows with the sea, remains attractive to humans and accommodates high biodiversity.

128. NATURA 2000 IN THE CZECH REPUBLIC: AN APPROACH LEADING TO UNPLANNED TEST OF EU NATURE DIRECTIVES

Roth, Petr, Ministry of Environment, Czech Republic

Establishing its part of Natura 2000 prior to its EU accession, the Czech Republic decided to build the network literally according to EU Nature Directive´s provisions in 1999, an approach unique within the EU. Ballanced proposal of SPA was prepared based on long-term monitoring data. For SCIs, however, a challenge represented above all the habitat types identification: despite long tradition of Czech phytosociological research the requirements of Habitats Directive could not have been met. Thus, national interpretation of habitat types was developed in 2000, followed by a global habitat mapping of the entire country´s territory during 2000 – 2005, delivering a GIS layer with recent, field data on all habitat types. After including species sites based on detailed field investigation, the Czech SCIs have been proposed strictly following the Directive´s requirements, which led to the Natura 2000 pattern unassailable from legal point of view but in many cases defying general understanding of „protected areas". The Czech approach can be viewed as a practical test under the natural conditions of Central Europe of theoretical approach introduced by the Habitats Directive originally for the circumstances of the most developed western European countries.

129. THE DEVELOPMENT OF SEED PROVENANCE ZONES AS MEANS TO SUPPORT THE REGIONAL PRODUCTION OF COMMON AND WIDESPREAD NATIVE PLANTS FOR RE-VEGETATION PURPOSES

Ruediger, Prasse, Institut of Environmental Planning, Leibniz University Hannover, Germany; **Dierk, Kunzmann**, Institut of Environmental Planning, Leibniz University Hannover, Germany

For the last 60 years most plant material that is used for re-vegetation purposes in Germany originated from commercial plant nurseries. Consequently, large quantities of non-native

species or cultivars of native species have been released. In addition, an increasing amount of seeds, even those of native species, is produced in and subsequently imported from regions with different sets of environmental conditions. That re-vegetation practice has a strong negative influence on the inter- and intra-specific diversity of the landscape. Landscaping companies already face financial losses because the lack of regionally adapted plants has lead to poor performance or failure of re-vegetation measures. Some countries have taken action (e.g. USA, UK and Switzerland) by trying to restrict the plants used in the landscape to a small fixed set of species of known provenance. In cooperation with responsible governmental agencies and a group of plant nurseries, we recommend supporting the use of a wider range of native species (for the sake of biodiversity conservation) by combining the use of 'seed provenance zones' with a 'filter' that selects widespread species that are suitable for a blanket use without negatively effecting other aspects of biodiversity conservation.

130. PREDICTED POPULATION DYNAMICS OF AN EPIXYLIC MOSS UNDER DIFFERENT FOREST AND CLIMATE SCENARIOS

Ruete, Alejandro, Swedish University of Agricultural Sciences, Sweden; **Wiklund, Karin**, Västmanlands County Administration, Sweden; **Snäll, Tord**, Swedish University of Agricultural Sciences, Sweden

We will present a Bayesian hierarchical model for the inter-annual population dynamics of the epixylic moss *Buxbaumia viridis*, which is prioritised according to EU's Habitat Directive. The model was fitted to data on abundance of *B. viridis* collected 1996-2003. It was validated by comparing the population size predicted for 2008 with the size observed in 2008. The prediction for 2008 was obtained by simulating population dynamics across simulated dead wood and observed climate dynamics 2003-2008. The dynamics are driven by not only availability of highly decayed dead wood, but also by climate: increased precipitation in the preceding winter and spring increase the number of mature *B. viridis* sporophytes. We will also show the benefits, in terms of increased sporophyte production, of increasing the amount of dead wood accounting for different scenarios of climate change.

131. ADAPTIVE MANAGEMENT: A COMMON LANGUAGE TO IMPROVE THE PRACTICE OF CONSERVATION

Salafsky, Nick, Foundations of Success, United States

Imagine a world in which a few years from now, any given conservation practitioner will be able to go online and immediately access information about the experiences of other practitioners around the world. In particular, he or she will be able to search for specific conservation actions and will be able to learn the conditions under which the action was applied, the results of the action (both successes and failures), and any lessons that emerged. Ultimately, realizing this vision is about developing a body of knowledge and practice about how to make conservation more effective - creating a science of conservation. An unglamorous yet essential foundation of any science is a standard nomenclature and language. To this end, the Conservation Measures Partnership has worked to create Open Standards for the Practice of Conservation (conservationmeasures.org), Miradi Adaptive Management Software (miradi.org), and standard classifications for direct threats and conservation actions (conservationmeasures.org/CMP/IUCN/Site_Page.cfm). We are now using these building blocks to develop linked databases of conservation projects and practice, providing a common language for true evidence-based conservation to occur, both within projects, and across the field of conservation.

132. AVAILABILITY OF PLANT MONITORING DATA IN EUROPE

Sammul, Marek, Estonian University of Life Sciences, Estonia

Plant species monitoring was analyzed to provide an overview on efforts made to monitor trends in vascular plant biodiversity in Europe. The study was based on an assessment of 63 plant monitoring schemes from Europe (collected into a database of EuMon), and 33 schemes supplied by a literature screening. Altogether, the monitoring schemes cover 354 vascular plant species, of which 69 are listed in Annex II of the EU Habitats Directive (= EU protected species; Annex II includes 420 species). In most cases, an EU protected plant species occurs in 3 countries but is monitored in only 1 country. Scientific interest was the main reason for launching a monitoring scheme in 21% of the schemes from the database, but in 56% of the schemes from the literature survey. The current schemes collect insufficient data particularly on the dynamics of the extent and distribution pattern of species. It can be concluded that planning to publish monitoring data when designing a scheme would improve the quality and general effect of monitoring programs and that there is a clear need for better coverage of the taxonomic diversity and integration of different scales.

133. ANALYSIS OF URBAN ARTHROPOD COMMUNITIES ON DIFFERENT SPATIAL SCALES REVEAL ECOLOGICAL INFORMATION HIDDEN BY ROBUST SPECIES RICHNESS MEASURES

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Urban habitat areas are spreading rapidly and therefore need to be included in biodiversity surveys. We analysed the relationship between arthropod biodiversity and urban environmental factors at 96 sites in three Swiss cities. We chose a two-step approach: First we analysed the influence of sealed area, age of settlement, human management and habitat heterogeneity (composition and configuration) on species richness of 29 taxonomic invertebrate groups. Results show that, overall, local species numbers are surprisingly robust to changes in environmental variables. The variables age and configuration exhibit a noticeable and positive effect on species richness while the remainder had only minor effects (increased sealed area and human management negative, composition positive effect). In the second analysis we re-analysed spiders and bees of the same data set with their species identity on different spatial scales (radius from 10m – 2000m). Despite city-specific influences there is a clear pattern that spider communities are influenced on local scale (maximum influence 100m) while bee communities are influenced on larger scales. Even though species richness is quite robust to man-made environmental changes in the urban area, species communities are heavily influenced by human planning and management. Management recommendations include less intensive and partial cutting of urban meadows/lawns.

134. TRANSLOCATIONS IN GROUSE - AN OPTION FOR SPECIES SURVIVAL?

Segelbacher, Gernot, University Freiburg, Germany; **Höglund, Jaob**, Uppsala University, Sweden

Grouse species have been dramatically declining in Central Europe during the last decades. Many populations went extinct and the remaining ones are isolated and consist of only a few individuals and several thousand of birds have been released in different reintroduction programmes during the last decades. However, not a single release has been successful. To overcome possible effects of maladaptation of birds due to captivity, only recently wild birds have been translocated. Conservationists are now much more aware of genetic problems due to possible outbreeding effects and thus a number of studies have been carried out to estimate ideal source populations for any translocations. However, it is very often unclear how such source populations can be identified best. Still most studies are using neutral genetic markers (e.g. microsatellites or mtDNA sequence variation) to reveal the phylogeographic patterns within a species. However, local adaptations may only be detectable using adaptive genetic variation or quantitative traits and are often not considered when management units are defined. Additionally only in a few cases the IUCN guidelines on species reintroductions are being strictly followed. I will highlight examples of reintroduction projects in grouse and discuss the genetic and political aspects of these programmes.

135. EFFECTS OF CARCASSES AND CARRION DUMPS ON THE LOCAL ENVIRONMENT AND COMMUNITIES

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In natural systems, carrion appears as a pulsed resource, randomly distributed. However, in carrion dumps and supplementary feeding stations, the natural dynamics of carrion resources are altered and the availability of food turns constant, aggregated and predictable in space and time. A carcass represents a local perturbation, which greatly impacts the surrounding communities. It constitutes an important pulse of nutrients into the soil, with consequences for the edaphic and vegetal communities. It is also a vital resource for many invertebrate species which rely on carrion to complete their life cycle. Carrion and dumps have also important effects on the behavior, densities, population dynamics and distribution of vertebrate scavengers, which tend to congregate in their vicinity. This aggregation of facultative scavengers produces an increase in predation and/or a lower presence of alternative prey in the dump vicinity. Whereas natural carcasses seem to promote biodiversity and spatial heterogeneity, these effects seem to reverse in the case of feeding stations. The permanent concentration of food in dumps has drastic consequences for the local communities and the environment. These effects must be considered in the design and management of feeding stations, especially when game species or species of conservation concern are affected.

136. EFFECTS OF AGRI-ENVIRONMENTAL MEASURES AND FARMING STYLE ON BIODIVERSITY IN AUSTRIAN AGRICULTURAL LANDSCAPES

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Farming still is the main activity in rural areas of Austria, but it is now largely dependent on agro-environmental subsidies. To assess the environmental effects of the Austrian agri-environmental measures (AEMs), we mapped landscapes, vascular plants and birds in 1998 and 2003, investigated the AEMs in a parcel-wise manner, and analyzed their effects on landscape values and biodiversity. Further, we used the concept of farming styles, which integrates human attitudes, farming objectives and economic success, to investigate the background of the different ecological performances of farms. The reduction of agrochemicals showed positive effects on biodiversity of vascular plants in grassland and of birds in arable land. Targeted measures that directly addressed threatened species were most effective, but had much less coverage. Farmers who were highly production oriented supported the lowest nature values on their land, whereas both traditionally oriented and innovative farm businesses carried a higher potential to farm in concordance with the biodiversity of their landscape. The farming styles also differed in their dependency on the subsidies. We conclude that AEMs are currently not targeted enough to effectively halt biodiversity losses and that they should be tailored to the individual needs of different regions and predominant farming styles.

137. PRECISION IN BIODIVERSITY MONITORING – THE VALUE OF VOLUNTEERS

Schmeller, Dirk, National Center for Scientific Research; Helmholtz-Centre for Environmental Research - UFZ, France; **Henry, Pierre-Yves**, National Museum of Natural History, France; **Juillard, Romain**, National Museum of Natural History, France; **Gruber, Bernd**, Helmholtz-Centre for Environmental Research - UFZ, Germany; **Clobert, Jean**, National Center for Scientific Research, France; **Henle, Klaus**, Helmholtz-Centre for Environmental Research - UFZ, Germany

Without robust and unbiased systems for monitoring, changes in natural systems will remain enigmatic for policy makers, leaving them without a clear idea of the consequences of any environmental policies they might adopt. In September 2007, the EuMon project has documented 395 monitoring schemes for species, which represents a total annual cost of about € 4 million, involve more than 46,000 persons devoting over 148,000 person days/year to biodiversity monitoring activities. Our results suggest that the overall sampling effort of a scheme is linked with the proportion of volunteers involved in that scheme. As precision is a function of the number of monitored sites, and since the number of sites is maximised by volunteer involvement, our results do not support the common belief that volunteer-based schemes are too noisy to be nformative. To the opposite, we believe that volunteer-based schemes provide relatively reliable data, with state of the art survey designs or data analysis methods, and consequently can yield unbiased results. Quality of volunteering data is more likely determined by survey design, analytical methodology, and ommunication skills within the schemes rather than by volunteer involvement per se.

138. INVOLVING STAKEHOLDERS IN THE IMPLEMENTATION OF ECOLOGICAL NETWORKS

Siebert, Rosemarie, Leibniz-Centre for Agricultural Landscape Research, Germany

The paper presents findings from an international research project that analyses the stakeholder perspective in ecological network implementation, using components such as power, influence and willingness to corporate. The ecological network concept is a response to biodiversity loss.

The concept integrates "normal use" areas over and beyond nature conservation areas (designated by law) in order to implement functional ecological networks. The implementation of such ecological networks requires cooperation among a wide range of stakeholders but this cooperation varies widely. The results are based on a survey of experts carried out in Bavaria, Germany that was guided by past research. The survey targeted people from regional and local governmental bodies and stakeholder from different sectors, including agriculture, nature conservation, forestry, hunting, transport, landscape planning, construction, civic groups, education and tourism. The paper describes the key stakeholders in a best practice example of ecological network implementation and outlines their perceptions of the ecological network concept. It analyses the forms of involvement that lead to good cooperation among the actors. It identifies barriers to implementation as well as key factors of success in order to generate recommendations about how to manage stakeholder involvement.

139. SPATIAL OVERLAP BETWEEN TOURIST ATTRACTIONS AND BIODIVERSITY

Siikamäki, Pirkko, Oulanka Research Station, Finland; **Kangas, Katja**, Oulanka Research Station and department of biology, Finland

This paper examines how species rich habitats and environments are located spatially in relation to tourist facilities in Finnish national parks by using Oulanka National Park (ONP), a popular destination for nature-based tourist in northern Finland as detailed example. The aim is to examine how the recreation areas are distributed in relation to occurrences of endangered plant, moss and lichen species, sensitive habitat types and nest of certain birds of prey. The recent growth of nature-based tourism has been remarkable, and unfortunately there are already examples on a situation where market forces driven by the private sector and providing for industry growth can override the needs for conserving nature upon which the long-term survival of the industry depends. We found that there is remarkable spatial overlap between biodiversity hotspots and recreational use within Oulanka National Park. Biodiversity hotspot areas should be taken into account in the large-scale planning of protected areas to which new GIS-based tools gives a cost-efficient solution for managers. If new trails or tourism service infrastructure is planned, areas with simultaneously high species richness and vulnerable habitats should be ideally avoided or otherwise taken into account.

140. CONSERVATION AND SOCIAL CHANGE: ANTI-CONSERVATION AS CULTURAL RESISTANCE

Skogen, Ketil, Norwegian Institute for Nature Research (NINA), Norway

Concepts like "biodiversity conservation" are parts of a nature discourse that currently holds a hegemonic position, and which is emblematic of the expansion of the modern middle class. This expansion and the wider processes of social change it is part of are perceived as threatening by people with close ties to traditional land use; in particular the rural working class. In combination with the tangible problems rural people may experience in connection with conservation, intrusive cultural influx triggers various forms of cultural resistance. The concept of cultural resistance denotes a situation where subalterns make use of cultural means to challenge domination. Cultural resistance is not necessarily launched openly against institutionalized power, nor does it imply a desire for fundamental change. It should be seen more as a struggle for autonomy. However, such autonomy does not entail influence outside the cultural realm: Those who reject hegemonic cultural forms, including academic knowledge and bureaucratic institutions, may place themselves outside of the political arena. This should have implications for communication with groups who apparently oppose conservation. Our ability to protect wild nature will depend upon our approach to groups that – just like nature itself – are exposed to the full force of modernization processes.

141. MITOCHONDRIAL DNA MUTATIONS REDUCE MALE FERTILITY IN A CAPTIVE COLONY OF EUROPEAN BROWN HARES

Smith, Steve, Research Institute of Wildlife Ecology, Austria; **Turbill, Christopher**, Research Institute of Wildlife Ecology, Austria; **Suchentrunk, Franz**, Research Institute of Wildlife Ecology, Austria

Mitochondrial DNA mutations causing slightly deleterious changes in the efficiency of energy production can affect sperm cells to a greater extent than somatic or female reproductive cells due to their disproportionate energy requirements. This asymmetrical connection between mtDNA mutations and fertility coupled with the maternal mode of inheritance for mtDNA has been termed the "mother's curse effect". The resulting phenotype of reduced sperm motility is paradoxically maintained in the population as selection cannot purge the trait from female carriers. The effect has been reported in humans and other model species but little is known of how this phenomenon may impact on the population viability of small natural or captive populations. We show a clear link between a particular mtDNA haplotype and greatly reduced male reproductive success in a captive colony of European brown hares. This source of increased variation in male fertility further reduces effective population size in promiscuous species such as hares. The effect is expected to be more pronounced for small isolated populations and is previously unrecognised for ex situ conservation programs. We suggest that changes to traditional captive breeding practices may be needed to ensure a wider diversity of mtDNA haplotypes is maintained in breeding populations.

142. FORESTS, FIRES, AND THE USE OF NATURAL RANGE OF VARIABILITY IN THE WESTERN UNITED STATES

Stephenson, Nathan, U.S. Geological Survey, United States

Management policies for many fire-prone forests in the western United States call for the restoration of more natural forest conditions, partly because natural conditions are thought to best sustain biodiversity and ecosystem functions. Reasonable reference conditions for forest management usually should bracket a range of possible outcomes, such as would have naturally occurred over a relatively long time period (e.g., a millennium). However, difficulty and imprecision in determining past forest conditions has helped fuel a debate between "structural restorationists," who believe that a semblance of past forest structure should be restored mechanically, and "process restorationists," who believe that natural conditions will be restored by the simple reintroduction of fire. Such debates may be losing some of their relevance. Rapid global changes are creating environmental conditions that have no precedent in Earth's history, suggesting that it may be undesirable or impossible to maintain forests in their natural state. Management alternatives for the future therefore might be informed by past conditions, but focus on enhancing forest resistance and resilience to stresses and realigning forests to environmental changes, even if the resulting forests fall outside of the natural range of variability.

143. WHY MOST PUBLISHED RESEARCH FINDINGS IN ECOLOGY ARE FALSE OR UNCERTAIN AND WHAT SHOULD WE DO ABOUT IT?

Stewart, Gavin, University of Bangor, United Kingdom; **Mengersen, Kerrie**, University of Queensland, Australia

There is increasing concern that most current published research findings are false in medicine. The probability that a research claim is true may depend on study power and bias, the number of other studies on the same question, and, the ratio of true to no relationships among the relationships probed in each scientific field. Thus a research finding is less likely to be true when the studies conducted in a field are smaller; when effect sizes are smaller, when there is a greater number and lesser preselection of tested relationships, where there is greater flexibility in designs, definitions, outcomes, and analytical modes; when there is greater financial and other interest and prejudice, and when more teams are involved in a scientific field in chase of statistical significance. Here we suggest that in ecology as in medicine, it is more likely for a research claim to be false than true. We propose that the adoption of evidence-based approaches can help to identify this problem. More realistic expression of uncertainty and increased awareness of the value of equivocal results are required to address it.

144. DIVERSIFYING GRASSLANDS USING PARASITIC PLANTS: EFFECTS ON THE ASSOCIATED INSECT FAUNA

Stewart, Alan, University of Sussex, United Kingdom; **Massey, Fergus**, University of Sussex, United Kingdom; **John, Libby**, University of Sussex, United Kingdom; **Press, Malcolm**, University of Birmingham, United Kingdom; **Hartley, Sue**, University of Sussex, United Kingdom

It is well established that hemiparasitic plants, such as *Rhinanthus minor*, can increase plant community diversity, primarily through suppression of grass hosts. This is increasingly being regarded as a promising conservation tool for diversifying lowland grasslands, by altering the competitive balance between plant species and facilitating colonisation by desirable forb species. However, the effects on other trophic levels have not hitherto been investigated. We experimentally manipulated *R. minor* densities under field conditions and demonstrated large significant indirect impacts of this hemiparasitic plant species on invertebrates from several trophic levels, including herbivores, detritivores, predators and parasites, as well as the physical structure of the grassland. The implications of these results will be discussed for the restoration and enhancement of species-poor grasslands and their associated invertebrate communities.

145. CAN RIPARIAN ARTHROPOD BIODIVERSITY BE MAINTAINED OR ENHANCED ON MANAGED GRASSLAND?

Stockan, Jenni, Macaulay Institute, United Kingdom; **Young, Mark**, University of Aberdeen, United Kingdom; **Langan, Simon**, Macaulay Institute, United Kingdom

Riparian zones represent the interface between terrestrial and aquatic ecosystems and as such have been the focus of land management policies aimed at reducing diffuse pollution and improving habitat quality. However, it remains unclear how individual terrestrial taxa respond to changes offered by these remedial measures and what the relative influences of land compared to water are. Coleoptera were sampled across riparian zones within two catchments in north-east Scotland. *Carabidae*, an important indicator group, were identified to species. A total of thirty-eight environmental variables were investigated to see if they correlate with the variation in taxon abundance and diversity. Results from stepwise multiple regression showed that land use and bank shape were key factors influencing abundance and species richness with grasslands providing the most favourable conditions. Further correlations were found between soil and water variables and individual taxa. Our findings demonstrate that grasslands have the potential to be and significant biodiversity resource in riparian zones. However desired management outcomes need to be clearly defined as different management favours different groups of species.

146. THEORY AND PRACTICE OF ADAPTIVE MANAGEMENT IN THE CONTEXT OF N2000

Teofili, Corrado, WWF Italy, Italy

Natura 2000 is a network of protected areas selected for their high conservation value. The Open Standards for Conservation have been evaluated, through a comparative approach, with the needs and the provisions of the Natura 2000 network. The main aims of this study have been: - to test a sound methodology for the management and monitoring the biodiversity targets of the Natura 2000 network; - to provide a common approach through which comparing results in different contexts; - to provide a tool through which analyse and assess the “conservation status” in the meaning of the Habitats Directive ; The main result is a comparison table that shows the level of overlapping between the Open Standards and the provisions of the N2000 network. The added value that Open Standards can bring to the N2000 network management is brilliantly perceivable: the use of the Standards can ensure a long term management of the sites along with the wider European strategies. In Italy, Open Standards have been applied for the definition of the management plan in a number of N2000 sites, one of them is presented as a good practice example.

147. CHANGES IN LANDSCAPE-LEVEL FOREST STRUCTURE AND NATURALNESS IN THE NORTH VIDZEME BIOSPHERE RESERVE, LATVIA (1930-2008)

Terauds, Aivars, Faculty of Geography and Earth Sciences, University of Latvia, Latvia; **Nikodemus, Olgerts**, Faculty of Geography and Earth Sciences, University of Latvia, Latvia; **Brumelis, Guntis**, Faculty of Biology, University of Latvia, Latvia

The forest pattern in the North Vidzeme Biosphere Reserve existing today is compared with that in the 1930’s – 1940’s. Borders of forest stands in forest inventories of pre-1941 and 2008 were entered in a GIS data base. Forest plans from archive data were rectified to the LKS-92 coordinate system, and digital layers derived. Inventory data were included as GIS layers. All data on Woodland Key Habitats (forests with specialist species that cannot survive under conventional forestry) were also included as layers, including existing borders. Age distribution of dominant tree species in stands was determined on a landscape level, and compared to natural variability that might be expected in the absence of forest management. Fragmentation indices were calculated with FRAGSTATS for forest classes and ages considered to be of higher value for biological diversity. Changes in forest management, such as drainage of black alder swamps and focus on monoculture stands have led to changes in forest structure. Some Woodland Key Habitat types, such as oak and lime broad-leaved forests and black alder swamps can achieve sufficient quality for presence of species and structural indicators in period of less than 70-80 years since logging.

148. GENETIC MANAGEMENT OF CAPTIVE POPULATIONS: A THEORETICAL ASSESSMENT OF CIRCULAR MATING

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From a genetic perspective, the main objectives of a captive program should be to maintain high levels of genetic variability and population fitness. Both properties are necessary to ensure the viability of reintroduced populations to the wild or even the success of supplementation programs. We examine the efficacy of management options which include i) serial half-sib matings (usually referred to as circular mating), and ii) mixed strategies according to which, several generations of circular mating are followed by random mating. We evaluate these strategies in terms of allelic diversity, heterozygosity, purging efficiency and mean population fitness. We also assess the expected reintroduction success, i.e. the probability of extinction of the released population for several generations after the end of the captive breeding program. We compare circular mating (pure and mixed) with other management strategies in order to find under what conditions it can be a good candidate for use in the genetic management of conserved populations.

149. A EUROPEAN OPEN STANDARD FOR THE PRACTICE OF ADAPTIVE SITE MANAGEMENT

Tilders, Ilke, Foundations of Success Europe, Netherlands

Site managers across Europe currently have no common way of assessing the status of the biodiversity they care about, measuring the impact of and improving the effectiveness of their management actions, and learning from one another in a systematic fashion. These very same issues caused a group of international organisations to form the Conservation Measures Partnership. This partnership aims to capitalize on collective experience and expertise, bypass tried but failed approaches, and quickly identify and adopt best practices. One of the Partnership's first products was a "Rosetta Stone" that helps translate commonly used concepts and terms in the various management systems used by its members. It concludes that although language may vary, the underlying concepts are actually remarkably similar. From there, the CMP Open Standards were jointly developed. The question is if these standards apply to the European context and if so, how they should be tailored to better fit specific challenges, such as Natura 2000. From a series of comparative analysis with various organisation, it is becoming clear that the Open Standards are a good fit in general, but that we need a stronger focus on participatory processes and a deeper integration of socio-economic and cultural stakes.

150. A FRAMEWORK FOR MAPPING CORRIDORS BETWEEN PROTECTED AREAS

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Systematic conservation planning concerns the identification of cost-efficient networks of protected areas, and it is often used to locate new areas to complement existing ones. One problem is that habitats surrounding protected areas are often transformed, isolating them in an inhospitable matrix. This isolation may lead biodiversity to decline within protected areas. A possible solution for this problem is the identification of suitable corridors between protected areas. However, it remains a matter of debate which method is best, particularly when the goal is to link many areas simultaneously. Here we present a novel approach that enables connections between environmentally similar areas, using a composite friction matrix that goes beyond the simplistic classification of the habitat as suitable or unsuitable for species dispersal. We also propose an heuristic algorithm, based on graph theory, which outperforms existing methods and is able to identify cost-efficient pathways between protected areas. To exemplify the use of this framework we apply it in the Iberian Peninsula

151. MIXED BIODIVERSITY EFFECTS OF SET-ASIDE IN CHANGING LANDSCAPES

Tscharntke, Teja, Agroecology, University of Göttingen, Germany

Mixed biodiversity effects of set-aside in changing landscapes Following reform of the European Union's (EU) Common Agricultural Policy (CAP) set aside of cropland became a common feature in Europe from the late 1980s onwards. In the very beginning, natural development of the vegetation on fallows turned out to be a major contribution to landscape-wide biodiversity and exhibited ecologically interesting successions of plants and animals. Such early-succession fields often supported high diversity of ephemeral plant-insect communities. In the following years, set aside fields were sown with easily manageable fodder plants in most cases, to reduce weed pressure and to make re-cultivation as crop fields easier. During the last years, growing of energy plants further decreased the conservation value of set aside and it became increasingly difficult to recognize any benefits of set aside for the enhancement of biodiversity and ecosystem services in agricultural landscapes. In my talk, I will present data from our research and review published evidence.

152. POPULATION BIOLOGY OF *DIANTHUS CARTHUSIANORUM*

Tschöpe, Okka, University of Potsdam, Germany; **Duwe, Virginia**, University of Potsdam, Germany; **Fritsche, Tina**, University of Potsdam, Germany; **Burkart, Michael**, University of Potsdam, Germany; **Heinken, Thilo**, University of Potsdam, Germany

Our objectives were (a) to measure the fitness of 9 population of *Dianthus carthusianorum* in Brandenburg, NE-Germany under controlled conditions to find out whether an allee-effect found in an earlier field-study was due to different genetic constitutions or to environmental factors and to derive appropriate conservation measures and (b) to find out how the species responds to water-stress, because climate-models predict drier summers for Brandenburg in the future. Seeds were taken from 10 mother plants of each population and grown to plants under dry and humid conditions. We measured generative and vegetative fitness parameters. Populations differed significantly in their fitness, but there was no correlation between fitness and population size. Since earlier field-studies revealed a reduced fitness in smaller populations, our results indicate that this allee-effect is based on varying phenotypes in their natural habitat rather than different genotypes. Water stress resulted in significant less flowers, and there was a significant treatment x population interaction, indicating that populations differ in their drought tolerance. Conclusion: For the studied *Dianthus carthusianorum* populations habitat improvement, rather than ex-situ conservation would be an appropriate conservation measure. However, the predicted climate conditions might make ex-situ necessary in the future.

153. POLICY PRINCIPLES AND MEASURES FOR FACILITATING BIODIVERSITY ADAPTATION TO CLIMATE CHANGE IN THE EU

Tucker, Graham, The Institute for European Environmental Policy, London, United Kingdom; **Dickson, Barney**, UNEP-WCMC, Cambridge, United Kingdom; **Harley, Mike**, AEA, Harwell, United Kingdom; **Keder, Guus**, Axiom, Brussels, Belgium; **Kettunen, Marianne**, The Institute for European Environmental Policy, London, United Kingdom; **de Soye, Yves**, IUCN, Brussels, Belgium

There needs to be two principal components to any strategy that aims to facilitate the adaptation of biodiversity to the effects of climate change. Firstly, measures need to be taken to increase the resilience of ecosystems, habitats and their associated species populations to climate change. Secondly, measures are needed to facilitate the movement of species to new areas with suitable climatic conditions. The optimal strategic balance of resilience and movement facilitation measures will be species specific and will especially depend on the impacts of climate change on the species, its dependence on specific habitats (and the impacts of climate change on them) and the dispersal and colonisation abilities of the species and its habitat. For many the priority will to increase resilience to buy time for habitat development in new areas of suitable climate space. This presentation draws on a number of studies to further develop strategic adaptation principles and identify existing EU policy instruments that may help to implement them through practical adaptation measures.

154. THE END OF EU SET-ASIDE, WHEN POLITICAL EXPEDIENCE TRUMPS CONSERVATION SCIENCE

Tucker, Graham, Institute for European Environmental Policy, London, United Kingdom; **Brunner, Ariel**, BirdLife International Brussels, Belgium; **Boccaccio, Luigi**, Royal Society for the Protection of Birds, The Lodge, Sandy, United Kingdom

There needs to be two principal components to any strategy that aims to facilitate the adaptation of biodiversity to the effects of climate change. Firstly, measures need to be taken to increase the resilience of ecosystems, habitats and their associated species populations to climate change. Secondly, measures are needed to facilitate the movement of species to new areas with suitable climatic conditions. The optimal strategic balance of resilience and movement facilitation measures will be species specific and will especially depend on the impacts of climate change on the species, its dependence on specific habitats (and the impacts of climate change on them) and the dispersal and colonisation abilities of the species and its habitat. For many the priority will to increase resilience to buy time for habitat development in new areas of suitable climate space. This presentation draws on a number of studies to further develop strategic adaptation principles and identify existing EU policy instruments that may help to implement them through practical adaptation measures.

155. STAKEHOLDER INVOLVEMENT IN PRACTICING ADAPTIVE MANAGEMENT IN THE KOSTERHAVET NATIONAL PARK (MPA) IN SWEDEN

Tullrot, Anita, Gothenburg University, Department of Marine Ecology, Sweden; **Nilsson, Per**, Gothenburg University, Department of Marine Ecology, Sweden

The proposed park Kosterhavet is situated in an archipelago on the west coast of Sweden, and it borders the proposed National Park Ytre Hvaler in Norway. Kosterhavet is the most species rich marine part of Sweden, but is also intensively used by humans. Tourism is a major source of income; Kosterhavet is intensively used as a recreational area both for permanent residents and visitors. The main tourist season is short, which creates a severe pressure on the area and infrastructure during a brief period. Other important human uses include a small-scale trawl fishery on shrimps, shipping, aquaculture, and marine scientific research and education. When developing the management plan we invited major stakeholders, and also representatives from the proposed Norwegian park to participate in the process. In workshops using CMP/Open Standards we agreed on targets, goals, objectives and activities for biodiversity and socio-economic activities in the area. This participatory process was important not only for getting acceptance for the management plan, but also contributed to make the management plan more realistic and efficient. The increased credibility for the process will hopefully also facilitate future changes of the management plan as a part of adaptive management.

156. THE ECONOMIC VALUE OF NATURE

Van der Straaten, Jan, Saxifraga Foundation, Netherlands;

The economic value of nature It is generally accepted that economic goods are scarce and have a monetary price. However, nature and natural resources do not always have a monetary price, though they are scarce economic goods. For example, crude oil has a monetary price, while the economic value of the Alps is unknown; however, this value is very high as it is an important resource in the tourism sector. The situation that some economic goods have a monetary price, while others are free, has substantial negative effects on the use of the non-priced natural resources: overconsumption, destruction and deterioration of these goods is a well-known phenomenon. Many economists regard this situation as a serious shortcoming in economic theories and practices, when natural resources are at stake. It is often propagated to give the non-priced natural resources a monetary price. By doing this, all scarce economic goods are in the same situation: they have a monetary price, which implies that economic overconsumption is no longer possible. However, these attempts have so many shortcomings, that another approach is necessary. The market is not the solution, but environmental policies based on physical information.

157. DOES KNOWLEDGE OF ENVIRONMENTAL PERFORMANCE CHANGE FARMER'S BEHAVIOUR?

van Dijk, Jerry, Utrecht University, Netherlands; **Lokhorst, Anne Marike**, Leiden University, Netherlands; **Staats, Henk**, Leiden University, Netherlands; **de Snoo, Geert**, Leiden University, Netherlands

Although agri-environmental scheme participation is high, current agri-environmental measures shows only minor effects on biodiversity compared with general agricultural practice and hardly any effects on rare or threatened species. There is a considerable body of research on why farmers decide whether or not to participate in agri-environmental schemes, but research dealing with what makes farmers deliver quality with agri-environmental schemes once participating is much scarcer. Drawing on insights and methodologies from studies of agri-environmental scheme participation and environmental psychology, we tried to answer the question "What makes farmers participating in agri-environmental schemes deliver quality in terms of surface area, diversity and management of habitats as well as species diversity on their farm?". Knowledge about the relation between farmers behaviour and outcome of agri-environmental management was subsequently used in an intervention study. This intervention aimed to increase farmers' conservationist behavior by providing tailored information combined with public commitment in a peer group. The intervention resulted in a stronger desire to engage in conservation, an increase in surface area of non-subsidized natural habitat, and an increase in time farmers spent on

conservation. The intervention affected both subsidized and non-subsidized conservation effort, but the effects were stronger for non-subsidized conservation.

158. LONG-TERM POPULATION DYNAMICS OF *PRUNUS SEROTINA* IN NATURAL FORESTS ON SANDY SOILS

Vanhellemont, Margot, Ghent University, Laboratory of Forestry, Belgium; **Verheyen, Kris**, Ghent University, Laboratory of Forestry, Belgium; **Hermy, Martin**, Catholic University of Leuven, Division Forest, Nature and Landscape, Belgium

Prunus serotina, a North-American tree species, is widely considered an aggressive invasive species in Western Europe. Opposite to prior studies, which focused mostly on areas heavily invaded by *P. serotina*, we studied long-term (70 years) forest development in two forest reserves in areas with a low propagule pressure: the forest reserves Liedekerke (Belgium) and Ossenbos (the Netherlands). Based on cadastral maps and aerial photographs, tree ring analysis, forest inventories and regeneration data, we reconstructed the invasion process. Long-distance dispersal events and windows of opportunity triggered the invasion of *P. serotina*, while further colonization was directed by connectivity to seed sources and light availability. The presence of native shrub species, the quick canopy closure, and the recalcitrant herb layer hampered further *P. serotina* establishment. Conversely, high herbivore pressure was found to favour *P. serotina* above native species, which resulted in *P. serotina* dominance. The outcome of the *P. serotina* invasion process contrasted sharply between the two studied forests: *P. serotina* was omnipresent and very abundant in the Ossenbos, while the species did not act as an aggressive invader in the Liedekerke forest reserve. Thus, formulating differentiated management approaches conditional upon the characteristics of the recipient ecosystem seems to be imperative.

159. ADAPTIVE MANAGEMENT IN THE AXIOS DELTA IN GREECE

Vareltzidou, Stella, Axios Loudias Aliakmonas Management Authority, Greece

Axios Delta (Ramsar and 3 N2000 sites) includes four estuaries, riverbanks, coastal areas and lagoons and is next to Thessaloniki. Axios Authority's challenge is to manage this area facing obstacles as: lack of the national park legislation, weak enforcement of environmental legislation, significant socio-economic pressures and weak political commitment to protected areas management authorities. Adaptive management (AM) was chosen because it applies in complex and dynamic systems, deals with ongoing and unpredictable change, accepts lack of information and allows immediate action to be taken. AM was applied in Axios Delta in three stages: a) preparatory work b) actual workshop c) review and reporting. Defining the scope proved a challenge due to inconsistencies in biological and administrative boundaries. Results chains revealed key factors otherwise neglected e.g. the land filling of a lagoon relates to locals fear of flooding. AM provides better and solid understanding of the interrelations affecting the biological targets thus assisting strategic decisions. Moreover, AM equips participatory approaches with more public friendly tools. Via AM Axios management plan becomes a living document able to incorporate changes. All the above justify that AM is the only viable approach to the complexity of the Greek situation.

160. MANAGING URBAN MEADOWS FOR INSECT BIODIVERSITY

Venn, Stephen, University of Helsinki, Finland; **Manninen, Sirkku**, University of Helsinki, Finland

Communities of forbs and insects have adapted to habitats managed for agricultural purposes over several centuries. Sprawling urban regions often contain remnants of such semi-natural habitats that, with appropriate management, provide suitable habitat for threatened species of these taxa. Also municipalities are committed to policies for the 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 vascular plant, lepidopteran, carabid beetle and hymenoptera assemblages of dry and fresh meadow habitats in and around Helsinki. Data on management regimes, environmental and spatial factors are also evaluated. This information is being applied to refine the planning and management of networks of meadow habitats for the enhancement of biodiversity. Our results show that the numbers of vascular plant and lepidopteran species are lower in urban than rural meadows. Management of urban meadows successfully reduces nutrient levels and thus promotes the occurrence of these interdependent taxa. A number of carabid species were sensitive to management intensity, and less intensive management resulted in more even carabid assemblages. Moreover, landscape level spatial factors such as fragmentation and patch size and connectivity, are important for lepidoptera.

161. CLIMATE CHANGE: RETHINKING RESTORATION UNDER THE NATURA 2000-REGIME

Verschuuren, Jonatahn, Tilburg University Law School, Netherlands

Currently, the EU Wild Birds- and Habitats Directives have, in theory, three top priorities with regard to Natura 2000 sites: maintenance, restoration and compensation, to get or keep Europe's most vulnerable ecosystems in a 'favourable conservation status'. We will show that in practice, there appears to be only a thin line between these three priorities. Climate change is further blurring the legal situation. Biologists have convincingly shown that adaptation measures to protect biodiversity against the consequences of climate change in Europe should first and foremost focus on connectivity between Natura 2000 sites, on increased size and on increased sustainability of these sites. In many parts of Europe (such as those with a dense population, with intensive economic activities, and those already under threat of climate change), these goals can only be achieved by restoration measures. This paper seeks to address the question whether the legal Natura 2000-regime is sufficiently equipped to address this formidable objective imposed by climate change. If the answer is no, alternatives for the current EU-Directives will be proposed.

162. TOLERANCE OF BOREAL FOREST SONGBIRDS TO INDUSTRIAL FORESTRY REFLECTS NATURAL DISTURBANCE LEGACY: A CANADA-WIDE INQUIRY

Villard, Marc-André, Canada Research Chair in Landcape Conservation, University of Moncton, Canada; **Drapeau, Pierre**, Centre for Forest Research, University of Québec at Montréal, Canada; **Hannon, Susan J.**, Department of Biological Sciences, University of Alberta, Canada; **Leduc, Alain**, Centre for Forest Research, University of Québec at Montréal, Canada

Natural disturbance emulation posits that species should tolerate anthropogenic disturbances whose characteristics

fall within the natural range of variation observed in their ecoregion. To test this assumption, we compared the response of bird assemblages from four forest regions of Canada to the opening of woodland by harvesting at stand and landscape scales. Breeding bird surveys were conducted in a total of 17 landscapes (2003 point count stations) across the four ecoregions. We predicted that (1) the number of species that are sensitive to a reduction in late-seral forest cover and their abundance rank in the species assemblage should be lower in ecoregions experiencing frequent, intense natural disturbances; (2) "sensitive species" still present in ecoregions with high-intensity natural disturbance regimes should be more tolerant to an intensification of forestry, and hence, the rate of increase in their abundance with late-seral forest cover should be lower than in ecoregions with low-intensity disturbance regimes. As predicted, boreal ecoregions (Alberta, Québec) had fewer sensitive species than the temperate forest ecoregion (New Brunswick). The slope of the sensitive species abundance/forest cover relationship was significantly lower in Alberta landscapes than elsewhere. These results indicate that conservation strategies should reflect the history of natural disturbance of the focal ecoregion.

163. CONSIDERING THE INTERACTION BETWEEN CONNECTIVITY AND ANTHROPOGENIC THREATS IN DYNAMIC RESERVE DESIGN: THE NEIGHBOURHOOD VULNERABILITY APPROACH

Visconti, Piero, James Cook University, Australia; **Pressey, Bob**, James Cook University, Australia; **Segan, Dan**, University of Queensland, Australia; **Watts, Matthew**, University of Queensland, Australia

Methods for scheduling conservation action over time to promote the persistence of species are poorly developed, yet urgently needed. For species sensitive to habitat fragmentation and isolation, persistence within a reserve depends importantly on unreserved neighbouring habitat. If this external habitat has some likelihood of disappearing, it follows that we should consider not just local vulnerability (within an area of interest) but also neighbourhood vulnerability when prioritizing areas for conservation. We present a selection approach that incorporates both local and neighbourhood vulnerability with biodiversity value and conservation cost. We compare it against other heuristics in a marine and a terrestrial case study. This new approach results in two new courses of prioritization for conservation: 1. protection of areas with neighbours that have low vulnerability and are more likely to retain their biodiversity value; or 2. protection of highly vulnerable neighbouring habitat that is important to retain the value of important nearby areas, avoiding species loss from these areas after loss of connectivity. The new approach outperforms other heuristics by minimizing both losses of habitat and connectivity, improving species persistence within reserves and across whole planning regions, in both reserved and unreserved areas

164. IMPACTS OF CLIMATE CHANGE ON CONSERVATION TARGETS

Vohland, Katrin, Potsdam Institute for Climate Impact Research, Germany; **Cramer, Wolfgang**, Potsdam Institute for Climate Impact Research, Germany

For several reasons, societies defined conservation targets. Ecosystem services such as biomass production, pollination, water retention or recreation rely on ecosystem function based on biodiversity at several scales. Biodiversity as for example measured by species distribution is modified due to climate change. For nearly all regions of the world, rising temperatures are projected. The pattern of other changing climate parameters such as precipitation or insolation is less consistent. However, for many regions water deficiency is projected with differentiated impact on rivers, lakes and forests. Many species and habitats protected under the Habitats' Directive of the EU are expected to suffer from climate change. Further, climate change interacts with changing land use. Here, an overview of climate change impacts on species and habitats for Germany is given. Implications for the European Network Natura 2000 are discussed, mainly considering the expected requirements with regard to connectivity and space for adaptation.

165. COMMON BIRD MONITORING IN EUROPE DELIVERS POLICY RELEVANT BIODIVERSITY INDICATORS

Voříšek, Petr, Czech Society for Ornithology, Pan-European Common Bird Monitoring Scheme, Czech Republic; **Škorpilová, Jana**, Czech Society for Ornithology, Pan-European Common Bird Monitoring Scheme, Czech Republic; **Klvaňová, Alena**, Czech Society for Ornithology, Pan-European Common Bird Monitoring Scheme, Czech Republic; **Van Strien, Arco**, Statistics Netherlands, Netherlands; **Gregory, Richard D.**, Royal Society for Protection of Birds, United Kingdom

The Pan-European Common Bird Monitoring Scheme (PECBMS) aims to use common bird species as indicators of the general state of biodiversity in Europe. The scheme collates data from annually operated national breeding bird surveys spanning different periods in more than 20 European countries. The last update of data confirms Europe-wide decline of common farmland birds, which on average have fallen in number by 48% while common forest birds have declined on average by 9%, both in period 1980-2006. There is good evidence that continent wide decline of farmland birds has been caused by intensive agriculture, although a role of intensification could differ regionally and temporarily. It appears that there is no such single driving force in case of common forest birds, where trends differ regionally. The PECBMS produces so called 'wild bird indicators' regularly, which are used by policy makers as official biodiversity indicators in Europe. Farmland Bird Indicator has been adopted by the EU as a Structural Indicator and Indicator of Sustainable Development and the wild bird indicator has been incorporated in the set of indicators to assess progress towards the European target of halting biodiversity loss by 2010.

166. ADAPTING LANDSCAPES TO CLIMATE CHANGE: PRIORITY ADAPTATION ZONES IN ECOLOGICAL NETWORKS

Vos, Claire, Alterra, Wageningen University and Research Centre, Netherlands; **Baveco, Hans**, Alterra, Wageningen University and Research Centre, Netherlands; **Schippers, Peter**, Alterra, Wageningen University and Research Centre, Netherlands; **Verboom, Jana**, Alterra, Wageningen University and Research Centre, Netherlands

Climate change has been inducing range shifts for many species following their suitable climate space and further shifts are projected. Models showed that whether species will be able to colonize regions where climate conditions become suitable, depends on: (1) the rate of climate change; (2) the size of the species distribution range; (3) the northward expansion rate, determined by (a) species traits and (b) habitat fragmentation. We identified those sites in Northwest Europe where ecosystem patterns are not cohesive enough to accommodate species' range expansion. The method allows pinpointing the best locations for climate corridors where improving connectivity is most urgent and potential gain is highest. We propose several adaptation strategies: (1) link isolated habitat that is within a new suitable climate zone to the nearest climate-proof network; (2) increase colonizing capacity in the overlap zone, the part of a network that remains suitable in successive time frames; (3) optimize sustainable networks in climate refugia, the part of a species' range where the climate remains stable.

167. NATURA 2000 IN 2010 AND BEYOND – THE VIEW OF THE EUROPEAN HABITATS FORUM

Waliczky, Zoltan, Chairman, European Habitats Forum (Royal Society for the Protection of Birds/BirdLife), United Kingdom;

The EU Birds and Habitats Directives are the cornerstone of the EU's biodiversity policy Key measure is the establishment of protected areas called Natura 2000. Thirty years after the adoption of the Birds Directive, the Natura 2000 network is now nearing completion, covering about 17% of the EU's terrestrial area. Natura 2000 represents the world's first continental network of protected areas with designated sites selected based on international standards and up-to-date scientific information. Key challenges for the implementation of the Natura 2000 network remain. Establishing marine Natura 2000 sites is only starting in 2009. Most designated sites do not have clear conservation objectives or management plans. Financing of the management is highly inadequate in most countries. Climate change imposes new challenges that require connectivity between sites. The European Habitats Forum firmly believes that the Directives have withstood the test of time and provide a flexible framework and high conservation standards that must be maintained and fully implemented well into the future. At the same time, there are ways in which they can and should be strengthened and additional measures are necessary to help them fulfil their full potential to protect the EU's biodiversity.

168. EUROPEAN UNION'S DIRECTIVES DO NOT ALLOW FOR CONSERVATION OF PRIMEVAL FORESTS

Wesołowski, Tomasz, Department of Avian Ecology, Wrocław University, Poland

The preservation of natural evolutionary processes is one of the most important targets of nature conservation. This can be only achieved by preservation of whole primeval ecosystems - forests which have originated and persist without direct human intervention. Only in such conditions one can see how forest ecosystems function without human interference. The primeval forests provide as well indispensable benchmarks for any re-naturalisation work in man-made woods. Therefore, their preservation should be at the very top of the European conservation agenda, but it is not the case. Strictly protected forests occupy less than 0.1% of Europe's woodland area, are concentrated in economically marginal places, and their creation is often vehemently opposed. NATURA 2000, even if properly implemented, would not provide sufficient means to preserve ecosystem integrity of natural forests. Still worse, the EU directives, not only allow for human interventions in the primeval areas, but – in some cases – outright demand them. Data from the Białowieża Forest (Polish/Belarussian border) clearly show inadequacies of the NATURA 2000 tools in the protection of primeval forests. The existing EU Directives have to be urgently amended to demand governments to preserve all remnants of pristine forests free of human management.

169. THE RARE AND THE EVERYDAY IN NATURE CONSERVATION

Whitehouse, Andrew, University of Aberdeen, United Kingdom

Nature conservation is ostensibly concerned with rarity. Species and habitats that are deemed to be rare, and thus threatened, are, at first glance, the focus of conservationists' activities. This paper explores the ways in which rarity is assessed and used within conservation. It examines the ambiguities of rarity and considers its relation to 'the everyday', that is to the very situated and regular experiences of nature that people enjoy in their day-to-day lives. Conservation, for example, is concerned with making the rare more everyday, and occasionally with making the everyday rarer. It also draws on narratives of the loss of everyday experiences of nature, for example Rachel Carson's clarion call Silent Spring. But conservation also needs rarity to justify itself and its actions. This paper thus attempts to examine the motivations and purposes of conservation through an examination of the tensions between rarity and the everyday. It also speculates on the possibilities for a more 'everyday conservation' focused on the maintenance of caring relations between people and nature, rather than on the continual production of threats to an objectified and quantified nature. Examples are drawn primarily from Britain but also from Brazil and New Zealand.

170. CHOKEBERRY (*ARONIA* SPEC.), AN INVASIVE SPECIES IN THE MARSHLANDS OF THE NETHERLANDS?

Wil L.M., Tamis, Institute of Environmental Sciences, Leiden University, Netherlands

Most non-native species in The Netherlands occur in anthropogenic or semi-natural habitats. Chokeberry (*Aronia* spec.) is one of the few non-native species, which occurs in natural habitats, in particular lowland peat marshlands. The taxonomic status of the wild *Aronia* populations is l unclear, but it is probably the hybrid *A.* x *prunifolia* (Purple Chokeberry). We analyzed the distribution and population development by using distribution data and relevées. We analyzed the correlations of Chokeberry with other native plants, as an indication of possible negative effects. We performed web-based surveys for nature conservation organizations and commercial plant breeders to investigate respectively the extent of the problem and which Chokeberry species and cultivars are sold. Chokeberry is regarded by the nature conservation organizations as an invasive species contributing to eutrophication and threatening of rare species. Despite its presumed negative effects it is still a very popular garden plant. Despite the strong opinion of the nature conservation organisations, they did not monitor the distribution or damage of the Chokeberry. The spreading of the Chokeberry on a national scale appeared to be stopped, but on a local scale it is still expanding, presumably because of a changed nature conservation management (less mowing etc.).

171. WOLVES, SCAVENGERS AND CLIMATE CHANGE

Wilmers, Christopher, University of California, Santa Cruz, United States

Scavengers of large bodied prey make their living by feeding off of the remains of predator kills and by finding animals that have died due to starvation or disease. In both cases, mortality of the prey is influenced by fluctuations in environmental conditions. This suggests the potential for a strong influence of climate change on scavenger ecology. Here we use the wolf-scavenger system in Yellowstone National Park to explore the role of top predators in buffering or exacerbating within and between year variation in climate on scavenger food procurement.

172. THE THEORY OF ALLOSTASIS IN STRESS ECOLOGY

Wingfield, John, University of California, United States

Field endocrinology techniques include collection of samples (i.e., blood, urine, feces, tissues) from free-living animals for analysis of hormones, receptors, enzymes, etc. that can be used to address issues in conservation biology. For example,

questions concerning a declining population of song birds may be include: is this due to environmental stress, altered habitat that no longer provides appropriate cues of when to breed or other causes? Application of field endocrinology techniques can determine rapidly whether a population may be stressed, or, if reproductive hormones are depressed suggesting altered responsiveness to the environment. Here I will review a theoretical approach using the concept of allostasis (stability through change) and allostatic load (energy demand of daily and seasonal routines) to predict susceptibility to stress. Endocrine methods that can be used to monitor threatened species, identify potential stressors, assess responsiveness to environmental cues and monitor captive breeding programs. These approaches are particularly tractable for determining effects of human disturbance in many contexts from major habitat destruction to influences of tourist trails. They can also reveal "hidden" effects such as low levels stress despite normal behavioral responses to daily and seasonal routines.

173. THE ECONOMICS OF ECOSYSTEMS AND BIODIVERSITY – FIRST RESULTS OF THE TEEB STUDY FOR POLICY MAKERS

Wittmer, Heidi, Helmholtz Centre fro Environmental Research, Germany

Managing humanity's desire for food, energy, water, life-saving drugs and raw materials, while minimizing adverse impacts on biodiversity and ecosystem services is today's leading challenge for society. In effect the world's economy is a sub-set of the much neglected larger economy of the natural resources and ecosystem services that sustain us. Phase II of the TEEB Study aims to integrate ecological and economic knowledge to advance in policy making the consideration and evaluation of ecosystem services under different scenarios. TEEB seeks to examine the economic costs of biodiversity decline and the costs and benefits of actions to reduce these losses. A selection of key recommendations for national and international policy levels will be discussed. These will have been presented to German and EU policy makers in Berlin on the 2nd of September 2009.

174. CONTRASTING SUCCESS IN THE RESTORATION OF PLANT AND PHYTOPHAGOUS BEETLE ASSEMBLAGES OF SPECIES RICH MESOTROPHIC GRASSLANDS

Woodcock, Ben A., Centre for Ecology & Hydrology, United Kingdom; **Brown, Valerie K.**, Centre for Agri-environmental Research, University of Reading, United Kingdom; **Mortimer, Simon R.**, Centre for Agri-environmental Research, University of Reading, United Kingdom

Since the end of the Second World War changing management of species rich mesotrophic grasslands has resulted in their large scale loss and degradation across Europe. Restoration of grasslands that have been agriculturally improved (e.g. NPK fertiliser, silage cutting regimes and increased livestock stocking rates) provides a valuable approach to the conservation of these threatened habitats. Over a four-year period a replicated block design was used to test the effects of seed addition (green hay spreading and brush harvest collection) and soil disturbance on the restoration of phytophagous beetle and plant communities. Patterns of increasing restoration success, particularly where hay spreading and soil disturbance were used in combination, were identified for the phytophagous beetles. For the plants, however, initial differences in restoration success in response to the same treatments were not followed by temporal increases in plant community similarity to target mesotrophic grasslands. It is possible that the long term consequences of the described management practices would not be the establishment of beetle and plant communities characteristic of the targets for restoration. However, short term increases in community similarity taxa to species rich mesotrophic grasslands for both plants and phytophagous beetles do significantly improve their conservation value.

175. FOREST MANAGEMENT IS DRIVING THE EASTERN NORTH AMERICAN BOREAL FOREST OUTSIDE ITS NATURAL RANGE OF VARIABILITY

Yves, Bergeron, Chair in sustainable forest management, University of Quebec in Abitibi-Témiscamingue, Canada; **Dominic, Cyr**, Centre for Forest Research, University du Québec in Montréa, Canada; **Sylvie, Gauthier**, Natural Ressources Canada, Canadian Forest Service, Canada; **Christopher, Carcaillet**, Centre for BioArchaeology and Ecology University of Montpellier 2, France

Fire is fundamental to the natural dynamics of the North American boreal forest. It is therefore often suggested that the impact of anthropogenic disturbances (e.g. logging) on a managed landscape are attenuated if the patterns and processes created by them resemble those of natural disturbances (e.g. fire). To provide forest management guidelines, we investigate the long term variability in the mean fire interval (MFI) of a boreal landscape in eastern North America, as reconstructed from dendrochronology and lacustrine sedimentary charcoal. We translate the natural variability in MFI into a range of landscape age structures using a simple modeling approach. Using the array of possible forest age structures confers flexibility for managers while being conservative enough to keep some room to maneuver in case of unpredictable natural disturbances. However, an assessment of the current state of the landscape suggests that logging has already caused a shift in the age class distribution towards a stronger representation of young stands with a concurrent decrease in old growth stands. Logging is indeed quickly bringing the studied landscape outside of its long term natural range of variability, implying that substantial changes in management practices are required.

176. COLLECTING SEEDS FOR EX SITU CONSERVATION OF EUROPEAN WILD PLANT TAXA: DEVELOPMENT AND APPLICATION OF THE ENSCONET COLLECTING STRATEGY

Zippel, Elke, Botanic Garden and Botanical Museum Berlin-Dahlem, Freie Universität Berlin, Germany; **Stevens, Albert**, Botanic Garden and Botanical Museum Berlin-Dahlem, Freie Universität Berlin, Germany

In view of the dramatic decrease of plant biodiversity ex-situ conservation is an indispensable supplement for in-situ conservation efforts. In contrast to the costly and time-consuming ex-situ-cultivation, permanent seed storage is comparatively economical and allows storing great amounts of plant genetic diversity. Since 2005 the European Native Seed Conservation network (ENSCONET), funded by the European Community, improves the quality of European seed banks, and co-ordinates the European seed conservation practice, policy and research. One of the main areas in ENSCONET is the coordination and standardisation of seed collecting and curation processes across Europe. A detailed collecting plan was developed considering the distribution of the taxa in the European bio-geographical regions and the whole European range. The Botanical Garden and Botanic Museum Berlin-Dahlem coordinates the development and later the application of the priority list for the European continental bio-geographical region. Prioritisation of taxa includes their degree of endemism and threat status. Additional target populations of selected high priority species were identified. These methods are also useful for planning and realization of seed collections on national level and easy to extend for other criteria like e.g. the economic value as used for the German Seed Bank Network for Crop Wild Relatives.

ERRATA

916. THE RELENTLESS TIDE OF INTRODUCED ALIEN SPECIES INTO THE WADDEN SEA

Reise, Karsten, Alfred Wegener Institute for Polar and Marine Research, List, Germany

In contrast to most inland nature reserves, coastal waters are readily accessible to human vectors of species introductions, in particular transoceanic shipping and trade with life oysters for culturing. The Danish, German and Dutch Wadden Sea has been developed into a well managed trilateral conservation area, and the Dutch and German parts are on the Unesco list of World Heritage Sites since 2009. On the other hand, invasions of alien species continue to irreversibly change the coastal biota. Most successful are universal invaders which modify habitats and respond positively to a recent trend of climatic warming. Prospects of controlling or even eliminating such invaders are dim, and mechanical removal would violate targets of nature conservation. Minimizing the influx of ever more alien species would require the ratification of international conventions on ballast water treatment and on use of alien species in aquaculture. Implementation is not yet in sight, and the public awareness of the consequences of biological globalisation in coastal waters needs to be strongly improved.

917. MODELLING THE IMPACT OF FEEDING STATIONS ON THE FORAGING BEHAVIOUR OF ENDANGERED AVIAN SCAVENGERS

Deygout, Chloé, AgroParisTech, France; **Duriez, Olivier**; National Museum of Natural History, France; **Sarrazin, François**, National Museum of Natural History, France; **Bessa-Gomes, Carmen**, AgroParisTech, France

Scavengers' present vulnerability is heavily related to resource availability and suitability. Placing livestock carcasses in feeding stations accessible to scavengers as a conservation measure can reduce the impact of resource limitation. In natural conditions, many scavengers are social foragers, exploiting unpredictable resources. By dramatically changing this predictability, feeding stations may affect scavengers' behavioural traits. In this study, we use an individual-based spatially explicit model to examine whether the preference of feeding stations can change individual search efficiency, social foraging characteristics and intraspecific competition patterns, given the current knowledge of griffon vultures (Gyps fulvus) in the Causses, southern France. Our results indicate that scavengers' ability to find any kind of resource is overall higher when their search is oriented toward feeding stations. This strategy decreases the advantage of acquiring information on food location from conspecifics. This may be advantageous for small colonies, particularly after re-introduction. Later, in bigger colonies, competition over the predictable resources could be reduced to levels similar as those expected in natural conditions by increasing the number of feeding stations for a similar total amount of resources.

ABSTRACTS OF ORAL PRESENTATIONS

Luscinia svecica
Graphics by Václav Bartuška

177. IS THE RECOVERY OF THE WOLF (*CANIS LUPUS*) POPULATION IN SLOVENIA, AFTER ITS LEGAL PROTECTION IN 1991 »TOO SUCCESSFUL«?

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With legal protection of wolves in Slovenia in 1991, successful recovery of the species was triggered. But according to the complaints of local communities, the wolves are recovering too quickly. The conflicts with livestock husbandry, which supported by EU subsidues, expanded in post 1991, too. According to Statistical Yearbook of Slovenia about 131.200 sheep have been bred in 2007. A lot of current sheep-farms are located inside Natura 2000 areas. 10 wolf litters, with 46 pups in total (average 4,6±1,96 per litter) have been registered in southern Slovenia in 2007 and in 2008 (source: Slovenia Forest Service). 1598 cases of wolf predation upon livestock, with the compensation claims of 1.075.600 Euros have been registered in the period 1994-2008. The main hotspot of conflicts in post-2005 period, is to be found in Slovenian Littoral Karst (44,5% of the compensation claims), where the species was absent for at least hundred years ago. The very area is known by the increase of forest surfaces in last Century. Although the expansion of wolves was among the conservation goals, the Government is trying to suppress it with issuing yearly extraction permissions. They triggered the protests of NGO-s, but brought no positive results in problem resolving.

178. FARMERS' INTEREST IN NATURE ENHANCE BIODIVERSITY IN ARABLE FIELDS

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Biodiversity declines in farmland have been attributed to field intensification and loss of landscape heterogeneity. However, farmers are not solely optimizing production, their actions are also influenced by socio-economic factors which indirectly influence biodiversity but rarely are incorporated in studies of farmland biodiversity. We used social science methods to quantify farmers' interest in nature on 16 farms in central Sweden, and combined this with biodiversity inventories of five organism groups, landscape composition and agricultural intensification. Crop density and farmers' interest in nature significantly explained variation in biodiversity, measured as the proportion of the regional richness found on single fields summed over the organism groups. Farmers' interest in nature also affected species richness of carabids and solitary bees, while crop density affected weed and carabid richness. Landscape measures were not significant for any of the studied groups. Our results suggest that future studies need to examine the relations between farmer attitudes and their corresponding actions and biodiversity in more detail. Conservation of biodiversity in farmland is dependent on understanding farmers' interest in nature and its relation to agricultural practices. This implies that effective agri-environmental schemes ought to include regional, local and manager considerations and be developed with stakeholder perceptions in mind.

179. ESTIMATING RED DEER POPULATION IN LOUSA MOUNTAIN USING DISTANCE SAMPLING TECHNIQUE

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The red deer (Cervus elaphus L.), the biggest Iberian ungulate, was reintroduced in Lousã Mountain (Central Portugal) during the 90's, after decades of local extinction. In the last years we started an intensive study aiming the evaluation of the adaptability and proliferation of the red deer population on this Natura 2000 site (PTCON0060 – Serra da Lousã). Since 2005 direct count methods (road transects) were applied and complemented by distance sampling technique in order to estimate deer density and some demographic parameters. Recent results (2007) show a mean density of 4.22 deer/100 ha (CV= 24.63) distributed in 20 000 ha during the roaring period and a mean cluster size of 1.93 animals. Demographically this population presents a sex ratio of 1:1.4 and a reproductive rate of 54% for adult females. This data has been used as the basis for the first red deer global management plan in Portugal, defining the hunting plan for the eleven hunting areas included in the species distribution area and allowing the sustainable exploration of this natural resource.

180. EFFECTS OF CLONAL GROWTH ON THE GENETIC STRUCTURE AND FITNESS OF THE ENDANGERED *PSEUDOMISOPATES RIVAS-MARTINEZII*

AMAT, MARIA ELENA, REAL JARDÍN BOTÁNICO DE MADRID (CSIC), Spain

Clonal growth is a double-edged sword for an endangered species because the short-term insurance against extinction incurs a potentially longer-term hazard of creating small, inbred self-incompatible populations with low fecundity. *Pseudomisopates rivas-martinezii* (*Scrophulariaceae*) is an endangered monotypic genus endemic to the Gredos Mountain Range (Spain). Plants multiplying vegetatively form very extensive underground stolon networks. In addition, although a range of pollinating insects has been observed visiting flowers during anthesis, most seeds seemed to be unviable and no recruitment was observed. One population of the species was selected for this detailed study. The reproductive system of the species was first investigated, and a Fully Replicated Nested Sampling Design was conducted in order to study possible factors affecting low seed viability, such as genetic diversity (using 7 microsatellite loci) or shrub cover. Generalized Linear Mixed Models were fitted relating distance to a different genotype and shrub cover to seed production and viability. Results showed that mate availability is a limiting factor for seed production and viability, therefore clonality becomes the main form of growth and reproduction in the population, thus being the main strategy for the survival of the species.

181. LANDSCAPE FRAGMENTATION CAUSED BY TRAFFIC AS A LIMITING FACTOR OF NATURE CONSERVATION

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Landscape fragmentation and population fragmentation caused by traffic are part of the serious negative factors which affect nature conservation. Fragmentation is hard to define and quantify which complicates the implementation of protective measures. Submitted outcomes from research are based on assigning unfragmented areas by traffic – UAT. These are defined as part of the landscape bordered by roads with traffic intensity exceeding 1000 vehicles per 24 hours and with an area greater than 100 km2. Presented maps show changes in landscape fragmentation in the Czech Republic from 1980 – 2005 and demonstrate its significant increase. In 1980 unfragmented areas covered 81% of the country, in 2005 it was only 64%. Another sign of landscape disintegration is the decreasing average size of UAT (In 1980 it was equal to 307 km2, in 2005 only 218 km2). Similarly the future prognosis based on traffic models is not optimistic. Polygons UAT represents a practical device for integration of the landscape fragmentation issue into landscape planning and into nature conservation concepts. Component modification of the methodology enables its use on an EU, country, or regional level.

182. DATA REQUIREMENTS FOR ROBUST CONSERVATION RISK ASSESSMENTS WHEN USING POPULATION MODELS

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Population models are promoted for estimating declines of at-risk species in the face of ongoing threats. However, such models require sufficient data to make accurate projections in the face of variability and uncertainty. It is therefore important to consider data requirements to accurately capture underlying population dynamics. We examined the accuracy of predicted population declines, and corresponding IUCN Red List status, generated from scalar and age-based models with simulated time series of abundance data of different lengths to estimate model parameters. We found that threat classification was typically robust across a wide range of simulated life-histories, variability in vital rates, and measurement error when age-based models were employed. Erroneous classifications were predictably minimized when time series were extended to 30-50 years and/or variability was small, yet differences in classification accuracies are often surprisingly insignificant when compared to shorter (5-15 year) time series when using age-based models. Scalar models, in contrast, often overestimated risk due to an inability to accurately estimate underlying population dynamics in the face of variability. Our results suggest that risk classification can be robust, even with limited data, if model structure is complex enough to capture basics of organism life-histories.

183. PATTERN OF BIODIVERSITY CHANGES ALONG A HABITAT DEGRADATION GRADIENT

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Biodiversity, its monitoring, selection of appropriate indicators, quantification of human activities impact on biodiversity, science based generalization and modelling of the matter in larger scales is a great challenge for scientists dealing the issue. We investigated using standard methods diversity of plant, mollusc, bird and bat communities in two sets of model sites (oak and beech forests) covering degradation gradient of central European deciduous forests (preserved, slightly affected, strongly affected, considerably changed, replaced with spruce monoculture). We found out particular diversity differences of all groups (with exception of lower plants) to follow the same pattern (one group diversity difference between two degradation stages is similar to differences of others). It is encouraging for effort of more general description of biodiversity changes as they can be well documented using several well selected indicator groups and change in diversity of one group can actually display quite similar change in diversity of several other groups. The common design in several groups and in two different forest types shows that the biodiversity changes pattern can have more general validity and larger scale modelling using area weighted, aggregated synthetic indices (e.g. Biodiversity intactness index) is expertly well-founded and reasonable way of biodiversity changes formularization.

184. POST-FIRE RESPONSE OF THE GREEK ENDEMIC *ABIES CEPHALONICA* FORESTS IN GREECE: THE EXAMPLE OF A NATURA 2000 SITE IN MT PARNITHA NATIONAL PARK

Arianoutsou, Margarita, University of Athens, Greece; **Christopoulou, Natassa**, University of Athens, Greece; **Ganou, Efi**, University of Athens, Greece; **Kokkoris, Yannis**, University of Athens, Greece; **Kazanis, Dimitris**, University of Athens, Greece

Fire is an infrequent disturbance agent for mountainous coniferous forests due to the prevailing climatic conditions. During the last decade there is a tendency of increasing fire events affecting these ecosystems across the North Rim of the Mediterranean Basin. Among the most affected forests are those of the Greek endemic Abies cephalonica Loudon (Greek fir) in southern Greece. In the summer 2007, a single fire burned the largest part of the strictly protected area of Parnitha National Park with Abies cephalonica forest. Permanent transects have been established for monitoring plant community regeneration. Some of the transects were extended towards the edge of unburned patches so as to estimate the long distance dispersal of fir seeds. During the first post-fire year, hundreds of unburned fir seeds were counted on the burned soil; however, no seedling was recorded. Several annual herbaceous seeders have established on the burned soil. It is concluded that beside the fact of successful regeneration of most understory plant taxa, the natural recovery of Abies will be an extremely low process, greatly depended upon the availability of seeds from the unburned patches and on the capability of seed germination and establishment in the conditions prevailing in the burned environment.

185. CURRENT DISTRIBUTION AND CONSERVATION OF MYOTIS MYOTIS (BOKHAUSEN, 1797) AND MYOTIS BLYTHII (TOMES, 1857) IN TURKEY (MAMMALIA: VESPERTILIONIDAE)

Aşan, Nursel, Kirikkale University, Turkey; **Albayrak, İrfan**, Kirikkale University, Turkey; **Yorulmaz, Tarkan**, Kirikkale University, Turkey

Untill now, 37 bat species have been recorded in Turkey by various authors. Of these, two sibling bats, western Palearctic species *Myotis myotis* and southwest Palearctic species *Myotis blythii* are the most common existed. Both occur sympatrically in natural and anthropogenic roosts such as caves, oldest khans, Turkish baths, abandoned houses and old ruins although *Myotis myotis* prefers moderate climate and humidty areas while *M. blythii* inhabits in semi-arid areas. Field trips for evaluating the potential distribution range of these two taxa in all regions of Turkey, are achieved between the years 2003-2008. Lack of understanding the importance of bats, the populations are threatened with the loss or destruction of their maternal roosts and hibernation sites, as reconstruction of old ruins, houses or fumigation of caves and old mines for using as shelter and dump by humans. With this study, we determined the current distribution of *M. myotis* and *M. blythii* in whole Turkey with recording new localities.

186. DISTRIBUTION, STATUS SURVEY AND CONSERVATION OUTLOOK OF THE DRILL MONKEY IN CAMEROON: LESSONS LEARNED FOR THE STUDY OF ELUSIVE MAMMALS

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Part of the challenge of protecting secretive, endangered mammals has to do with the inability of common monitoring techniques (i.e. line transects, point counts) to generate information on their status; a prerequisite for efficient management. Encounter rates are too few for traditional population size estimates to be statistically meaningful. Facing this challenge with the endangered drill monkey (*Mandrillus leucophaeus*) in Cameroon, where an estimated 80% of the remaining range of the species occurs in discontinuous forests, we designed a national-wide survey that combined the limited evidence on drill presence with an array of indirect parameters (i.e. hunter opinion, wildlife and habitat status, human activities) to qualitatively rank 52 survey areas in terms of current drill status and future conservation outlook. Using widely available computer technology and visiting at least once each survey area, we produced national distribution, status and conservation outlook maps directly usable by decision makers for focusing and prioritizing conservation actions. In our presentation, we will describe the survey design, present briefly our findings, and discuss the potential applicability of this method for different settings, scale and study species.

187. GENETIC CONSEQUENCES OF ANIMAL TRANSLOCATIONS: A CASE STUDY USING THE FIELD CRICKET, *GRYLLUS CAMPESTRIS* L.

Axel, Hochkirch, University of Trier, Germany; **Kathrin, Witzenberger**, University of Trier, Germany

Animal relocations have become an important tool in nature conservation. As translocated populations may be affected by genetic drift (founder effect), decreased genetic diversity and increased rates of inbreeding, genetic analyses are important to evaluate the success of relocation projects. The field cricket (*Gryllus campestris*) has been subject to reintroduction and translocation projects in England and northern Germany. We present a microsatellite study on the population genetics of one translocated population of this species in comparison with old populations and recently colonized sites. Our results show that the translocation did not result in a loss of genetic diversity, suggesting that using a high number of nymphs from different subpopulations may be suitable to decrease the loss of genetic diversity. We also found no negative effect on the source population, which reached a new maximum population size in 2006. An assignment test showed that individuals from the translocated population (F4 generation) were still assigned to the source populations, whereas two young natural subpopulations formed separate genetic clusters. As the strong fragmentation of *G. campestris* populations in northern Germany hampers natural colonization of newly created potential habitats, translocation projects seem to be an appropriate method to preserve this species.

188. PROBLEMS AND SOLUTION IN ASSESSING AND MONITORING PLANT SPECIES RICHNESS IN RESERVE NETWORKS

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The whole network of protected areas in the province of Siena, Italy (made by all the Natura 2000 and other protected areas), was sampled by a probabilistic approach based on the sampling design of the National Inventory of Forests and Carbon Sinks. In each of the 606 sampling sites, a plot of 100 m2 divided into 16 subplot was located and plant species diversity recorded in each subplot/plot. The occurrence data of all plant species were then used to model the spatial patterns of plant diversity and the relation between the sampling effort and completeness of species lists. The results were then used to estimate the partitioning of species diversity across the different spatial components investigated (subplot – plot - nature reserve and whole network) and to provide practical indices for monitoring future changes of plant species diversity.

189. A LARGE SURVEY SHOWS THAT EMOTION HENCE FIELD EXPERIENCES ARE ESSENTIAL TO STIMULATE PUPILS TO PROTECT LOCAL BIODIVERSITY

Ballouard, Jean Marie, Centre National de Recherche Scientifique, France; **Bonnet, Xavier**, Centre National de Recherche Scientifique, France; **Ajtic, Rastko**, Institute for Nature Conservation of Serbia, Serbia and Montenegro; **Brito, Jose**, Centro de Biologia Ambiental and Departamento Zoologia e Antropologia, Faculdade de Ciências da Universidade de Lisboa, Portugal; **Crnobrnja-Isailovic, Jelka**, Institute of Zoology, Faculty of Biology, Serbia and Montenegro; **ElMouden, Hassan**, Département de Biologie, Faculté des Sciences Semlalia, Marrakech, Morocco; **Halpern, Halpin**, BirdLife Hungary, Hungarian Ornithological, and Nature Conservation Society, Költo, Hungary; **Pleguezuelos, Juan Miguel**, Departemento de Biologia Animal, Facultad de Ciencias, University of Granada, Spain; **Prokov, Pavol**, Department of Biology, Faculty of Education, University of Trnava, Slovakia; **Uşak, Muhammed**, Department of Elementary Education, Faculty of Education, Dumlupınar Universitesi, Turkey; **Erdogan, M.**, Middle East Technical University, Faculty of Education, Department of Educational Science, Turkey; **Feriche, Monica**, Departemento de Biologia Animal, Facultad de Ciencias, University of Granada, Spain; **Sánchez, A.**, Departemento de Biologia Animal, Facultad de Ciencias, University of Granada, Spain; **Santos, Xavier**,

Departemento de Biologia Animal, Facultad de Ciencias, University of Granada, Spain; **Slimani, Tahar**, Département de Biologie, Faculté des Sciences Semlalia, Marrakech, Morocco; **Sterijovski, Bogoljub**, Macedonian Ecological Society, Faculty of Natural Sciences, Macedonia; **Tomovic, Lijiljana**, Institute of Zoology, Faculty of Biology, Serbia

Environmental education should be heavily based on field experiences. Unfortunately, most educational effort for biodiversity is channelled via virtual systems, essentially television, magazines, and Internet/media at school. A limited number of charismatic animal species (i.e. mammals) are employed because they have the virtue to generate strong general conservation feelings that should benefit to the whole ecosystems. We set up a comparative survey (>2,000 children, 10 countries) to investigate the knowledge and the interest of young school pupils (8-12 years old) toward biodiversity. Results revealed that children identified easily popular, often exotic, animal species (e.g. polar bears), but hardly recognised local species (e.g. blackbird). Pupils also considered that conservation priority should be given to charismatic/exotic mammals. Nonetheless, children believed that many species should be protected, even venomous snakes in certain countries. Further analyses suggested that affective emotional factor were determinant: any cute mammals, or species that have been manipulated, ranked among the first on the 'to be protected' list. On a positive note, field experiments showed that such affective factor was easily transferred to non-charismatic animals. Because a field-oriented approach is more efficient than superficial and theoretical methods, scholar educational programs should be more focused on local organisms.

190. EFFECTS OF RESTRICTING RANGE OF OCCURRENCE DATA TO PROJECT CURRENT AND FUTURE SPECIES DISTRIBUTIONS - BACK FROM PREDICTED IBERIAN BIRD MASS EXTINCTION

Barbet-Massin, Morgane, UMR5173 USM305, France; **Thuiller, Wilfried**, Laboratoire d'Ecologie Alpine, UMR-CNRS 5553, France; **Jiguet, Frédéric**, UMR5173 USM305, France

Climate suitability models are used to make projections of species' potential future distribution under climate change. Within such frameworks, the extent of the study range is of particular importance, especially when the full range of a species occurrence is not considered. We aimed at estimating biases induced by the use of range-restricted occurrence data on predicted changes in species richness at study area margins. We compared projections of future suitable climate space for 180 bird species breeding in Iberia and North Africa (27 of them breeding only in North Africa), using occurrence data from the full species range or from the often considered European-restricted range. The use of range-restricted occurrence data compared to the use of full occurrence data of a species led to underestimate its suitable climatic space. The projected changes in species richness across the focus area (Iberia) varied considerably according to the occurrence data used, with higher local extinction rates with European-restricted data (38% vs. 12% for full data). Modeling results for species currently breeding only in North Africa revealed potential shift to the Iberian Peninsula, hence the necessity to consider species outside the focus area if interested in forecasted changes in species richness.

191. ADDRESSING THE BIAS IN PROTECTED AREA REPORTING

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The Convention of Biological Diversity set a target to reduce the rate of current biodiversity loss by 2010. As this target is often hard to quantify, indicators were set to help countries assess their progress. One such indicator is protected area coverage, which is often reported as the percentage of land or sea protected in a region. For example, currently over 12% of the EU's total landmass is protected. The problem with using total percentages is that it doesn't illustrate how evenly protection is distributed across the different habitat and ecosystem types. The extent to which protected areas fulfil their role depends largely on how well they represent the full variety of biodiversity. Therefore to assess how effective protected area coverage is, planners need to be able to measure how evenly distributed total protection is of all habitats and ecosystems. The Gini coefficient, which is used in economics to measure inequality in income distribution, is a way planners can measure this value. In this presentation I illustrate how the Gini coefficient can be used to calculate the evenness of protection across all habitats in the EU and how this can more accurately gauge progress towards stopping biodiversity loss.

192. CONSERVATION AND AGRICULTURAL LAND-USE: INSIGHTS FROM ECOLOGICAL-ECONOMIC MODELLING

Barraquand, Frederic, Center of Biological Studies of Chizé - French National Centre for, France; **Martinet, Vincent**, INRA (French National Institute for Agricultural Research) - Public, France

As agricultural lands belong to private owners, linking socio-economic to ecological processes is critical to the formulation of efficient public policies for farmland biological conservation. We develop here an integrated ecological-economic model linking farmers' land-use decisions to the spatially extended dynamics of a theoretical farmland population (e.g. of Passerine birds). The explicit link between the farmers' land-use decisions and the biological population dynamics is the land-use pattern, as habitat types (grassland or cropland) affect local growth rates. We first related the population size of the target species to the economic context (prices, costs and subsidies of crops). Such relationship led us to devise two alternative strategies to maintain the biological population at a suitable size through changes in subsidies: (1) maintaining a stable land-use pattern (2) maintaining directly the population above a target threshold with sufficient probability. We then compared these two strategies to protect a bird population in a French agricultural landscape: our model suggests that strategy (2) is more efficient and less costly. We eventually discuss the interest of bioeconomic models accounting explicitly for population dynamics.

193. DECOMPOSING LANDSCAPE HOMOGENIZATION AND PRACTICE INTENSIFICATION EFFECTS ON FARMLAND BIRDS IN FRANCE

Bas, Yves, MNHN, France; **Jiguet, Frédéric**, MNHN, France

Large-scale studies have shown that national trends of farmland species are negatively correlated to national intensification indicators, but a lack of coherence with national-scale studies make difficult to conclude on specific cause of declines. Here we propose a study using finer scale agricultural data and air photo interpretation in a large country with diverse landscapes showing a broad gradient of intensification. We modelled local abundance of 43 farmland bird species with the French BBS data. For this purpose, we used a set of control variables including local climate and habitat types, an indicator of production intensity and densities of different types of field edges. Our results showed that the distinction between ground-nesters and hedge-nesters explained the most important part of variation among the species response to production intensity and landscape features. Ground-nesters exhibited a clear negative trend against the production intensity

gradient, whereas abundance of hedge-nesters is best explained by woody landscape elements within farmlands. Our results suggest not only differential responses, but also a strong competition between the two groups. These findings should have strong implications for the design of Agri-Environmental Schemes, especially on the statement of the target species.

194. IS A GROUP OF CONSERVATION BIOLOGY EXPERTS GOOD ENOUGH TO WRITE A SUCCESSFUL LARGE CARNIVORE MANAGEMENT PLAN?

Bath, Alistair, Memorial University, Canada

Traditionally, creating a management plan for large carnivores remained with a few individuals, often biological experts, and sometimes the task was assigned to an environmental NGO. Under such circumstances the experts and NGOs would do their best, design a management plan, but it would receive little to no support from other interest groups and became simply a paper document on a shelf with no relevant consequences. Conservation on the ground did not occur. A human dimensions (HD) facilitated workshop approach was used as an alternative to gain complete consensus between all interest groups in a wolf management plan for Croatia after a traditional approach had failed. Eight facilitated workshops, out of which two lasted for two days, were needed to reach an agreed plan on the ninth workshop. A similar process produced recently a brown bear management plan for Bulgaria, signed by the Minister in January 2009. A HD approach increases tolerance, builds trust and credibility, and allows for all groups to effectively work toward a common agreed upon vision. Working with different interest groups and perspectives rather than against them, will enable experts to achieve effective conservation and not be in the position of just defending their own ideas.

195. ESTABLISHING AN EVIDENCE BASE ON INVASIVE SPECIES RESPONSES TO CLIMATE CHANGE

Bayliss, Helen R, Harper Adams University College, United Kingdom; **Randall, Nicola**, Harper Adams University College, United Kingdom; **Wilcox, Andy**, Harper Adams University College, United Kingdom; **Stewart, Gavin B**, Centre for Evidence Based Conservation, United Kingdom;

Invasive species are of international concern as one of the major threats to biodiversity. Negative effects on industry, human health and ecosystem services combined with the high cost of control mean that invasive species present serious management challenges. Global climate change is likely to affect invasive species at all stages of the invasion pathway with potentially serious implications for invaded ecosystems. We have undertaken a review of the available evidence demonstrating the effects of climate change on invasive species. Although there is some existing discussion in the literature in this area, available research evidence is limited and there are crucial knowledge gaps which need addressing through primary research. We discuss the implications of our findings for short and medium term management and monitoring of invasive species and suggest potential research ideas to address the identified knowledge gaps.

196. 'MOVE US OUT OF THE FOREST. WE ARE NOT INTERESTED IN CONSERVATION!' AN EXAMINATION OF LOCAL ATTITUDES TOWARDS CONSERVATION AND NATURE IN RURAL INDIA

Beazley, Kim, Department of Geography, University of Cambridge, United Kingdom

In April/May 2007, Botezari village in central India was displaced from Tadoba-Andhari Tiger Reserve, reflecting an enduring state conviction that relocating communities from protected areas is essential for successful wildlife conservation. Grounded in doctoral fieldwork, this paper examines Botezari's displacement process, focusing on the multitude of prevailing local attitudes towards conservation and nature which the displacement operation crystallized. Drawing upon data largely derived from discussions with Botezari villagers, I document that local interest in participating in Tadoba's management was negligible, enthusiasm for relocation was substantial, attitudes towards nature were mostly negative and that many local activities in Tadoba were ecologically detrimental. In light of this local alienation, I argue that to instigate community-led conservation there appears impossible. Conversely, using such anti-conservation attitudes to legitimize a continuing strategy of exclusion seems obtuse, particularly when these attitudes are likely the product of this longstanding "fortress" strategy of social dispossession. The paper concludes by calling for an alternative approach, and suggests that this requires a deeper understanding of the complicated linkages between poverty and biodiversity decline which can only be achieved through the expansion of multidisciplinary research projects that bring together biological and social scientists collectively to work towards a more sustainable future.

197. CONSERVATION OF THE IBERIAN REED BUNTING *EMBERIZA SCHOENICLUS* WITHERBYI: GENETIC DIVERSITY AND HABITAT USE

Belda, Eduardo_Jorge, Universidad Politécnica de Valencia, Spain; **Kvist, Laura**, University of Oulu, Finland; **Poninkas, Suvi**, University of Oulu, Finland; **Encabo, Ignacio**, University of Valencia, Spain; **Marin, Marcial**, University of Valencia, Spain; **Rodriguez, Alejandro**, University of Valencia, Spain; **Vera, Pablo**, University of Valencia, Spain; **Monros, Juan Salvador**, University of Valencia, Spain

The Iberian Reed Bunting is an endangered species (Spanish Red List). Only 254-360 breeding pairs are estimated in Spain, and its population is highly fragmented in several wetlands. Therefore, it's urgent to implement management measures to recover and ensure their viability in a mid-long term. The proposal of this study is: i) to know the populations isolation degree ii) identify the requirements and habitat use with the goal to promote adequate management measures in order to create the needed conservation criteria. The results confirm that genetic diversity is reduced and that genetic differentiation among populations was We propose that these subpopulations should be considered as independent management units (Castilla-La Mancha, Baleares, Catalonia). In terms of habitat use, territories are characterized by reed covering 70-80%, with herbaceous and pasturage (emergent) vegetation as complement. Our results show that territories exclusively covered by reed are not adequate. The medium home range was around 23 Ha. In Castilla-La Mancha, the presence of the species is limited by the availability of long extensions with habitat features mentioned. These results may be use for management guidelines, and are in agreement with the habitat loss hypothesis as the main factor to explain the decline

198. THE CASE FOR INTEGRATED MANAGEMENT IN FOUR EUROPEAN WETLANDS

Bell, Sandra, Department of Anthropology, Durham University, United Kingdom

The paper is based on findings from an EU funded, three year research project - Integrated Management of European Wetlands (EVK2-CT-2000-0081) conducted during 2001-2004. Research was located within four protected areas. This discussion focuses on three, the Danube Delta, Romania; the Nemunas Delta, Lithuania; Kerkini Lake, northern Greece. The most significant finding demonstrates that inhabitants of these wetlands feel marginalized by conservation biologists and policy makers. Local people believe that their experiential knowledge and opinions are relevant and valuable, but are undervalued and ignored by professional experts and people with political power. Despite the negative appraisal of those who make and contribute to conservation policy, local people are not against the general principles underlying nature conservation. The paper argues that despite the continuing controversy about the value of participatory approaches to conservation management, much greater transparency is required between scientists, policy makers and local populations and more respect paid to potential input from local natural resource users. Collaborations and co-management regimes must be tailored to configure a host of factors including the rate of economic development, the style of political culture, types of environmental education, the form of local and national governance and conservation practices.

199. THE OBSERVATORY OF MEDITERRANEAN WETLANDS

Beltrame, Coralie, Tour du Valat,A research centre for the conservation of Mediterranean wetlands, France; **Galewski, Thomas**, Tour du Valat, A research centre for the conservation of Mediterranean wetlands, France; **Perennou, Christian**, Tour du Valat, A research centre for the conservation of Mediterranean wetlands, France; **Grillas, Patrick**, Tour du Valat, A research centre for the conservation of Mediterranean wetlands, France; **Chazee, Laurent**, Tour du Valat, A research centre for the conservation of Mediterranean wetlands, France

This talk presents the Observatory of Mediterranean Wetlands, a new program supported by the Mediterranean initiative of the Ramsar Convention on wetlands, addressing two objectives all over the Mediterranean Basin. First, it seeks to create a research network to explore the linkages between human activities and the fate of wetlands ecosystems. This issue is of particular conservation interest as Mediterranean wetlands hold a great biodiversity, are the source of a number of ecosystem services, and yet under the threat of dramatic anthropogenic pressures. In this complex socio-ecological context, there is a pressing need for a long-term ecological monitoring scheme of biodiversity and ecosystem functions. Beyond this first objective, this Observatory explicitly relies on institutional and technical alliances in order to build a shared view for wetlands management. The communication of these synthetic results should in turn facilitate the policy-makers' awareness. The first promising outputs will also be presented: an assessment of biodiversity trends around the Mediterranean Basin measured with the Living Planet Index and a prospective work on ecological services and land use changes in selected wetlands. We show that this initiative is a valuable tool for habitat conservation embedded into a fragmented territory resulting from social and historic confrontations.

200. EUROPE-WIDE NEGATIVE EFFECTS OF AGRICULTURAL INTENSIFICATION ON BIODIVERSITY AND BIOLOGICAL PEST CONTROL ON FARMLAND

Bengtsson, Jan, Swedish University of Agricultural Sciences, Sweden; **Berendse, Frank**, Wageningen University, Netherlands; **Inchausti, Pablo**, Chizé Centre for Biological Studies, France; **Weisser, Wolfgang W.**, Friedrich-Schiller-University, Germany; **Emmerson, Mark**, University College Cork, Ireland; **Morales, Manuel B.**, Autonomous University of Madrid, Spain; **Ceryngier, Piotr**, Centre for Ecological Research, Polish Academy of Sciences, Poland; **Kindlmann, Pavel**, Institute of Systems Biology and Ecology, Czech Republic; **Tscharntke, Teja**, University of Goettingen, Germany; **Liira, Jaan**, University of Tartu, Estonia; **Camilla, Winqvist**, Swedish University of Agricultural Sciences, Sweden; **Sönke, Eggers**, Chizé Centre for Biological Studies, France; **Riccardo Bommarco**, Chizé Centre for Biological Studies, France; **Tomas, Pärt**, Chizé Centre for Biological Studies, France 3, **Benjamin, Boisteau**, Chizé Centre for Biological Studies, France; **Lars W., Clement**, Institute of Ecology, Friedrich-Schiller-University Jena, Germany; **Christopher, Dennis**, University College Cork, Eire; **Catherine Palmer**, University College Cork, Eire; **Irene Guerrero**, Faculty of Sciences, Autonomous University of Madrid, Spain; **Violetta Hawro**, Centre for Ecological Research, Polish Academy of Sciences, Poland; **Olga Ameixa**, Institute of Systems Biology and Ecology, Academy of Sciences of the Czech Republic, Ceske Budejovice, Czech Republic; **Tsipe Aavik**, Institute of Botany and Ecology, University of Tartu, Estonia; **Carsten Thies**, Georg-August-University Goettingen, Germany; **Andreas Flohre**, Georg-August-University Goettingen, Germany; **Sebastian Hänke**, Georg-August-University Goettingen, Germany; **Christina Fischer**, Georg-August-University Goettingen, Germany

The intensification of agriculture associated with increased production during the last 50 years has resulted in the decline of biodiversity of many taxa and the loss of ecosystem services. The increased use of fertilizers and pesticides, higher inputs of energy, larger farms and fields and landscapes simplification are all components of agricultural intensification. However, the relative contribution of the different components to the decline of biodiversity is hardly understood. In a large-scale study, including nine different European countries, we investigated the effects of agricultural intensification on vascular plant, carabid and bird species. In addition, we tested experimentally the biological control potential of natural enemies, by putting living aphids, glued on plastic labels, into arable fields and measuring their survival time. After correcting for differences in regional landscape structures, we found consistent negative effects of agricultural intensification on the species diversity at three trophic levels (plants, carabids and birds) and on the biological control potential of natural enemies. Furthermore, we were able to disentangle the relative effects of 14 different intensification components on the different species groups. We conclude that Europe-wide negative effects of agricultural intensification still continue and that current policy is apparently not sufficient to reverse these losses.

201. LINKING SUBSTRATE AND HABITAT REQUIREMENTS OF WOOD-INHABITING FUNGI TO THEIR REGIONAL EXTINCTION VULNERABILITY IN SOUTHERN FINLAND

Berglund, Håkan, Department of Ecology, Swedish University of Agricultural Sciences, Sweden; **Hottola, Jenni**, University of Helsinki, Finland; **Penttilä, Reijo**, Finnish Forest Research Institute Metla, Finland; **Siitonen, Juha**, Research Institute Metla, Finland

We assessed the habitat requirements and extinction vulnerability of wood-inhabiting fungi by analyzing the occurrence patterns of 13 spruce-associated polypore species. The data consisted of 95,535 dead-wood objects in 331 stands located in three regions across southern Finland.

Studied substrates consisted of various tree species and dead-wood qualities, and stands represented both unmanaged and managed forests of different successional stages. The substrate preferences of studied species overlapped as almost all favored natural spruce logs in intermediate decay. However, only a few species were specialists confined to this specific substrate. Most other species were less specialized in their resource use as regards host tree species, dead-wood qualities and decay stages. These generalist species occurred frequently also in managed forests. Specialist species showed a significant, 30-60-fold decline in the occurrence probability along a gradient of increasing duration and intensity of past forest use, while generalists showed no change or an opposite trend. Continued loss of threatened, specialist species is likely if old-growth preservation is not combined with conservation actions in managed forest. As specialists were restricted to specific dead-wood types that yet can occur in any successional stage, dead-wood restoration in managed forests may slow down their decline.

202. IMPACT OF LIVESTOCK GRAZING ON THE VEGETATION AND WILD UNGULATES IN THE BARANDABHAR CORRIDOR FOREST IN THE LOWLANDS OF NEPAL

Bhattarai, Bishnu, University of South Bohemia, Czech Republic; **Kindlmann, Pavel**, Institute of Systems Biology and Ecology AS CR, Czech Republic

We investigated, how livestock grazing inside the Barandabhar Corridor Forest (lowland in the south-central part of Nepal) affects plant community structure and standing biomass of grasslands in this area. There were 2432 individuals of livestock regularly grazing inside the natural habitats. As much as 73 % of the area was occupied and grazed by livestock, which caused a high competition between the livestock and wild ungulates for food. Grazed areas differed from the ungrazed ones in species composition and community structure. In the ungrazed areas, the standing biomass was higher, the proportion of barren surface smaller, and the number of plant species larger, compared with the grazed areas. Livestock grazing also affected the composition of herbs and that of grasses. For the maintenance of such degradable grasslands, the excessive grazing of livestock needs to be reduced by establishing proper alternative ways, such as improved varieties of livestock, community based programs and public grazing lawns for the local people.

203. DIVERSITY AND CONSERVATION VALUE OF NATIVE *VITIS SYLVESTRIS* GMEL. STANDS FROM HUNGARY, EVALUATED BY MORPHOLOGICAL TRAITS AND MOLECULAR MARKERS

Bodor, Péter, Corvinus University of Budapest, Faculty of Horticultural Science, Department of Viticulture, Hungary; **Bisztray, György Dénes**, Corvinus University of Budapest, Faculty of Horticultural Science, Department of Viticulture, Hungary; **Deák, Tamás**, Corvinus University of Budapest, Faculty of Horticultural Science, Department of Viticulture, Hungary; **Dücső, Imola**, Corvinus University of Budapest, Faculty of Horticultural Science, Department of Genetics and Plant Breeding, Hungary; **Pedryc, Andrzej**, Corvinus University of Budapest, Faculty of Horticultural Science, Department of Genetics and Plant Breeding, Hungary; **Höhn, Mária**, Corvinus University of Budapest, Faculty of Horticultural Science, Department of Botany, Hungary

Wild grape, *Vitis sylvestris* GMEL. became a highly threatened species of Europe because of the habitat loss, competitive exclusion with alien grape species and intensive forest exploitation. In order to analyse morphological traits and to perform molecular study, we sampled individuals from five remnant, native habitats of the wild grape. Morphological investigations referred altogether to 20 herbarium specimens, including both recently collected material and also herbarium specimens by Terpó (1963). Molecular study was based on 7 microsatellites confirmed formerly to be variable in case of both *Vitis sylvestris* GMEL. and *Vitis vinifera* L. Eight samples of wild grape were screened for length variation. To compare the genetic relationships among the wild specimens, cultivars of *Vitis vinifera* were also included. Genetic variability proved to be high among the autochthonous specimens of wild grape (H=0.81). Based on morphological traits and molecular evaluation on the territory of the Szentendre-island we identified interspecific hybrids of *Vitis sylvestris* and *Vitis riparia*. Moreover, on the UPGMA dendrogram the two samples of *Vitis sylvestris* from the Szentendre-island rooted in a separate cluster supporting the probable hybrid provenience of these samples. Based on our results we can conclude that most of the studied Hungarian habitats proved to be valuable for conservation.

204. FOREST RESERVE MANAGEMENT FOR SYNTOPIC SPECIES WITH CONTRASTING HABITAT PREFERENCES

Bollmann, Kurt, Swiss Federal Research Institute WSL, Switzerland; **Schäublin, Sabrina**, Zoological Institute, University of Zürich, Switzerland; **Imhof, Stefan**, Geographical Institute, University of Zürich, Switzerland;

The under-representation of pioneer and old-growth stands and the loss of structural richness through changes in forest practices are major problems for the conservation of forest biodiversity in Europe. Today, mountain forests are the only stronghold for plenty of species that prefer open stands with structural richness. This applies also to Capercaillie Tetrao urogallus and hazel grouse Bonasa bonasia, two endangered forest grouse with contrasting habitat preferences. We systematically assessed the distribution and habitat characteristics of both species in a forest reserve in the Swiss Alps. In a grid system, we investigated abiotic, structural and vegetation parameters and compared presence and absence cells of both grouse species by applying logistic regressions. In general, capercaillie preferred semi-open forest stands with well developed ground vegetation whereas hazel grouse was restricted to stands with an understorey providing a minimal amount of softwood trees. Thus, forest management for the coexistence of both species has to define a procedure how semi-open stands with low and high understorey cover can be combined within a single reserve. We will present a simple spatial concept how forest stands of both types can be triggered by considering topographic characteristics and differences in home range size of both species.

205. LONG-TERM MONITORING OF HERONS' COLONIES IN PROTECTED AREAS (RESERVATIONS) OF UKRAINE

Bondarchuk, Yuriy, National Taras Shevchenko University of Kyiv, Ukraine; **Serebriakov, Valentyn**, National Taras Shevchenko University of Kyiv, Ukraine

Herons (Ardeidae) monitoring has been carried out in Ukraine since 1986. So in 2006-2008 regular Ardeidae census was conducted throughout the Ukraine. For this research method with using special questionnaire was applied and the breeding sites were examined personally by us. Results: actual data was collected and analyzed - database of grey herons' colonies in Ukraine and the cartographical material are created. So about 14000 grey heron pairs nested in Ukraine. About 45 percent of herons' breeding colonies are located in protected areas (reservations) of Ukraine. The number of reservations with herons colonies grew up since 1980-th, this is important for biodiversity conservation management, because breeding colonies of herons make a great role in formation of biogeocenosis

206. COASTAL AND MARINE PRIORITY AREAS FOR CONSERVATION BASED ON BIODIVERSITY VALUATION: AZORES CASE STUDY

Botelho, Andrea, Environmental Protection and Conservation Center; Research Center in Biodiversity and Genetics Resources - Biology Department of the University of the Azores, Portugal; **Costa, Ana**, Research Center in Biodiversity and Genetics Resources - Biology Department of the University of the Azores, Portugal; **Pérez-Ruzafa, Angel**, Research Group. Ecology and Management of Coastal Marine Ecosystems. Department of Ecology and Hydrology. Faculty of Biology. University of Murcia, Spain; **Calado, Helena**, Research Center in Biodiversity and Genetics Resources - Biology Department of the University of the Azores, Portugal

Human activities on land and in the ocean impact on coastal and marine ecosystems (e.g. fisheries, tourism) are particularly evident in islands where inland activities almost always have repercussions on coastal and marine environment. Consequently, some conservation measures need to be taken to restrict and prevent these impacts caused by human and natural pressures. Ecosystem-based management considers the whole ecosystem as a functional entity where humans play a role and regards ecosystem functions' management rather than considering one issue or resource by itself. This study combines this aspect in an integrated management strategy, with application of modelling analysis (coastal and marine ecosystems), together with decision support towards an ecosystem conservation strategy. Based on the data available on ATLANTIS database for the Azores, biodiversity (specific richness) for several taxonomic groups was determined for São Miguel island littoral areas. Field work provided database update, improving species spatial distribution patterns resolution and enabling identification of the most sensitive and most threatened areas. Integration of the biological and socio-economic information on GIS support assists zoning and enables a strong baseline for management decisions. A guideline is established for definition of coastal and marine priority areas for conservation based on biodiversity evaluation criteria.

207. THE CONCEPT OF "NETWORKED COLLECTION" OR "VIRTUAL COLLECTION": NEW DEVELOPMENTS AND THEIR APPLICATIONS TO THE CONSERVATION OF THE COCONUT PALM

Bourdeix, Roland, Cefe Cirad, France; **George, Maria Luz**, Bioversity, Malaysia; **Baudouin, Luc**, Cirad, France; **Joly, Hélène**, Cefe Cirad, France; **Guarino, Luigi**, Global Crop Diversity Trust, Italy; **Engels, Jan**, Bioversity, Italy

A networked collection, also called a virtual collection, is located at more than one site, spans the genetic diversity of a given species (genepool) and gathers stakeholders having a mutual interest for conserving germplasm. In the extreme application of this concept, each accession could be conserved at a distinct site. All intermediate strategies are thus conceivable. The global coconut conservation strategy (GCCS) is mainly based on ex situ conservation in five regional gene banks. The implementation of a networked collection moves this system towards the involvement of more countries, sites and stakeholders. In the case of coconut, the main limiting factor of conservation is regeneration by using controlled pollination. Several accessions could be planted each in a distinct isolated site. These sites could be islets near inhabited islands or insulated valleys. This geographical remoteness will ensure the reproductive insulation needed for true to type breeding through cheap and natural pollination. In this paper, we discuss the criteria for an accession to be included in the networked collection: uniqueness of the germplasm, genetic representativeness, ability to reproduce it true-to-typeness and policy considerations. This new approach could lead to the disappearance of the classical delineation between in situ and ex situ conservation.

208. IDENTIFICATION OF CORRIDORS AND LINKAGE ZONES FOR BROWN BEAR AS MITIGATION TO THE IMPACTS FROM THE CONSTRUCTION OF E65 HIGHWAY IN CENTRAL GREECE

Bousbouras, Dimitris, Environmental Centre ARCTUROS, Greece; **Chouvardas, Dimitris**, Laboratory of Rangeland Ecology, Aristotle University, Greece; **Evangelou, Christakis**, Laboratory of Rangeland Ecology, Aristotle University, Greece; **Lampou, Eleni**, Laboratory of Rangeland Ecology, Aristotle University, Greece; **Kakouros, Petros**, Greek Biotope / Wetland Centre, Greece; **Georgiadis, Lazaros**, Environmental Centre ARCTUROS, Greece

A highway under construction in between the mountain ranges of Pindos and Olympus-Pieria will reduce the connectivity of large mammals' habitats between the two mountain ranges. Mitigation of this effect relies heavily on the preservation of the intermountain habitat connectivity. Brown bear was used as indicator species for the assessment of landscape connectivity that relied on the least cost analysis model. Model's input were land use types, settlements impact and road network. As a result actual and potential corridors and linkage zones that allow brown bear to shift between the two ranges were identified. The main land use types were coppice oak forests, arable land and grasslands. Inversion of coppice forests to high forests was proposed for the long term functionality of the corridors and linkage zones. This is because large mammals, as they disperse in the landscape, need forest patches suitable for shelter and rich in food resources that only high forests can provide.

209. TURNING BACK THE TIDE OF AMERICAN MINK INVASION IN PARTNERSHIP WITH COMMUNITIES

Bryce, Rosalind, University of Aberdeen, United Kingdom; **Lambin, Xavier**, University of Aberdeen, United Kingdom; **Davies, Llinos**, University of Aberdeen, United Kingdom; **Gray, Helen**, University of Aberdeen, United Kingdom; **Oliver, Matthew**, University of Aberdeen, United Kingdom; **Urquhart, Jamie**, University of Aberdeen, United Kingdom

Eradication of invasive alien vertebrates has hitherto been restricted to islands and has rarely been achieved on a significant scale in mainland areas, where native biodiversity continues to be severely affected. We describe how adaptive management has been successfully used in a large scale community-based American mink eradication project. Control has been systematically implemented in multiple river catchments covering approximately 7000 km^2, working from the headwaters where functioning metapopulations of water voles, a native species severely impacted by American mink, persist downstream to lowland areas. Two catchments are now effectively mink free with substantial progress in the adjacent catchments. The project has capitalised on the convergent interests of diverse communities including scientists, sporting industries, conservation bodies and public stakeholders with 80% of monitoring now done by volunteers. Widespread volunteer involvement has been essential in achieving the vast spatial scale dictated by the high mobility of mink. Indeed, genetic analysis of culled mink reveals that they travel >50 km during dispersal. The large scale of the project reduces mink incursion in upland areas where the species most vulnerable to mink invasion persist. The involvement of multiple stakeholders is essential in ensuring the long term sustainability of invasive species management in mainland areas.

210. IDENTIFYING RESARCH NEEDS FOR ECOSYSTEM SERVICE CONSERVATION: RESULTS FROM THE RUBICODE COORDINATION ACTION

Bugter, Rob, Alterra, Netherlands; **Harrison, Paula**, University of Oxford, United Kingdom; **Watt, Allan**, CEH, United Kingdom; **Settele, Josef**, UFZ, Germany

One of the results of the growing concern about the vulnerability of biodiversity resources enhanced by the increasing stochasticity of our environment is the FP6 co-ordination action RUBICODE. The primary objective of this project is to contribute to the development and dissemination of ideas and knowledge that can help conservation strategies to better protect ecosystem services and increase ecosystem resilience. During the first project phase we reviewed concepts and frameworks for ecosystem services, drivers of change, indicators, the usability of species traits and existing management and conservation strategies. In the second phase we synthesized results, integrated and further developed concepts and evaluated them in a series of workshops together with a large number of associated scientists and stakeholders. We identified knowledge gaps and translated them into research needs that were ranked for priority in the categories concepts and drivers, quantification and valuation, indicators, and management and conservation. Complete results are published on www.rubicode.net/rubicode/outputs and will be used to draft a research roadmap. In summary, major research needs were identified for integrated assessment methodology and tools, ecosystem classification, valuing and tipping points, trait-based indicators, interactions with socio-economic drivers and landscape scale approaches.

211. IDENTIFYING NATIONAL RESPONSIBILITIES FOR CONSERVING BREEDING BIRD SPECIES IN EUROPE

Burfield, Ian, BirdLife International, United Kingdom

Legal instruments like the CBD and the EU Birds and Habitats Directives oblige their signatories to identify, monitor and protect biodiversity. Unfortunately, the resources available are scarce, forcing countries to prioritise their spending. At species level, national Red Lists are commonly used for this purpose, even though extinction risk (which is what Red Lists measure) is not the only factor to consider when setting conservation priorities. If other factors are not taken into account, there is therefore a risk that precious resources may be misdirected. One such factor is national responsibility. When setting priorities, it is logical that countries should consider the international significance of their national populations. If done correctly, with countries agreeing to share the overall cost burden, this should lead to more efficient resource allocation and more effective conservation. Some countries have tried to take this approach, but they have adopted various methods that are not comparable and may even conflict. Using BirdLife's unrivalled data sets, this presentation will build on recent developments in the field (e.g. Keller and Bollmann 2001, 2004; Schmeller et al. 2008) to identify national responsibilities for breeding bird species in Europe, taking into account their global and regional populations and threat status.

212. BIRDS AT THE INTERFACE OF COMMERCIAL FORESTRY PLANTATIONS AND OPEN HABITATS: CAN RESTRUCTURING BENEFIT BIODIVERSITY?

Calladine, John, British Trust for Ornithology, United Kingdom; **Garner, Graeme**, British Trust for Ornithology, United Kingdom; **Douglas, David**, British Trust for Ornithology, United Kingdom; **Bielinski, Andrew**, Scottish Natural Heritage, United Kingdom; **Shaw, Geoff**, Forest Enterprise, United Kingdom

Commercial forestry plantations in Britain have often been criticised by nature conservationists because of their predominant use of non-native coniferous tree species, their high planting densities, low structural heterogeneity and their replacement of extensive areas of semi-natural moorland. These managed, man-made forests can be of strategic conservation importance, however, as they can support some bird species at relatively high densities including some that are of high conservation concern. In south-west Scotland, the edges of some upland conifer plantations, where they adjoin open moorland, are being 'restructured' by creating fringe strips including native shrubs and permitting natural regeneration, replacing the otherwise hard boundary between the plantations and open moorland. Bird populations using these restructured fringes and the neighbouring plantations and moorland were assessed in both winter and breeding seasons. The presence of fringe areas added to the species richness of bird communities within the overall plantation areas and was associated with comparatively high densities of some species. Although the fringe areas contributed to the conservation value of the areas in general, preliminary results in their early stages of development suggest there is little effect on the local moorland bird communities.

213. THE STATUS OF LEOPARD IN TURKEY, 2000-2008

Can, Ozgun Emre, Carnivore Initiative for Turkey & Turkish Nature Association, Turkey; **Lise, Yıldıray**, United Nations Development Programme Turkey, Turkey; **Koban, Evren**, The Scientific and Technological Research Council of Turkey, Turkey; **Cetin, Turan**, Carnivore Initiative for Turkey & Turkish Nature Association, Turkey; **Kurdoglu, Oguz**, Artvin Coruh University, Turkey; **Bucak, Faruk**, Artvin Provincial District of Environment and Forestry, Turkey

Leopards were believed to become extinct in late 1970s in Turkey. However, no field surveys by trained biologists were conducted to document the current status of leopards until 2000. We collected information on the historical occurrence of leopards and conducted field surveys during 2000-2008 to evaluate the possible presence of leopard, determine the availability of prey species, and evaluate the suitability of the habitat in 29 provinces. Interviews (n=650) were conducted in southern and Southeastern Turkey. Reported sightings were evaluated by conducting field visits. Camera trapping surveys were conducted in selected locations in western and northern Turkey to document the species. We found no evidence of an established leopard population over the last eight years, but did identify priority areas where leopards may occur and the habitat is suitable for re-colonization. In 2007, we documented that 2 leopards were killed during the last 2 years. The mtDNA ND5 region sequence analysis revealed that the 2 leopard samples belonged to the same haplogroup with *Panthera pardus saxicolor*, the subspecies present in countries neighboring eastern Turkey. The presence of a resident leopard population is still questionable and recovery of the species is doubtful without specific, recommended conservation actions by Turkish national authorities.

214. PRIORITIZING RAT ERADICATION ON ITALIAN ISLANDS TO PROTECT NESTING SEABIRDS

Capizzi, Dario, ARP, Regional Park Agency, Italy; **Baccetti, Nicola**, ISPRA, National Institute for the Protection and Environmental Research, Italy; **Sposimo, Paolo**, Nemo, Nature and Environment Management Operators, Italy

To prioritize the actions on Italian islands against alien species we used the case study of black rat eradication to

protect two nesting seabirds, i.e. Calonectris diomedea and Puffinus yelkouan. After selecting islands hosting both rats and shearwater colonies, we evaluated for each island the effectiveness of rat eradication by means of two different indexes. We estimated analytically the monetary costs of rat eradication on each island. Islands considered at high risk of recolonization were excluded from the analysis. Costs and effectiveness of rat eradication were compared for all remaining island. Rat eradication was most cost-effectively carried out on the island hosting the largest colony of *P. yelkouan*. Benefits to 63.9% of Italian population of P. yelkouan (but only to 7.1% of C. diomedea) derived from eradicating rats from all the islands in the ranking. This disproportion was due to the different pattern of distribution of the colonies of the two shearwaters. The optimal budget was around 200.000 €, showing that relevant benefits could be achieved also with relatively small monetary budgets. When adopting the cost/effectiveness rankings, the number of pairs protected for 1000 € of investment was much higher than that deriving from adopting effectiveness rankings.

215. A LANDSCAPE SCALE STUDY OF BUMBLEBEE POPULATION RESPONSES TO HABITAT ENHANCEMENT UNDER AN AGRI-ENVIRONMENT SCHEME

Carvell, Claire, Natural Environment Research Council, Centre for Ecology and Hydrology, United Kingdom; **Pywell, Richard**, Natural Environment Research Council, Centre for Ecology and Hydrology, United Kingdom; **Osborne, Juliet**, Rothamsted Research, United Kingdom; **Martin, Andrew**, Rothamsted Research, United Kingdom; **Bourke, Andrew**, School of Biological Sciences, University of East Anglia, United Kingdom; **Jordan, Bill**, Institute of Zoology, Zoological Society of London, United Kingdom; **Heard, Matthew**, Natural Environment Research Council, Centre for Ecology and Hydrology, United Kingdom

Bumblebees are a key component of agricultural ecosystems as pollinators of crops and wild plants, yet populations of many species have declined as a consequence of habitat loss. Agri-environment schemes have shown potential to attract large numbers of foraging bumblebees, but their effects on populations over time, and how these may vary according to landscape context, remain poorly understood. We combined detailed observations of bees and habitat quality with a genetic approach to assess the response of bumblebees to introduced forage patches across a landscape gradient. Density of foraging bumblebees was significantly higher on introduced forage patches than on control transects in surrounding habitats. More importantly, relatively higher densities of foragers were attracted to patches in landscapes with greater proportions of arable land, suggesting that the response to introduced forage was driven by a lack of suitable habitats elsewhere. We used microsatellite analysis to estimate relative change in the number of colonies of two common species visiting patches over three years. Our results show that population growth was greater in more arable landscapes. This study supports the application of targeted agri-environment schemes in intensively farmed areas, and provides useful insights into patterns of bumblebee distribution across contrasting agricultural landscapes.

216. AN INVASIVE EXOTIC UNGULATE IN THE SOUTH OF EUROPE: ORIGIN, EXPANSION AND CONSERVATION CONCERNS

Cassinello, Jorge, Instituto de Investigación en Recursos Cinegéticos (CSIC-UCLM-JCCM), Spain

The introduction of alien species is one of the main threats to biodiversity conservation. One particularly problematic example is that of wild ungulates which are increasingly being established in areas outside their natural distribution range due to human hunting interests. Unfortunately, we know little of the effects these large herbivores may have on the host ecosystems. In Europe we have a paradigmatic case: the aoudad Ammotragus lervia freely expanding in the southeastern mountains of Spain. The aoudad is a North African caprid introduced in 1970 as a game species in a single mountainous area (Sierra Espuña Regional Park). Since its introduction, the aoudad population adapted rapidly to a warm Mediterranean ecosystem, the absence of competitors or predators, and plenty of resources. The species reproduced easily and started to expand its range, as far as 50 km from the original release site. Recent habitat suitability studies have shown very similar ecological niches of the aoudad and the Iberian ibex, which highlights the risk of resource competition between both species. The aoudad has also been introduced in one of the Canary Islands, putting at risk endemic flora. It urges to carry out research to disentangle the ecological effects originated by this alien species.

217. IDENTIFYING THE EFFECTIVENESS OF NEST-SITE PROVISIONING IN THE ENDANGERED LESSER KESTREL (*FALCO NAUMANNI*)

Catry, Ines, Conservation Science Group, Department of Zoology, University of Cambridge, Cambridge, Portugal; **Franco, Aldina**, School of Environmental Sciences, University of East Anglia, Norwich, Portugal; **Sutherland, William J.**, Conservation Science Group, Department of Zoology, University of Cambridge, Cambridge, United Kingdom

The lesser kestrel is a globally endangered species having undergone a dramatic decline across its breeding range in recent decades. In Portugal it was identified that lack of suitable nest-sites was limiting its populations. Consequently, a massive provisioning of artificial nests and the implementation of a medium term monitoring scheme was established to improve nesting habitat and to assess the effectiveness of undertaken measures and describe remaining constraints. The lesser kestrel population increased from 155-158 pairs in 1996 to 527-552 in 2007 and 52% of the population currently breeds in artificial nests. Changes in colony size were negatively affected by predation and human disturbance and positively affected by the provisioning of artificial nests. Mean colony growth was estimated at 6.46 ± 1.86 for colonies where artificial nests were provided and -0.69 ± 0.5 pairs in colonies without nest-site provisioning. Predation rate was significant lower in artificial nests than in natural ones and interspecific competition decreased after nest provisioning. High risk of collapse of rural abandoned farmhouses (where most colonies are located) may jeopardize the future of the species in Portugal. This study shows that artificial nest-site provisioning is a powerful and effective measure in mitigating the lack of traditional sites.

218. CONFLICTING ECONOMIC AND CONSERVATION INTERESTS IN THE SUGAU GORGES NATURE RESERVE IN THE ROMANIAN CARPATHIAN MOUNTAINS

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In the Sugau Gorges Geological and Botanical Reserve, comprising a 7220 Natura 2000 habitat located in the Eastern Carpathians (Oprea et al., 2007), a conflict has been triggered (2003) by a mineral water exploitation that impedes upon the conservation purposes. Travertine formation has stopped and circa 20 endemic plant species (including among others a locus clasicus for *Astragalus pseudopurpureus*) are being menaced because of the water exploitation installations and the depletion of the springs. In order to propose a sustainable solution to this conflict, we apply the sustainable

vs. unsustainable scenario analysis method developed by Ciumasu et al. (2008) using a series of sustainability filters. Scenarios of unsustainable development correspond to the situation when the management decision chain in the nature reserve misses at least one of the sustainability filters: economic sustainability filter, social sustainability filter, environmental sustainability filter (scenarios S1 – S6). Sustainability filters are defined via separate sets of economic, social or environmental indices respectively. The solution is identified in a scenario of sustainable development (S7), where none of the sustainability filters is being missed. Basically, the mineral water should be exploited just outside the reserve area. We argue that this approach is applicable for similar conflicts Europe wide.

219. ESTIMATION OF THE EXTINCTION RISK OF HIGH MONTANE SPECIES AFTER GLOBAL WARMING AND COMPARISON OF THEIR SUITABILITY AS CROSS-TAXON INDICATORS

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Aim of this study is to model the occurrence of six high montane species representing ferns, vascular plants, wood inhabiting fungi, molluscs, saproxylic beetles and breeding birds under two global warming scenarios to estimate the extinction risk; and the assessment of cross-taxon indicator suitability for climate change monitoring in the Bavarian Forest National Park. Using Bayesian methods, we tested the influence of temperature and other habitat variables. Applying generalized linear models, the probability of occurrence for the high montane species was calculated under present conditions and for two scenarios of global warming. Cross taxon indicator suitability was tested using the discrimination results of the models. For all selected species our statistical models predict a considerable risk of extinction within the Bavarian Forest National Park as a result of global warming. As a result of the essentially similar relationships with the environment exhibited by species characteristic of the high montane zone, their relative suitability as indicators of early signs of global warming can be considered to be indicated by the results obtained from the discrimination model. The choice of which indicators to use should involve a consideration of what sorts of monitoring systems are al-ready in local existence.

220. FUNCTIONAL HOMOGENIZATION, AGRICULTURE AND WILDFIRES: PERTURBATION MAY PROMOTE MORE SPECIALIZED BIRD COMMUNITIES

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We describe functional homogenization patterns of bird communities in relation to perturbation gradients in Catalonia. Specialization and habitat preference indices were created for 103 terrestrial bird species on the basis of their frequency of occurrence variation in 2834 1 km2 squares along three orthogonal landscape gradients (i.e. niche dimensions). These indices were then averaged for bird communities. We analyzed the patterns of variation of communities' mean specialization and mean habitat preference along an agricultural-forest and a wildfire-forest gradient. Agricultural habitats held more specialized bird communities in terms of their species' use of climate and urban gradients than did forest habitats. Burnt habitats held more specialized communities in terms of their use of urban gradients than forest habitats, but these later had more specialized communities in relation to their use of agricultural-forest gradients. Our results show that functional homogenization indicators for different niche dimensions can behave differently along perturbation gradients and that some of these differences can be explained by the variation of mean habitat preferences. Widespread land abandonment and secondary forest expansion throughout the Mediterranean area are promoting functional homogenization of bird communities, a pattern that may be blurred by the occurrence of wildfires.

221. BIODIVERSITY AND THE GOALS OF CONSERVATION BIOLOGY

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Preservation of biodiversity is widely regarded as the fundamental goal of conservation biology. This goal usually takes one of two forms: (1) as a narrow concern with species extinction, or (2) as a broad label for any goal that merits conservation attention. Both alternatives present problems. Preoccupation with species preservation embodies a questionable allocation of conservation priorities. The loss of any species is regrettable, however resources are limited and some should be devoted alternatives inquiries like invasion biology and delivery of ecosystem goods and services – especially given the inevitable tradeoffs between conservation goals and more humanistic concerns involving equity and environmental justice. Furthermore, there is real danger that the concern to rationalize species preservation will influence research into controversial ecological claims regarding the relationship between biodiversity and processes such as community stability and ecosystem function. The alternative, defining biodiversity in terms of whatever conservation biologists happen to be concerned about, has the advantage of getting beyond a narrow focus on species extinction. However, conservation biology would be better served by focusing on specific normative goals, and on the tradeoff involved in pursuing those goals, rather than burying its normative agenda in a vague and unspecified conception of biodiversity.

222. DOOMED WHILE THRIVING: CESSATION OF TRADITIONAL WOODLAND MANAGEMENT AND EXTINCTION DEBT OF SAPROXYLIC ORGANISMS IN CENTRAL EUROPE

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Many endangered saproxylic organisms require large trees. Since trees need time to reach the required dimensions, it is possible to estimate current and future resource base for organisms depending on large trees. At sites across the Czech Republic we inventoried trees suitable and potentially suitable for three model beetle species (*Osmoderma barnabita*, *Cerambyx cerdo*, *Eurythyrea quercus*). We found that: (i) Insects mostly exploit habitats created dozens to hundreds years ago by traditional woodland management such as forest pasture and pollarding; (ii) currently occupied trees are decaying and the numbers of suitable trees are rapidly declining; (iii) future cohorts of big trees, which would eventually support the beetles, are heavily underrepresented. It follows that population sizes of organisms depending on large trees are decreasing at most sites, regardless of management and conservation status. In most sites, our model organisms will face depletion of their crucial resource within several dozens of years. The current measures to conserve saproxylic biota in the Czech Republic are ineffective. Rapid change in both reserve and commercial woodland management is needed to prevent otherwise inevitable depletion of saproxylic diversity including extinction of EU protected species. The research was supported by KJB600960705 & LC06073

223. USING ANCIENT DNA TO RESOLVE HOW POPULATIONS RESPOND TO CLIMATE CHANGE

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It is generally believed that climate change during the next 100 years will cause species' habitats to shift or contract northwards. However, little is known about how populations actually respond to such changes in habitat availability. Two likely scenarios are that populations either respond by altering their distributions accordingly (the habitat tracking hypothesis), or that they become extinct (the local extinction hypothesis). To investigate this issue, we have used ancient DNA analyses to study the effects of known past habitat reductions in the arctic fox and the woolly mammoth. Mitochondrial DNA sequences were obtained through genetic analysis of DNA extracted from teeth, bones and ivory. The results show that range contractions in both the arctic fox and the woolly mammoth were accompanied by losses of unique genetic diversity, suggesting that populations of at least some species are unable to track climate-induced reductions in habitat availability.

224. THE IMPLICATIONS OF AGRICULTURAL CHANGE ON AVIAN DIVERSITY AND THE ECONOMICS OF UPLAND FARMING

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Upland agriculture operates at the margins of profitability and yet supports substantial numbers of threatened bird species. Many farmers in the UK uplands rely on income from subsidies and agri-environment schemes (AES). However, these policies are in flux. We examine the influence of recent agricultural policy reforms on both avian diversity and the economic viability of upland farming. Avian diversity is dependent on habitat quality, farm management practices and socio-economic factors. Crucially, for some highly mobile species, such as the Eurasian curlew (*Numenius arquata*), the quality of multiple, distinct habitat types within the landscape is important for maintaining high densities. Different bird species either benefited from, or showed no response to, the presence of AES options at both the field- and landscape-scale. The impact of policy changes varied according to farming system and bird species. For instance, the switch from production-based to area-based subsidy had a positive effect on song thrush (*Turdus philomelos*) numbers, but a negative effect on lapwings (*Vanellus vanellus*) and curlews. In conclusion, species do not respond in a uniform manner to policy initiatives; different scenarios will result in winners and losers, both among the farming and avian communities.

225. PERSPECTIVES OF THE NEW DUTCH SPECIES CONSERVATION STRATEGY

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From 2010 onwards a new nationwide species conservation programme will be implemented in The Netherlands for the wider countryside as well as for nature areas. Integrating the needs of endangered species in spatial planning in all landscapes wherever possible as well as supplementing nature management plans with specific species conservation measures are the main characteristics of the new strategy. The twelve regional governments (provinces) are responsible for the implementation and realisation of this strategy. Analysing the plans for all 12 regions on the coverage of all species and on sharing the responsibility for species conservation by more private and public partners we conclude that the strategy has a high potential for a wide success of species conservation. Of the 329 species selected more than 70% appears to be dealt with in the plans. Conservation ambitions as well as involvement as expressed by public and private partners are significantly higher than under the preceding Dutch species conservation programme. Some successful examples of those recent actions will be presented. Yet the new strategy may still suffer severely from structural lack of financial support as well as from bureaucratic procedures.

226. EVIDENCE FOR THE NEGATIVE AFFECTS OF AGRICULTURAL INTENSIFICATION ON THE FUNCTIONAL DIVERSITY OF BIRDS

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Agricultural intensification (AI) is known to significantly reduce the diversity of European farmland birds. We investigated whether the range of processes provided by bird communities (functional diversity) is also affected by AI or whether communities are buffered against species loss through ecological redundancy: the occurrence of functionally similar species within the same community. Farm level intensification data and GIS-derived landscape data for each site were selected using multivariate statistics to provide a measure of AI. Birds were surveyed 3 times at each site during the breeding season in 2007. Data on 18 different bird traits were used to calculate FD, a continuous measure of functional diversity, for each site. Observed FD was significantly lower than would be expected if bird communities were assembled randomly. This provides evidence of environmental filtering, most likely through the process of AI. Our results showed that AI not only significantly reduced species richness of farmland bird communities, but also reduced the range of processes that bird communities performed. FD was significantly correlated with species richness suggesting that there is a lack of ecological redundancy in farmland bird communities. Consequently, the ecosystem functions provided by bird communities are likely to be threatened by any species loss.

227. SPATIAL MISMATCH BETWEEN FUNCTIONAL, TAXONOMIC AND PHYLOGENETIC DIVERSITIES CHALLENGES CONSERVATION STRATEGIES

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Beyond the maximization of taxonomic diversity in biodiversity hotspots, the conservation of functional diversity is necessary for the maintenance of ecosystem functioning and ecological services, while the protection of phylogenetic diversity is needed to face global changes on the long run. Although it should be the prerequisite of any conservation planning, measuring and mapping the spatial mismatch and congruence of key regions for taxonomic, functional, and phylogenetic diversities have never been proposed. Here, using a country-wide standardized monitoring scheme

providing high resolution data on the spatial distribution and abundance of birds, we assess the synergies and trade-offs in protecting each facet of biodiversity. We found a large amount of spatial mismatch between taxonomic, functional and phylogenetic diversities. We also show that French protected areas are biased towards the protection of high taxonomic diversity, while functional diversity is the great forgotten of protected areas. This study shows that getting the full picture of biodiversity is highly needed in large-scale conservation strategies as different conservation options are required to optimize the protection of each biodiversity facet.

228. EVALUATING TRENDS IN GLOBAL BIODIVERSITY: THE STATUS OF FISH AND CRAYFISH

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Using the IUCN Red List Index (RLI), based on the IUCN Red List of Threatened Species, it is possible to evaluate trends in global biodiversity by tracking changes in the conservation status of species over time. Until now RLIs have been produced for birds, amphibians and mammals however much of the world's biodiversity is found within the lesser known groups, such as insects and plants. A sampled approach to the RLI has been developed to include a greater variety of taxonomic groups into this global biodiversity indicator. Here we present the results of two recently assessed groups, crayfish and fish. Initial results from the study of all the world's crayfish species, highlights the need for rapid conservation action across this group. Changes in land use practice, water abstraction programs and disease, pose some of the biggest threats to the worlds' crayfish species. Results from our analysis of threatened fish species, indicate that conservation efforts need to target South East Asia, especially within the South China Sea and Mekong River. Over-exploitation of fisheries, water pollution, and rapidly expanding coastal development are driving many of these species to extinction.

229. PRESERVING NATURAL RESERVES IN EUROPE: MANAGING EXOTIC UNGULATES AND LIVESTOCK TO SUSTAIN BIRD & PLANT COMMUNITIES

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The natural reserves of Sierra Espuña and Sierra María are two mountainous areas in southeasthern Spain, containing SPAs for birds. However, free-ranging exotic aoudad (*Ammotragus lervia*) is present in both areas and livestock in María. Both herbivores are known to damage vegetation of these areas, which includes several endemisms. Despite this, the aoudad is considered an important game resource in the area, entailing high economic profits. Hence, opposite interests difficult an adequate management of these two reserves. A study modeling distribution of bird and large herbivores according to topograpy and vegetation was conducted to contribute improving management of both herbivores and reduce their impacts on both plant and bird communities. The aoudad and bird community showed opposite winter patterns of distribution according to altitude and steepness. The aoudad selected high and steeped sites, whereas the largest bird abundance and richness were observed in the lowest and plane sites. However, livestock preferences could not be explained by any variable. This lead to the conclusion that the aoudad and bird selection patterns may be related to variables featuring thermal stress during winter, while habitat selection is not taking place for livestock. Further research will be conducted during spring, without thermal constrains.

230. USING HYPERSPECTRAL SENSORS TO MAP THE SPREAD OF THE INVADING WATER FERN (*AZOLLA FILICULOIDES*)

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The water fern *Azolla filiculoides* is a floating plant native from Central America. It was detected for the first time in the year 2000 in the Guadalquivir river marshes, within Doñana National Park. These are seasonal fresh-water marshes that flood in winter and dry-up in summer. The water fern, although original from tropical permanent fresh-water habitats, has been able to survive the summer dry period and the cold winters of Doñana, and continues to spread. Since 2000 we are monitoring in the field the annual extent of the water fern. In 2007 and 2008 we carried two air-borne remote sensing campaigns with three different hyperspectral sensors (AISA-Hawk and AISA-Eagle, and AHS) and since 2007 have aquired several hyperspectral images of the CHRIS sensor on board of the Proba satellite. Hyperspectral sensors allow to identify accurately areas invaded by the water ferm and distinguish them from other floating aquatic vegetation. We will present the accuracy of the different sensors and design a monitoring protocol using remote sensing for the water fern.

231. CO-VARIATION OF BRYOPHYTES, LICHENS, AND SAPROXYLIC BEETLES AND RELATED HABITAT VARIABLES IN SPRUCE FOREST STANDS IN BOREAL SWEDEN

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Protection of forest area to secure future existence of species is of continuous concern for forest management. It is essential to effectively and appropriately identify forest areas with high conservation value, whether it is for nature reserves or retention patches. Different types of species and forest structures has been suggested and frequently used to indicate high biological diversity. Site selection could be more successful if habitats were species rich for several taxa and also contained red listed species. Hence an important question in forest conservation is whether the biodiversity of different taxa is correlated. We investigated to which extent lichens, bryophytes and saproxylic beetles, covary and whether species richness can be associated with habitats variables. Species occurrences and habitat variables were inventoried in old managed forests and in different type of set asides, (nature reserves, woodland key habitats, and retention patches) in a boreal forest region in central Sweden. The results indicate that co-variation between and within different taxa exist and several habitat variables can be related to species richness. This knowledge can be used to make habitat selection more successful. Our results also support the view that it is important to provide a wide variety of habitats.

232. HUMAN IMPACT ON STABILIZED POPULATIONS OF THE HYBRID *NARCISSUS PEREZLARAE* (*AMARYLLIDACEAE*) IN THE VALENCIA COMMUNITY (SPAIN)

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Plant hybridization is one of the most controversial aspects in plant conservation. Several kinds of habitat change can increase the probability and rate of hybridization and therefore it has become a subject of recent attention. However, recognition of the historical role of hybridization as an evolutionary process can cause a re-evaluation of conservation policies. *Narcissus perezlarae* is a natural hybrid originated between *N. cavanillesii* and *N. obsoletus*, both narrow endemic in the Iberian Peninsula. Both species coexist in south Iberian where the hybrid is frequent in sympatric populations. However, recent studies supports that several isolated hybrid populations in Valencian Community are stabilized. *N. perezlarae* is isolated reproductively from the progenitors and can produce viable seeds either by autogamous or xenogamous fertilizations in these populations. However, a major concern to the survival of these populations is their occurrence in a highly touristic area. Based on a 6 –year monitoring study, we have evaluated the demographic status of these populations and its reproductive fitness. In addition, we have assessed the vulnerability of *N. perezlarae* populations based on their proximity to network roads. A predictive model was developed to identify available areas for *N. perezlarae* in Valencian Community if future translocation action is needed.

233. MATRIX EFFECTS ON LOCAL SPECIES ASSEMBLAGE OF SOIL SPRINGTAILS

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Many studies have shown that spatial heterogeneity in landscape mosaics and the structure of heterogeneity influence the structure of local communities. In particular, it appears that local diversity decreases with the level of fragmentation of landscape mosaics. Previous results suggest that for *Collembola* (soil microarthropods), local diversity also decreases with heterogeneity of habitat mosaics (number of habitats found in a landscape). This might sound like a paradox since the number of ecological niches and also the possibilities of coexistence should increase with the level of heterogeneity. We observed a drop in the local species richness (at the scale of a habitat patch) of the most heterogeneous communities of *Collembola* in landscape mosaics (at the scale of a habitat mosaic): the local number of species of *Collembola* decreases when heterogeneity (habitat diversity) of the landscape mosaics increases. These results might be understood as a negative response of species with a low dispersal capacity to the heterogeneity of the landscape mosaics and as a lack of response of species with a greater dispersal capacity faced to diversification of landscape mosaics.

234. GENETIC STRUCTURE OF THE COASTAL GIANT SALAMANDER (*DICAMPTODON TENEBROSUS*) IN CANADA: PATTERNS WITHIN A DEFORESTED LANDSCAPE

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In Canada the Coastal Giant Salamander (*Dicamptodon tenebrosus*) only occurs in a 100 km2 area within 60 small streams in southwestern British Columbia, although the species is also found along the west coast of the United States. *D. tenebrosus* is classified as threatened in Canada due to intense forestry practices occurring in the region, while little is known of the species' life-history, dispersal and behaviour. We use microsatellite markers to examine genetic structure within and across 15 streams in 6 drainages, to test for effects of forest age (10-250yrs post harvest), landscape features and microhabitat variables on dispersal and habitat connectivity. Recently logged sites showed increased genetic differentiation and higher genetic relatedness between individuals, and evidence for a skewed age distribution towards larger size classes. Capture rates also increased with forest age. Logging may therefore influence dispersal of *D. tenebrosus* between streams, resulting in population isolation. Such effects may lead to inbreeding and population decline. We examine the genetic patterns in relation to habitat variation between sites, utilising mapping and landscape genetics methods. Such information obtained from both molecular and ecological data will aid in the management of *D. tenebrosus*, as well as other stream amphibians threatened by forestry practices.

235. EXOTIC FISH SPECIES IN THE ADRIATIC: A REVIEW

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This review has underlined a significant number of new fish species new to the Adriatic Sea. At least 34 new species became a new elements of the Adriatic ichthyofauna representing 24 family (of which 10 are new for the Adriatic: *Hemiramphidae*, *Leiognathidae*, *Haemulidae*, *Siganiidae*, *Ipnopidae*, *Zoarcidae*, *Monacanthidae*, *Cylopteridae*, *Terapontidae*, *Fistularidae*) and increasing the number of fish recorded in the Adriatic to 447. This has been attributed in part to the increased prospection activity, coupled with new, recently adopted techniques which allow access to previously inaccessible habitats, and observation in vivo. It is also clear, however, that this increase is also attributable to real changes in population dynamics during this period. The most relevant is the fact that the increase in number of species correlates clearly with interannual shifts in climatic and oceanographic processes. The impact of other potential factors is less well understood at present, but it is also likely that biological invasion (eleven lessepsian migrants have reached Adriatic up to date), overfishing by humans, and the consequent changes in the food chain equilibrium, have a significant impact on fish populations and diversity over the last few decades.

236. MEASURES FOR RECOVERY OF THE SOFT-MOUTH TROUT (*SALMOTHYMUS OBTUSIROSTRIS*) IN CROATIA

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A study was carried out on the Soft-mouth trout (*Salmothymus*

obtusirostris) in order to find the bottle neck of population biology, especially the early life history of fish, with the aim of developing a recovery program through artificial breeding. The Soft-mouth trout is an endemic fish species restricted to Dinaric karst waters of the Adriatic basin in Croatia (Rivers Krka, Jadro, Vrljika, Neretva, and Zrnovnica), Bosnia and Herzegovina (Neretva and tributaries) and Montenegro (Zeta and Moraca Rivers). Over the past few decades some genetically unique populations have drastically declined, especially in the River Krka where this species is practically extinct. The Soft-mouth trout is presently listed in Croatia as a critically endangered (CR) species. The major threats are pouching, especially in the spawning season, habitat destruction, introduction of alien species (*Onchorhynchus mykiss*) and overfishing. Conservation of this species additionally complicates genetic and morphological differences among populations. Despite enormous anthropogenic pressures that usually highly effect salmonid species, the Soft-mouth trout population in Vrljika River is relatively well preserved. In 2007 we started implementation of conservation measures through an experimental program of artificial breeding. Wild specimens were collected from natural habitats in Vrljika River, bred and then released.

237. THE ROLE OF NGOS IN NATURA 2000 CONSERVATION

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The Coalition of NGOs for Natura 2000 was founded in the Czech Republic in 2003. At present, it has 14 active member NGOs associated on informal basis to cooperate on Natura 2000 related topics. From its very beginning, the coalition deals especially with analysing the state of habitat types´ and species´ conservation in the Czech National List under Habitats Directive. Shadow lists of Natura 2000 sites were compiled in cooperation with scientists and presented to the European Commission at the biogeographic seminars (for Continental and Pannonic region). Current activities are focused on preparing management plans of SCIs and pushing the state administration to declare them as protected areas (SACs). Some SCIs are endangered by inappropriate (non) intervention and should be declared as soon as possible. The coalition runs common project which aims at proposing management for 50 SCIs and negotiating with landowners and state administration. The coalition monitors appropriate assessment according to Article 6 of the Habitats Directive at the national level with focus on directive violation and infringements. The Czech Coalition of NGOs for Natura 2000 could serve as an example applicable in other member states. We also suggest founding an international European Coalition of NGOs for Natura 2000.

238. GLOBAL PATTERNS AND DRIVERS OF LINGUISTIC AND BIOLOGICAL DIVERSITY AND EXTINCTION RISK

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Both biological diversity and human cultural diversity (collectively, biocultural diversity) are facing an unparalleled global 'extinction crisis'. Understanding large-scale patterns and drivers of the distribution of biocultural diversity and extinction risk is central to mitigating the crisis. We conducted a global spatial analysis of linguistic and biological diversity at 2°x 2° resolution using a GIS. Total richness and threatened richness were measured using distributional range maps of languages (cultural diversity) and mammals, birds and amphibians (biodiversity). We tested for congruence between linguistic and biological diversity as well as for correlations with environmental, geographic and anthropogenic factors. Linguistic and biological diversity show similar geographic patterns and unevenness of distribution. Much of the spatial variation among groups is explained by similar factors including habitat diversity, available energy and anthropogenic disturbance. While the underlying mechanisms for the distributional variation of both biological and linguistic diversity are likely to differ, their similarities emphasise the intimate relationship between humans, other species and their environment. Certain tropical forests with both high biocultural diversity and high levels of threat will chiefly benefit from conservation actions.

239. NON-INVASIVE SCAT SAMPLING AS A POPULATION ESTIMATION TOOL - FIELD METHODS AND SAMPLE SIZE CONSIDERATIONS FOR WILD BOAR (*SUS SCROFA*)

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Reliable population estimates are crucial in wildlife management, in particular for wild boar with respect to the epidemiological role this species plays in the transmission of the classical swine fever. In research for methods that enable to obtain reliable data and are less biased than most traditional approaches (e.g. hunting bag analysis or traditional mark-recapture), strategies based on non-invasive genetic sampling yield promising results in several species. The most commonly used tissue sources are hair and scat. After individual identification of samples via genotyping, a modified capture-mark-recapture approach can be applied for population estimation. For wild boar, a pilot study revealed that hair sampling at baited stations is not practicable. Alternatively, scat sampling along transects was tested in the field. Scat sampling trials were conducted during two years in a forested area in south western Germany. Seasonal and habitat-related effects on sampling success are evaluated with the help of GPS-telemetry data collected in the same area. Due to changes in transect design and search method, sample size was considerably increased during our study, an adequate sample size being important for successful population estimation. Our results indicate that scat sampling is a promising tool for wild boar population management.

240. CONTRIBUTION OF MULTI-SOURCE REMOTE SENSING DATA TO PREDICTIVE MAPPING OF PLANT INDICATOR GRADIENTS WITHIN SWISS MIRE HABITATS

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Topo-structural variables derived from LiDAR data have not been used for stand-level predictive mapping of plant indicator gradients hitherto. For this presentation we assessed the partial and combined potential of different spectral sensors (RC30, ADS40, SPOT5) and digital elevation models (LiDAR DTM and DSM) to accordingly map complex mire habitats. We supplied about 70 spectral and 30 topo-structural variables to predict 7 plant indicator gradients across 7 mire objects resulting 49 models each. PLS regression was used for sensor comparisons. Summary statistics and informal multiple pair tests (Wilcoxon signed rank tests) were applied to descriptively compare the source-specific mapping contributions (RMSEcv and r2cv). The airborne images (RC30, ADS40) and the LiDAR data proved high mapping potential. However, topo-structural predictors equalled or even outperformed the predictive power of pure spectral reflectance data. The combination of both predictor types yielded additional benefits for all indicator values. Thereby topo-structure compensated for the shortcomings of the spectral sensors to predict moisture, dispersion and light, whereas spectral signals particularly improved prediction success of soil reaction, nutrients and humus. The contributions of the individual sensor types might

give an impression to which degree individual plant indicator gradients are controlled by terrain and canopy height alone or by additional ecological factors.

241. OF SHRIMPS AND MEN. 15 YEARS OF CRUSTACEAN CONSERVATION IN AUSTRIA - SUCCESS AND SETBACKS

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Since 1994, the authors have been working intensively on faunistics and conservation of Austrian crustaceans, mainly large freshwater branchiopods (Crustacea: Branchiopoda excl. Cladocera) and crayfish (Crustacea: Decapoda: *Astacidae*). Agricultural development, changes of hydrological conditions and urbanisation are the main threats to large branchiopod diversity in Austria, whereas alien species introduction is the dominating threat to native crayfish. Both issues were addressed to a broad public audience by popular science books and websites, more than 50 articles in local journals, public talks, interviews on radio and TV, and interactive exhibitions in local museums. Public awareness accelerated the protection of the most important Austrian large branchiopod habitats as nature reserves. We published local Red Lists, and several species were protected by the Lower Austrian regulation for species conservation due to our initiative. Recent developments create new threats and arouse old ones again. A local NGO that was successfully managing the “wise use” of flooded meadows along the Morava and Dyje rivers for 20 years, abandoned its work in 2008. Due to new EU policy and changed subsidies, farmers cease cooperation with conservationists and produce “renewable energy” instead: Climate protection versus nature conservation may become a critical challenge for the next decades.

242. TOWARDS SUSTAINABLE FOREST MANAGEMENT: FROM POLICY TO PRACTICE USING LANDSCAPES AS LABORATORIES IN EUROPE’S WEST AND EAST

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Sustainable development as a process and sustainability as a long-term goal engage actors and stakeholders involved with and affected by the use of goods, ecosystem services and values in forests and woodlands. A key challenge is to build bridges in a geographical area among actors involved with different sustainability dimensions, actors in different sectors at different societal levels, and different disciplines for knowledge production. Communication, education and public awareness are critically important dimensions of good governance, as well as the need for transparent information about the state and trends of ecological, economic and socio-cultural dimensions of landscapes as social-ecological systems. The term landscape approach captures this, as well as concepts as Model Forest, Biosphere Reserve and traditional village systems. In this paper we advocate an approach supporting learning and knowledge production that relies on landscapes as laboratories. However, to implement policies about sustainable development and sustainability the context of landscapes in terms of forest history, biophysical conditions, and modes for government and governance in the landscape need to be considered. We illustrate this idea by reviewing challenges and opportunities in Sweden, Ukraine, Belarus and NW Russia using urban-rural gradients and large river catchments as case studies.

243. FIRST FERAL CAT ERADICATION ON A SMALL MEDITERRANEAN ISLAND: TRENDS OF RAT AND SHEARWATER POPULATIONS AND THEIR INTERACTION WITHOUT CAT PRESENCE

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Cats, alien predators spread on island worldwide, can often survive on these ecosystems by consumption of other introduced mammals. Cat predation is highly detrimental for native species, particularly seabirds. Therefore, cat control or eradication were generally undertaken to reduce negative impact on native fauna, but potential cascading effects, such as mesopredator release need to be taken into account. On Port-Cros Island, the strong and recurrent threat caused by feral cat predation on the small yelkouan shearwater population, led to conduct cat eradication. To evaluate the recovery of the seabird population and detect a potential mesopredator release, shearwater and rat populations were monitored simultaneously to cat eradication. Even if only live traps were used, most of cats were trapped in the first year and the last sign of cat predation upon yelkouan shearwater occurred the following year. The recovery of the shearwater population occurred, especially due to the installation of new breeders on the colony. Rat population dynamics highly fluctuated and even if the interactions between rats and shearwaters at breeding cavities increased, no breeding failure was attributable to rat predation. Feral cat eradication on Port-Cros Island induced an increase of the yelkouan shearwater population without any evidence of mesopredator release.

244. DO ESTONIAN FARMLAND BIRDS BENEFIT FROM AGRI-ENVIRONMENTAL SUBSIDIES?

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In the EU, agri-environmental support schemes (AES) are among the key means for managing the farmland Natura 2000 network and addressing the 2010 biodiversity target. To evaluate the efficacy of AES, we monitored farmland birds in a total of 66 farms, representing two types of AES (nature friendly management, organic farming) and control (whole-area payment), in three regions in Estonia. Birds were censused on line transects during three years; their density and diversity among subsidy types and regions were explored using generalized linear models. Additionally, basic habitat parameters were used as covariates (% of different crop types, area of woodland and yards, lengths of tree-lines and ditches). None of the six variables describing bird populations (breeding-species richness, the number of all species seen, Shannon-Wiener diversity, total density of breeding pairs, total number of individuals seen, density of *Alauda arvensis*) varied according to AE measures. Instead, landscape features had many significant effects on the avian community characteristics, and the densities of *A. arvensis* and all individuals seen differed regionally as well. According to our results, the Estonian AES do not deliver significant biodiversity benefits for farmland birds, i.e. they apparently are not changing the landscape features important for birds.

245. TUFA SPRING PROTECTION STATUS IN THE CENTRAL EASTERN ALPS WITH SPECIAL REFERENCE TO THE DESMID OOCARDIUM STRATUM, A FREQUENTLY OVERLOOKED KEY ELEMENT

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On the European scale tufa springs are considered as habitats deserving a specific protection status. However within the different regions of the Alps the actual attitudes and day-to-day practical handling of this topic differ on the background of peculiar regional differences in legislation and politics. Our recent investigations of tufa springs in Tyrol, Vorarlberg, Trentino and Bavaria indicate more and more that each tufa spring has specific biota related to the particular environmental conditions and therefore deserve as such highest conservation status. Beside several other taxa of different organism groups (especially water mites) which are closely related or even exclusively found in spring habitats, we found out that the niche of *Oocardium stratum* (Chlorophyta, *Desmidiaceae*) and its calcification type are forming defined zonations at and below tufa spring-mouths. We will show distribution data based on earlier and recent investigations of this taxon as well as details of the calcification types. In addition we will highlight the actual situation of spring protection in Bavaria, N-Tyrol and Trentino and propose new ways to improve the situation.

246. GETTING TO A LONG-TERM SUSTAINABLE CONSERVATION STRATEGY: WHAT PART DOES POWER HAVE TO PLAY?

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Co-management, or the joint management of the commons, is often regarded as a way of power sharing between the State and a community of resource users that improves the sustainability of conservation projects. Volunteers that report greater levels of satisfaction in a project are more likely to continue volunteering, thus enabling projects to be more sustainable. To explore the relationship between the power volunteers have in the management process, and how this relates to volunteer satisfaction, we sent out questionnaires to over 800 participants of red squirrel and water vole projects, across Scotland, England and Wales. We assessed whether volunteers report 1) a higher level of satisfaction when they had greater involvement in the management, and 2) what aspects of participation had the most influence on satisfaction. Volunteers' that had greater involvement in the management of a project were more likely to report higher satisfaction levels, overall volunteers placed most importance on being involved in local area decisions . We conclude that increasing the amount of power volunteers have in the management of conservation projects has implications for how conservation projects can be managed sustainably into the long term.

247. METAPOPULATION DYNAMICS OF EPIPHYTIC SPECIES IN A BOREAL FOREST LANDSCAPE

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Epiphytic lichens and bryophytes that are confined aspen in old-growth forests may go extinct if the rate of disappearance of these trees is higher than the rate at which new trees are created. In today's Fennoscandian boreal forests aspen recruitment is very limited due to moose browsing. It is therefore of important to increase our understanding of the metapopulation and metacommunity dynamics of species depending on aspen. We re-surveyed nine epiphytes on all mapped aspen in an area which had been surveyed 13 years ago. We investigated which variables for local environmental conditions, variables assumed to reflect species interactions, and spatial connectivity explained colonization and extinction dynamics of our study species. The models differed between species but show that tree diameter, tree condition, and spatial connectivity explain colonization and extinction probabilities. In some species, the colonization probability increased if another lichen species that shares the same photobiont genus with the focal species was present, suggesting facilitation. This study shows, for the first time, colonization and extinction rates for an epiphyte metacommunity. These rates are required for estimating time to regional extinction.

248. KNOWING THE PAST TO PREDICT THE FUTURE: LAND-USE CHANGE AND THE SPREAD OF INVASIVE BULLFROGS

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Biological invasions and land-use changes are two major causes of the global modifications of biodiversity. Habitat suitability models are used to predict potential distribution of invasive species. Land-use is a key predictor of suitability for alien species. However, land-use is often assumed to be constant. Here we combine historical and present day information, to evaluate whether land-use changes explain the dynamic of invasion of the American bullfrog *Rana* (*Lithobathes*) *catesbeiana* in Northern Italy, from the 1950's to present-day. We built suitability models, on the basis of past (1960's, 1980's) and present-day data on land-uses and species distribution. For example, we used models built using the 1960's data to predict distribution in the 1980's, and so on. Furthermore, we used land-use scenarios to project suitability into the future. Suitability models predicted well the spread of bullfrogs in the subsequent temporal step. Land-use was not constant in time; models considering land-use changes predicted invasion dynamics better than models assuming constant land-use. Our study shows that suitability models are useful to understand and predict the dynamics of invasions. However, land-use is not constant in time; an integration of land use changes in studies of biological invasions can help to improve management strategies.

249. IS LANDSCAPE STRUCTURE OR ORGANIC FARMING PRACTICE A BETTER PREDICTOR OF FARMLAND BIRD DIVERSITY?

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Farmland bird diversity is declining across Europe due to widespread and increasing agricultural intensification.

Although many causes for this pattern have been suggested, the loss of suitable habitats may be the key factor. In the frame of the Europe-wide AGRIPOPES project (http://www.agripopes.net/) we analysed the species richness and diversity of farmland birds in organic and conventional managed wheat fields across landscapes differing in structural complexity (0 70% semi-natural habitats). A bird survey was conducted during the breeding season and in winter in western and eastern Germany, where all bird species were mapped on 500 x 500 m quadrates around the central point of each focal field. We hypothesized that species richness, abundance and diversity are negatively affected by conventional management and a decreasing amount of semi-natural areas. Our results show positive effects of landscape complexity on farmland bird species richness but no effect of farming practice. In conclusion, the restoration and preservation of semi-natural habitats in agricultural landscapes may be more effective for the conservation of farmland birds than organic farming.

250. EVALUATION AND QUALITY MANAGEMENT IN APPLIED CONSERVATION

Fischer, Frauke, University of Würzburg, Germany

Applied conservation remains one of the large (economic) fields in which evaluation and quality management play only a little role - if at all. I here refer to conservation as an economic activity since large NGOs have access to financial resources that makes some of them and their projects large businesses. NGOs working in conservation are not required to fulfil general quality standards. Even though they are required under most national laws to prove their benefit to the public in order to get or keep their tax benefits, they often do not have to prove how they spent their money on the ground that their work is successful. This lack of accountability varies, with some NGOs having strict internal evaluation processes while others are only large fundraising machines with little conservation expertise. This lack of accountability results in a non-comparability of projects and NGOs that makes it difficult if not impossible for donors and the general public to discriminate sound projects from trial-and-error approaches or the simple waste of money. In this paper I describe the underlying problems and outline a potential way out of this dilemma, while briefly outlining future standards and potential benefits to the conservation community.

251. AGRICULTURAL INTENSIFICATION AND DISPERSAL ABILITY AFFECT BETA DIVERSITY OF PLANTS, CARABIDS AND BIRDS

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Agro-environmental schemes aimed at reducing agricultural intensification focus on local field scales to conserve biodiversity, whereas diversity patterns largely differ across spatial scales. Unfortunately, most studies addressing the effects of agricultural intensification on biodiversity use the mean diversity on the plot scale (i.e. alpha diversity). The plot scale diversity, however, is only one part of the total diversity (gamma diversity). The between plot diversity (beta diversity) can account for major parts of the total diversity and gives important insights into the variation of species composition between plots. In the Europe-wide AGRIPOPES project we quantified the alpha-, beta- and gamma-diversity at the micro, meso and macro scale from fields to regions to countries to explore how agricultural intensification filters the beta diversity of plants, carabids and birds via species-specific dispersal abilities. Our results indicate strong changes in the relative values of alpha- and beta-diversity depending on the taxon and its body size, thereby indicating species-specific effects of agricultural intensification at different spatial scales. Agro-environment schemes therefore should not only consider this large-scale contribution of beta-diversity at regional scales to maximize the dissimilarity between conservation areas, but also recogconize species-specific responses to intensification.

252. CLIMATE CHANGE AND THE FATE OF MEDITERRANEAN WATERBIRD COMMUNITIES UNDER A POTENTIAL SCENARIO OF INCREASED SALINITY

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Among other impacts, climate change may increase salinity in inland wetlands due to changes in precipitation and evaporation regimes, especially in Mediterranean countries. This may influence the composition of bird communities wintering, foraging or breeding in wetlands. We studied bird species composition in 80 wetlands of South-western Spain (including the Doñana wetland complex) covering a wide range of salinity to ascertain whether this variable may affect the occurrence of some bird species, thus modifying the composition of bird assemblages. We used self-organized maps to create clusters of sites showing similar species composition. The association between clusters and site's salinity was explored for the wintering, pre-breeding, breeding and post-breeding periods. In each period, we only considered those species greatly contributing to the main activity of the bird assemblage (i.e. breeding species during breeding, wintering and sedentary species during wintering and non-resident species during the two migratory periods). In every period we found that increased salinity may jeopardize the occurrence of several bird species of conservation concern, sometimes affecting a significant proportion of the European population. Potential changes in wetland salinity should be considered when analysing the impact of climate change and designing management policies to deal with it.

253. HOW TO MANAGE URBAN GREEN TO PROMOTE BIRD SPECIES RICHNESS AND DIVERSITY

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Urbanization represents a worldwide and rapidly increasing high-impact environmental change. Therefore, urban areas need to be incorporated into biodiversity surveys and management plans. We tested the response of avian species richness and diversity (Simpson index) to different urban environmental gradients. Data were collected within a radius of 50 m around 96 sampling points in three Swiss cities. Bird species richness and diversity are negatively influenced by sealed area and buildings, respectively. On the contrary, increasing vegetation structures have positive effects. Trees represent the most effective structural element to reverse the negative effects of urbanization for birds. When analyzing tree composition we obtained a result contradicting with common conservation believes: coniferous trees, which are not native in Swiss lowland areas, help to maximize bird species richness. The optimum ratio of coniferous vs. broadleaf trees is at least 1:1. Species diversity also responds positive to trees (meaning dominance of single species is reduced) but is not influenced by tree composition. Changing tree composition offers different habitat to different species but does not change the whole bird community structure. We conclude that species richness and Simpson index offer some new but not all cues for urban avifauna conservation.

254. COMPENSATORY MEASURES: CHANCE FOR NATURE

Francek, Jiří, NaturaServis .s.r.o., Czech Republic; **Rozínek, Roman**, NaturaServis .s.r.o., Czech Republic

NaturaServis s.r.o. designs and implements steps reducing the adverse impacts on the nature during the construction of roads, motorways, railways and similar economic activities. It implements the saving clauses that the Ministry of Environment of the Czech Republic gave to the investors. The successful transfer of the tadpole shrimp *Lepidurus apus* from the route of the motorway D11 to the alternative locality can serve as first case study. The deposit tanks method, using by NaturaServis s.r.o. during realization compensatory measures, enables to save amphibians and reptiles against destruction during several constructions, renovations or restorations e.g. of railways and embankments where amphibians and reptiles often live or hibernate. This method was successful for strengthening poor populations of amphibians in open nature: it saved and stabilized the only in the Czech Republic existing population of *Lissotriton helveticus* (*Triturus helveticus*). It can serve as second case study.

255. PUBLIC OPINION POLLING IS NOT HUMAN DIMENSION RESEARCH: UNDERSTANDING PUBLIC PREFERENCES TOWARD WILD BOAR MANAGEMENT IN CENTRAL ITALY

Frank, Beatrice, Memorial University, Canada; **Bath, Alistair**, Memorial University, Canada

Conservation strategies today may succeed or fail not because of the biological science but due to the lack, or poorly developed involvement, of the public. Unfortunately, when the public has been consulted on management issues it has been done in traditional ways like public presentations or opinion polling, both of which are not recognized as effective by human dimension researchers. Through scientifically rigorous methods and large representative sampling it is possible to achieve better public involvement that leads to effective conservation strategies. In Circeo National Park and surrounding area, 801 face-to-face interviews were conducted to explore wild boar management options. Results from this study offer managers clear direction on support and opposition to issues of relocation, culling, compensation and recreational viewing opportunities. Due to the large sample size, subgroup analysis was possible examining differences between the general public and farmers. Farmers were significantly more positive toward increasing compensation ($t=3.75$, $p<0.001$), culling ($t=4.90$, p)

256. EFFECTS OF BAD HABITAT QUALITY THROUGH RESOURCE ALLOCATION IN *PARNASSIUS APOLLO*

Fred, Marianne, Aronia Coastal zone Research Team, Åbo Akademi University, Finland

I have experimentally studied the resource allocation in an endangered butterfly (*Parnassius apollo*) to determine how fitness related measures are affected by larval and adult resources. The treatment groups were starved as larvae and/or as adults. I recorded fitness related traits such as the length of the last instar, the pupal weight, mortality, and egg number. The results show a clear effect of starvation in the larval phase on the length of the last instar, pupal weight, and mortality in the pupal phase. There is also a carry over effect of starvation in the larval phase on the mating success and time to mating of the females. There also seems to be an additive effect of starvation in the larval and adult phase on total egg production. The equivalent to the experiment would be comparing good and bad quality habitat. My results suggest that bad quality habitat in terms of larval resources has profound consequences for population growth not only through higher mortality but also through adult mating success and female egg production. The study gives an understanding of the mechanisms on the level of the individual affecting population processes through resource allocation, and combines conservation with behavioural studies.

257. BIODIVERSITY CONSERVATION IN AGRICULTURAL WETLAND – THE CASE STUDY OF THE FLOODING « PLAINE MOTHAISE » (DEUX-SEVRES, FRANCE)

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The « Plaine Mothaise », plays an important role for controlling water flow and quality of the Sèvre Niortaise River and constitutes a reservoir of biodiversity. Evolutions in agricultural practices induce replacement of more than 25 % of grassland by crops and poplars these last ten years. This affects habitats, resources and finally the biodiversity services. In order to integrate restoration management of this area, we estimate the impact of changes by studying two soil macrofauna taxa: terrestrial isopods and carabids contributing to ecosystems functioning: isopods as decomposers, recycling organic matter, and carabids as polyphagous predators. These bio indicators allow a diagnosis concerning the quality of the ecosystem and its functioning. A plot and landscape scale survey is carried out in order to evaluate these impacts on individuals, populations and communities. At the plot scale we consider available housing environments and the effects of the agricultural practices. The neighbouring landscape elements such as non-crop area and crop mosaic dynamic will be taken into account. Multivariate analyses showed degrees of correlation between populations and various environmental factors such as the composition, the density and the height of vegetation, the soil physicochemical characteristics, and various elements of the landscape and habitat availability.

258. FACTORS LIMITING BOTANICAL DIVERSITY IN FIELD MARGIN HABITATS WITHIN INTENSIVE PASTORAL SYSTEMS

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Field margin management is a common measure in agri-environment schemes however, establishment and subsequent management of grassland field margins is not well researched. Botanical diversity is likely to be limited by impoverished seed banks, high soil nutrient status, and dominance of rank vegetation. This experiment investigates methods of successful establishment and management of botanical diversity within intensive grassland field margins. A replicated split-plot field margin experiment was established in 2002 on a dairy farm in SE Ireland. Experimental margins were established using three methods: fencing, natural regeneration and reseeding with a grass and herb mixture, at three widths (1.5, 2.5 and 3.5m). Grazing was introduced to half of each plot one year after establishment. Establishment method, width and grazing had a significant effect on plant species richness. Reseeded plots had highest species richness over all sampling periods ($p < 0.0001$). Grazing significantly increased quadrat species richness over time ($p < 0.001$). Soil seed bank was the limiting factor in establishment of botanically diverse field margins. Under these conditions propagule addition is required to enhance plant diversity. This would be most appropriate where there is no existing diverse field margin flora, and the objective is habitat creation.

259. ATTRACTIVITY TO HUMANS AS A TICKET TO THE NOAH'S ARK: WHAT SPECIES COMPOSITION AND POPULATION SIZE OF ZOO ANIMALS CAN TELL US?

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We analyzed population sizes of terrestrial vertebrates kept in zoos worldwide and found that their median sizes are surprisingly small: 12, 13 and 34.5 individuals for reptile, bird and mammalian species, respectively. Thus, the vast majority of zoo populations is too small to be sustainable and its regular replenishment from nature should be permitted. Nevertheless, even relatively small captive population may save the species in a case of unexpected crisis of natural population. Thus, species composition of zoo animals may serve as a rough estimate of ex situ conservation effort. We tested the hypothesis that animal attractiveness influences human effort devoted to ex situ breeding projects more than conservation needs. Human preferences to particular species and/or families were examined directly by presenting their pictures to respondents to rank them according to their perceived beauty. Analyses performed on various scales and taxa revealed that human preference ranks as well as body size appeared to be the best predictors of population size in zoos. Surprisingly, people from different ethnic groups shared most of their preferences to animal species. In conclusion, understanding human preferences is an important part of conservation strategies. Special attention has to be paid to less preferred, but endangered species.

260. THE INFLUENCE OF ARGI-ENVIRONMENT SCHEMES ON BAT POPULATIONS AND NOCTURNAL INSECTS IN SCOTLAND

Fuentes-Montemayor, Elisa, University of Stirling, United Kingdom; **Goulson, Dave**, University of Stirling, United Kingdom; **Park, Kirsty**, University of Stirling, United Kingdom

Many bat species in Europe have recently undergone large population declines. One of the driving causes is believed to be the agricultural expansion and intensification. Agri-environment (AE) schemes aim to counteract the negative effects of modern agriculture on biodiversity by providing financial incentives for farmers to adopt environmentally-friendly agricultural practices. Whilst such schemes are potentially beneficial to bat populations, to date no study has quantified the response of either bats, or their prey species, to AE prescriptions. We used a paired survey design to quantify bat activity and nocturnal insect abundance on 18 pairs of AE and conventional farms in Central Scotland between June and September 2008. Specific AE prescriptions (field margins, species rich grasslands, hedgerows and water margins) were surveyed and compared with equivalent features in conventional farms. Five bat species were recorded. No difference was observed in bat activity between AE and conventional farms. A total of 3,600 moths were sampled over all sites with 75 macro moth species identified. There are non-significant trends towards higher abundances of moths at AE farms in comparison to their conventional counterparts, and differences in moth abundance between prescriptions. We suggest how current AE prescriptions could be altered to enhance them for foraging bats.

261. RESTORATION FOR OLD FIELDS AND AREAS CLEARED OF ALIEN VEGETATION – ADDING ECOLOGICAL AND COMMERCIAL VALUE THROUGH FYNBOS PLANTS

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The Cape Floristic Region boasts one of the world's highest concentrations of plant species. The predominant vegetation type in the biome is fynbos which occurs on nutrient-poor substrata. Large areas of fynbos have been ploughed up or heavily impacted by alien vegetation. While a number of studies have focused on restoration aimed purely at restoring ecological functionality this study aimed to explore cost effective methods for restoration that will improve the commercial value of the site by promoting species for the flower export industry at the same time as restoring ecological processes. In a first project phase we investigated the impacts of agricultural practices and alien vegetation on the natural ecosystem. Lower species richness as well as higher nutrient levels were observed in all disturbed sites compared to natural sites. Using these results we identified different restoration strategies: To return soil to pre-disturbance nutrient levels we applied mulching and sowing of indigenous species which have the capacity to extract soil nutrients. To increase biodiversity and to promote high value species for the flower export industry we re-introduced indigenous species. Our results provide guidelines for restoring natural fynbos thereby improving the conservation status and increasing commercial value of disturbed lands.

262. FRUGIVOROUS BIRDS AS SUPPLIERS OF SEED DISPERSAL SERVICE IN TEMPERATE ECOSYSTEMS: SEEDING THROUGH THE WHOLE LANDSCAPE?

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Seed dispersal by animals is considered to be a pivotal ecosystem service, contributing to the dynamic and recovery of vegetation in both pristine and degraded habitats. Despite this importance, there is a need of geographically comparative studies about the role of seed dispersers as service providers in relation to human-caused landscape heterogeneity. We evaluate the seed dispersal service supplied by frugivorous birds at three different temperate ecosystems: the Cantabrian mountain forest (N Spain), the Mediterranean mountain shrubland (S Spain), and the Patagonian temperate forest (S Argentina). We demonstrate that the abundance of frugivorous birds represents by itself a good bio-indicator of seed dispersal magnitude, irrespective of the site, habitat structure and fruit resource availability. Nonetheless, habitat features and fruit availability always explain a large portion of the variability in seed dispersal pattern in all studied ecosystems. Birds acted as mobile links for the seed dispersal function across the landscape, since they connected patches of different degrees of degradation and/or habitat quality via the deposition of seeds. The spatial configuration of original patches, providing dense woody cover and fruits, as well as the structural features of the degraded matrix, seemed crucial for seed dispersal connectivity through the whole landscape.

263. R.A.C.E.ING FROM EXTINCTION: THE EMERGENCE OF THE AMPHIBIAN PATHOGEN *BATRACHOCHYTRIUM DENDROBATIDIS* ACROSS EUROPE AND THE EU BIODIVERSA FUNDED RESPONSE

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Batrachochytrium dendrobatidis is a globally emerging pathogen of amphibians putatively responsible for species declines, population extirpations and even species extinctions on multiple continents. Europe is not free from the ravages of this infectious disease: infection-associated mass mortality events and species declines are known from at least 4 European countries and over 10% of Europe's amphibian species. In response to this threat to European amphibian biodiversity, we have assembled a core team of more than 30 researchers at seven institutions and mobilized approximately €2.5 million in funding, including over €1 million acquired through a grant funded by the EUs BiodivERsA program. The project will investigate evolutionary and ecological drivers of infection and disease-caused mortality and develop the epidemiological tools and risk assessment models for all of Europe's amphibian species. Most importantly, we will deliver the European Threat Abatement Plan (ETAP) for chytridiomycosis, including means for mitigating the disease in wild populations.

264. ROADS STUDIES WITH SKELLAM'S MODEL

Gavinhos, Catarina, Agrarian School -Polytechnical Institute of Castelo Branco, Portugal; **Pereira, Henrique M.**, Faculty of Sciences of the University of Lisbon, Portugal

Roads occupy an increasing proportion of the landscape around the world. Thus the study of ecological effects of roads is of growing importance. We chose to use the Skellam's model for a species in idealized landscapes. In our first scenario we assumed that the species does not survive on the road and we solved analytically the model. In a second scenario we assumed that the species does not die nor avoids the roads, and ran the model using a numerical method. We then tested the effect of adding bridges or tunnels in our landscapes, to assess what impact this measure may have on the species persistence in the landscape. We found that species with greatest mean dispersal distances are the ones most at risk in a landscaped fragmented by roads and that the construction of bridges or tunnels significantly improve the persistence of a species in the presence of a road network.

265. BURROW ENTRANCE ANGLE AND GRASS HEIGHT INFLUENCE TRANSLOCATION SUCCESS IN THE EUROPEAN GROUND SQUIRREL (EGS)

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Conservation management techniques can fail because knowledge of a species is deficient. We investigated a burrow-morphological character and height of the grass in relation to the initial, ecological success of a translocation. 50 cm long burrows were dug in the release site. We made a systematic, alternate and even distribution of vertical – slanted burrows within a square grid. Animals were released in even distribution, and their exact number and position were recorded at time of the release. We could have an accurate and reliable picture about all burrows, and we could count the ratio of used/ unused and vertical/ slanted burrows without significant error. We checked each grid-cell 5 times until hibernation. As a direct observation of the animals, we had a visual scan census of animals twice a day in the activity peaks. Although the results of the translocation show that animals preferred slanted burrows and moderately unmown grass within the grid, the difference changes with time (from 1 until 72 days). The results underline the importance of release site preparation in animal translocations. EGS have slanted and vertical burrows naturally, and the data implicate that slanted burrows are dug from the surface while vertical ones from the bottom to the surface.

266. WILDLIFE CONSERVATION OF TRANSBOUNDARY MOUNTAIN AREAS IN NORTHWESTERN GREECE

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Effective conservation should be planned on a large geographical scale. The mountainous areas of northwestern Greece have high transboundary value for wildlife conservation. In 2007, conservation actions were carried out in the area focusing on bears, wolfs, the local avifauna and Habitat Types of the EU Directive 92/43. The project methodology included recording of bio-evidences, collection of bear hair for genetic analysis, bird observations, and completion of questionnaires. Evaluation of the data collected indicates the presence of a large bear population (N≈60), a stable wolf population and 155 bird species. In addition, 13 habitat types and interesting flora of international significance were recorded. Based on these results, following conservation actions were carried out: 18 information sign posts were placed throughout the area, an educational kit produced, a workshop for transboundary management of ecosystems organized and a breeding centre for the Hellenic Livestock Guarding Dog constructed. This project improved significantly our knowledge over the conservation status of the area and enabled us to plan and implement specific conservation actions that will promote the continued survival of the endangered wildlife and threatened habitats of northwestern Greece. It has also provided incentives and guidelines for similar research and conservation actions across the borders.

267. INTER- AND INTRASPECIFIC DETERMINANTS OF ABUNDANCE IN UK BUTTERFLIES

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Understanding the determinants of species abundance patterns is a central to the development of predictive conservation science. However, uncertainty remains about the extent to which biological and environmental mechanisms are responsible for driving these abundance patterns. The present study aims to simultaneously determine the role of both intrinsic species traits and extrinsic site traits in determining the abundance of UK butterflies. We analysed a comprehensive dataset from the UK Butterfly Monitoring scheme (BMS), which includes >30 years of butterfly counts at more than 1000 sites, using generalized linear mixed models. Our results show that while there is considerable variation in butterfly abundance between sites, there is much more variation between species. Butterfly abundance is strongly associated with life-history, climatic and management variables, although not all correlations are in the direction predicted. Interactions between site-level and species-level variables reveal how different species respond to environmental change and directly inform our ability to define future biodiversity conservation strategies.

268. IS IT BETTER A CHICKEN TODAY OR A FEW EUROS TOMORROW? PUBLIC PREFERENCES FOR COMPENSATION IN ABRUZZO, LAZIO AND MOLISE NATIONAL PARK

Glikman, Jenny Anne, Memorial University, Canada; **Bath, Alistair**, Memorial University, Canada

Paying for compensation for losses caused by large carnivores is generating considerable discussion amongst scientists, governments and the agricultural community within European countries. To ensure conservation of large carnivores, the solution often is perceived in the mechanism, the amount and the nature of compensation offered directly to the individual who has experienced the wildlife damage. Little is known about public preferences and the role they should play regarding compensation measures in the Abruzzo, Lazio and Molise National Park where small populations of brown bears and wolves exist. We collected data on public preferences toward various compensation issues through personal interviews with rural residents (n=1611) of which 344 were livestock owners. We found that while statistical differences in strength of attitudes exist between these two groups, the direction of these preferences was the same. This suggests that a large general public sample may include the views of this interest group. While the general public is sympathetic to the pastoral lifestyle, and livestock owners are positive toward large carnivores, the significant statistical differences lie in economic terms. For example, the general public are closer to neutral (x=2.87) than livestock owners (x=2.35) on reimbursing only those who use preventive measures ($t=5.439$, $p<0.001$).

269. ETOSHA BUFFER ZONE – A CONCEPT TO SUPPORT EFFORTS TO LINK ETOSHA NATIONAL PARK TO THE TRANSNATIONAL NETWORK OF PROTECTED AREAS IN SOUTHERN AFRICA

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Due to political decisions of former years, the Etosha National Park in Namibia was significantly reduced in size and is completely fenced-in. Along its border, contrasts of land use put emphasis on fringe effects. Cutting off interactions between the park and its environment has reduced nature's ability to adapt to the lack of resources due to climatic changes. Considering the vulnerability of semi-arid ecosystems, the present situation appears to be anachronistic. The overall aim of this project is to support current conservation efforts that aim at connecting the Etosha National Park with the transboundary network of protected areas in southern Africa by re-opening traditional migration routes. We propose the development of an effective buffer zone according to IUCN-criteria on land that is adjacent to the park. The project deals with an ecological assessment of potentially suitable areas that we have started in 2005, including the location of suitable areas, inventory of species, selection of bio-indicators and the development of specific management strategies for flagship species. We investigate the development of wildlife utilisation and tourism and emphasise the need to distinguish between traditional land use strategies on communal and private land, when it comes to setting up criteria of a buffer zone.

270. GENETIC DIFFERENTIATION OF THORN-TAILED RAYADITO (*APHRASTURA SPINICAUDA*, AVES: FURNARIIDAE) AS REVEALED BY ISSR PROFILES

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Nucleotide sequence data (cytochrome b) and ISSR genomic fingerprints were used in order to analyse the genetic variation and population differentiation in Thorn-tailed Rayadito (*Aphrastura spinicauda*). We included samples from eight populations covering most of the distribution range of the species. Low levels of genetic diversity were found among populations with a large within-population molecular variance indicating high levels of gene flow. Cluster analyses based on ISSR markers are consistent with the view of considering three subspecies for *A. spinicauda*. Bayesian analyses show that the Mocha Island population contributes most to the total genetic diversity observed in the species. Mantel test revealed no significant correlation between geographical distance and pairwise genetic distance and cytochrome b sequence analyses failed to detect differentiation among subspecies recognized for *A. spinicauda*. Mocha Island might have been a palaeorefuge holding a population drifting genetically away in glacial times. There is also the possibility of a postglacial colonization of Thorn-tailed Rayadito from an austral palaeorefugium supporting a multiple refugia hypothesis.

271. SPECIES-SPECIFIC SPATIAL CHARACTERISTICS IN RESERVE SITE SELECTION

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This paper addresses the problem of selecting reserve sites cost-effectively when the spatial characteristics of species need to be taken into account. Ideally, reserve selection considers the possibility that species use reserve sites as stepping stones between sites. This consideration is difficult to include in optimization models. This paper demonstrates three models that include species' spatial characteristics as much as possible, including the possible role of sites as stepping stones. Although none of the models fully capture the necessary spatial considerations, all models find spatial reserve networks with larger numbers of species than a non-spatial selection model under similar costs.

272. FEMALE-BIASED MORTALITY CAUSED BY ANTHROPOGENIC NEST LOSS CONTRIBUTES TO POPULATION DECLINE AND TO A SHIFT IN ADULT SEX RATIO OF A MEADOW BIRD

Grüebler, Martin, Swiss Orni hological Institute, Switzerland; **Schuler, Heidi**, Swiss Orni hological Institute, Switzerland; **Müller, Mathis**, Swiss Orni hological Institute, Switzerland; **Spaar, Reto**, Swiss Orni hological Institute, Switzerland; **Horch, Petra**, Swiss Orni hological Institute, Switzerland; **Naef-Daenzer, Beat**, Swiss Orni hological Institute, Switzerland;

Meadow breeding birds such as the whinchat *Saxicola rubetra* have been declining due to increased farming intensity. In modern grassland management, the first mowing and the birds' breeding cycle coincide, causing high nest destruction rates and low productivity of grassland bird populations. However, it is virtually unknown whether the mowing process directly affects adult survival by accidentally killing incubating females. In our study using radio-telemetry of adult whinchats in a subalpine valley in Switzerland, mowing undoubtedly killed two of 20 radio-tagged females when they were laying or incubating. During the 20-year period of assessing whinchat territories and mowing phenology, an increasing proportion of nests were destroyed before the chicks hatched and this change was associated with an increased distortion of the adult sex ratio. Modelling the population growth rate showed that including the additional effect of mowing on female mortality resulted in a 1.7 times faster local population decline. These results are consistent with the hypothesis that the extinction of whinchat populations in the lowlands of central Europe was caused not only by habitat degradation and low productivity, but also by increased man-made female mortality.

273. STRENGTHENING GOVERNANCE AND FINANCIAL SUSTAINABILITY OF THE NATIONAL PROTECTED AREA SYSTEM (UKRAINE)

Gudkova, Nataliya, United Nations Development Programme, Global Environment Facility Project, Ukraine

The goal of the UNDP/GEF project "Strengthening governance and financial sustainability of the national protected area system in Ukraine" is to secure long-term conservation of biodiversity within Ukraine's Nature Reserve Fund. The project's three outcomes are: (i) Development and implementation of a strategic vision for protected areas (PAs) financial sustainability – which will include: (a) the development of a national strategy for PA financing, a set of regulations governing PA revenue generation and implementation of revenue generating options; (b) introduction of business planning as a standard practice in PAs; (c) testing private public sector partnerships as a model for maximizing and fairly sharing revenues from activities such as tourism, and engaging local people in conservation activities. (ii) Improved governance of the national PA system – will support the following interventions: (a) testing decentralized governance systems for PAs; (b) developing mechanisms to facilitate PA management across administrative jurisdictions (i.e. local governments known as oblast's in Ukraine); (c) providing for staff training; (d) establishing an association of PAs; and (e) introducing systems to monitor management effectiveness as a feed-in to decision making processes; (iii) Capacity in place to replicate the improved management approach across the national PA system.

274. CONSERVATION PRINCIPLES FOR SOUTH EAST ASIAN TROPICAL PRODUCTION FORESTS

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Based on a systematic literature review on plant ecology in South East Asian tropical forests we formulate conservation principles for dipterocarp forests, the main timber source in the region, mainly directed to industrial logging. Important results from the review to support the formulation of principles were 1) identification of key habitats and forest types for plant diversity, 2) compilation of current knowledge on natural disturbance processes, and 3) synthesis of information from species accumulation curves to assess minimum size of areas to capture a majority of tree species. Main conservation principles were classified into 'authenticity', 'continuity', 'heterogeneity', 'proximity' and 'rarity', separated into the different scale levels of trees, forests and landscapes. The suggestions for actions to be taken by practical forestry were described in the categories 'maintain', 'retain', 'set aside' and 'create'. Important suggestions include maintaining a continuous tree cover, retaining biodiversity-important trees (large, with buttresses, knotholes), and setting aside at least 150 – 250 ha large areas for the preservation of tree diversity. Main general conclusions are: 1) dipterocarp forests have distinctive characteristics which warrant fine-tuned and specialized conservation models, 2) conservation principles cannot uncritically be transferred from boreal and temperate forests to tropical regions.

275. LICHENS FROM THE ALADAGH MOUNTAIN, IRAN

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The present paper is a contribution of Iran's lichen flora. It consists of several species which were found in a deserved region situated in the Aladagh mountain (NE Iran). The survey area covers 4000 hectares, ranges from ca. 1000 to 2455 m and has an annual precipitation of ca 500 mm. The climatic condition in the area is influenced by three different air masses Mediteranian, Khazari and Siberian, so that the average temperature is about 15°C. Geologically the area is composed of limestone, conglomerate, dolomite, shale and marl. Morphological and chemical identification of lichens has been undertaken using standard reagents, microscopical techniques and TLC. A list of 33 taxa including six new species to Iran, sampled in four sites mostly on soil, mosses and some trees (*Acer monspessulanum* & *Quercus castaneifolia*) is presented.

276. THE USE OF BIODIVERSITY VALUATION AS A PART OF ENVIRONMENTAL MANAGEMENT ACCOUNTING

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Monetary valuation of biodiversity is an important activity for decisionmakers at government or company level. Environmental management accounting is an important instrument of the environmental policy which is aimed at environmental and economic benefits. It is possible to use environmental management accounting in private or public sector and in different types of companies. Key question is, how to express relation between business accounting and biodiversity and a mutual influence. Take into account all these relations is a challenging idea and it is important try to find a solution. The environmental management accounting is an opened information system which has enough capacity to process the information. Environmental management accounting guideline (IFAC 2005) is a basic document, which is used. This guideline includes material flow accounting and environmental costs and revenues. Method how to use this accounting system is the subject of contribution. The problem is, of course, methodology of a valuation of biodiversity and possibility to use it in the environmental management accounting system. Practical case study is as a part of contribution.

277. AGRICULTURAL INTENSIFICATION AFFECTS THE CONTRIBUTION OF FUNCTIONAL ENEMY GROUPS TO BIOCONTROL SERVICES ACROSS EUROPE

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Natural enemy communities can provide important biocontrol services, thereby contributing to environmentally friendly crop management with reduced pesticide applications. However, communities of biocontrol-agents change with agricultural intensification and the processes determining these services are little understood. Here, we analyse cereal aphid populations under experimentally reduced densities of (i) ground-dwelling generalist predators (ii) flying predators and parasitoids, a combination of (i) and (ii), and a comparison with open controls. In addition, these experiments were replicated in landscapes with low versus high agricultural intensity and across five European countries (Sweden, Ireland, Poland, Czech, Germany). Aphid densities were ~70 individuals per 100 shoots, well below the threshold level of economic damage. Exclusion of ground-dwelling predators, flying predators, and a combination of both natural enemy groups increased aphid densities by ~29%, ~86%, and 186%, respectively indicating complementary effects of natural enemy groups on aphid suppression. In landscapes with low agricultural intensification aphid densities were 50% lower than in landscapes with high agricultural intensification, despite density difference among countries (39-262 aphid individuals per 100 shoots). Our results show the European-wide importance of natural enemies for aphid-biocontrol, thereby supporting the insurance hypothesis, predicting that biodiversity insures ecosystem functioning because many species provide greater security that some will maintain functioning even if others fail.

278. LANDSCAPE PERCEPTION BY FOREST UNDERSTORY BIRDS IN THE BRAZILIAN ATLANTIC RAINFOREST

Hansbauer, Miriam, University of Freiburg, Germany; **Storch, Ilse**, University of Freiburg, Germany; **Knauer, Felix**, University of Freiburg, Germany; **Pilz, Stefan**, University of Munich, Germany; **Küchenhoff, Helmut**, University of Munich, Germany; **Végvári, Zsolt**, University of Debrecen, Hungary; **Pimentel, Rafael**, University of Sao Paulo, Brazil; **Metzger, Jean Paul**, University of Sao Paulo, Brazil

The Atlantic Rainforest of Brazil is one of the world's 25 biodiversity hotspots. It holds a high biodiversity, including endemic and threatened species, but the primary forest has widely (88%) disappeared. The objective of our study was to assess how forest specialists respond at the landscape scale to anthropogenic forest fragmentation. Some species are more restricted to forest interiors, and perceive a fragmented landscape as a mosaic of suitable patches and hostile matrix. Others, however, use also the matrix and perceive the landscape in shades of grey rather than black-and-white. Between 2003 and 2005 we radio-tracked 96 *Chiroxiphia caudata* (Blue Manakin), 38 *Pyriglena leucoptera* (White-shouldered Fire-eye) and 27 *Sclerurus scansor* (Rufous-breasted Leaftosser) in the Atlantic Rainforest of Brazil. We compared available with used habitat, and developed a species-specific preference index for each of six habitat classes. All three species preferred old forest, but relative use of other classes differed significantly. *S. scansor* perceived great contrast between old forest and matrix, whereas the other two species perceived greater habitat connectivity. Our study suggests species most confined to forest interiors to be considered as potential umbrella species for landscape-scale habitat connectivity.

279. COMPETITION FOR LIGHT AS A MECHANISM OF PLANT BIODIVERSITY LOSS FOLLOWING EUTROPHICATION

Hautier, Yann, University of Zurich, Switzerland; **Niklaus, Pascal**, Swiss Federal Institute of Technology Zurich, Switzerland; **Hector, Andy**, University of Zurich, Switzerland

Human activities have dramatically increased the availability of nutrients in terrestrial and aquatic ecosystems. In grasslands this eutrophication causes loss of plant species diversity. Surprisingly, we lack a mechanistic understanding of how eutrophication decreases plant diversity even though alternative hypotheses were suggested decades ago. Here, using experimental grassland plant communities, we found that addition of light to the grassland understory prevented the loss of biodiversity caused by eutrophication. There was no detectable role for competition for soil resources on diversity loss. Thus, competition for light is a major mechanism of plant diversity loss following eutrophication and explains the particular threat of eutrophication to plant diversity. Our conclusions have implications for grassland management and conservation policy and emphasize the need to control nutrient enrichment if plant diversity is to be preserved.

280. PRAGUE ZOO AND THE EAZA EUROPEAN CARNIVORE CAMPAIGN

Hauznerová, Marta, Prague Zoo, Czech Republic

As EAZA (European Association of Zoological Gardens and Aquaria) member Prague Zoo regularly participate in international EAZA educational and foundrising campaigns. This year „European Carnivore Campaign - Living together" is focused on conservation of European carnivore species and coexistence of people and carnivores. In Prague Zoo the campaign begins on 21th March 2009 and finishes at the end of September. How the campaign passed, how successful we were in its educational part and also how large amount of money we were able to collected to support campaign projects will be content of presentation.

281. IMPORTANCE OF PROPORTION WOODLAND AT CITY AND LANDSCAPE SCALES FOR BIRDS IN LOCAL URBAN WOODLANDS

Hedblom, Marcus, Swedish University of Agricultural sciences, Sweden; **Söderström, Bo**, Swedish University of Agricultural sciences, Sweden

Swedish cities have relatively large proportions remaining woodlands in comparison to cities in western and southern Europe. However, these woodlands (fragments > 1 ha, structurally equivalent to natural forest stands) are under severe threat due to exploitation. The objectives were to study how the proportion of woodland at city and landscape scales affected breeding bird abundances in local urban woodlands. Bird surveys were conducted in 474 woodlands located in urban and peri-urban (surrounding landscape) areas in 34 Swedish cities. The results showed that twice as many bird species were significantly more abundant in urban than in peri-urban woodlands. In urban woodlands, local abundances of one third of all bird species were significantly associated with the proportion of woodland at city or landscape scales. Urban woodland was particularly important for bird species associated with forest habitats when there was less peri-urban forest. For two species there seemed to be a threshold of 21–23% urban woodland below which the amount of peri-urban woodland became more important. Furthermore, the results suggested that some bird species may become urbanized as their natural forest habitats become fragmented. Local, city and landscape factors need to be considered to fully understand birds breeding in urban habitats.

282. THE WESTERN DERBY ELAND CONSERVATION: HOW TO PUT THE SCIENCE TO PRACTICE?

Hejcmanová, Pavla, Czech University of Life Sciences, Czech Republic; **Koláčková, Karolína**, Czech University of Life Sciences, Czech Republic; **Antonínová, Markéta**, Czech University of Life Sciences, Czech Republic; **Svitálek, Jan**, Czech University of Life Sciences, Czech Republic

The endangered Western Derby eland (*Taurotragus derbianus derbianus*) belongs to flagship species in West Africa. Less than 200 individuals dwell, however, in its last refuge in the Niokolo Koba National Park (Senegal). Minimal viable population concept warns against risks of extinction in such situations. Despite, no conservation action was undertaken until May 2000 when the Administration admitted the need for a coordinated conservation action and authorized the Society for Protection of Environment and Fauna in Senegal (SPEFS) the capture of few individuals in order to establish ex-situ breeding herd. Misunderstanding with local people caused that no more conservation action in-situ could be undertaken. Captured antelopes were placed in the Bandia Reserve (Senegal) and since 2002 they successfully reproduce. We carried out a continuous monitoring of kinship in the herd and developed a science-based management plan for captive population. Respecting the minimizing kinship strategy we progressively separated the animals to four herds within two reserves. Genetic parameters suggest the urgent need of new breeding male, however the administrative and financial constraints slow down to put the theory to practice. Despite, we highlight to undertake another captures from the wild and thus, to increase the chance for survival of this majestic antelope.

283. REALISING BIRD BIODIVERSITY BENEFITS IN A PLANTATION FOREST; RECONCILING CONFLICTS OF INTEREST

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Managed forest mosaics provide a huge potential resource in northern temperate Europe, of high strategic conservation, ecosystem and amenity value. This is demonstrated in Thetford Forest, England, a commercial, lowland conifer forest of varied habitat structure. Forestry methods incorporate clear-fell and continuous cover, alongside heathland restoration and semi-natural habitats (eg. wet-woodland. Forest management includes amenity and conservation objectives (Natura 2000) which, as part of a Special Protection Area for three bird species (but especially Nightjar and Woodlark), underpin site conservation management. However, recent studies have identified significant populations of a large variety of other bird species, several of which are subject to national conservation measures, focused principally on non-forest habitats – such as farmland (eg. Turtle Dove, Song Thrush and Yellowhammer). Intra forest-scale measures of bird abundance provide comparative data for bird-habitat relationships with forest growth stages and heathland. They demonstrate the value of obtaining measures of interaction between human recreation, predator impacts and non-bird taxa (e.g., deer), to optimise the multi-functional value of managed forests and to maintain a favourable conservation status of all component species. They also indicate the need for 'landscape vision' to reconcile potential conflicts between conservation objectives.

284. HUNTING, REINFORCEMENT AND PROJECTED VIABILITY OF THE NORTH AFRICAN HOUBARA BUSTARD

Hingrat, Yves, Emirates Center for Wildlife Propagation, Morocco; **Robert, Alexandre**, National Museum of Natural History, France; **Lacroix, Frédéric**, Emirates Center for Wildlife Propagation, Morocco

The North African houbara bustard, *Chlamydotis undulata undulata*, is a vulnerable bird species legally protected. In Morocco, the population was estimated less than 3000 individuals in 1996. In 2002, the Emirates Center for Wildlife Propagation implemented a framework of protected areas (15000km²) surveyed by a guarding network. Regular counts showed that the density shifted from 0.054 birds/km² to 0.565 in the last six years. In parallel, ecological surveys helped gathered life history parameters on residual wild populations that were incorporated to a population dynamics model to project population viability. The analysis uncovered a strong yearly deterministic increase (12%) and a high viability in the absence of illegal hunting. Further analysis uncovered strong synergistic interaction between environmental variation and hunting. Therefore, even modest annual outtakes (<1% of the carrying capacity) would lead to drastic population decline and probable extinction in the next decades. Finally, models integrating combinations of in-situ conservation measures (effective protection, reinforcements, changes in hunting practices) showed that population dynamics are mainly driven by a balance between hunting pressure and reinforcement rates, which allowed determining the conditions of sustainable hunting. This comprehensive strategy may guaranty the long-term sustainability of houbara populations and the preservation of traditional Arab falconry

285. CONSERVING PERIPHERAL POPULATIONS IN A CHANGING WORLD: A NOVEL CLASSIFICATION SCHEME

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Peripheral populations are at the conservation forefront as species respond to climate change by shrinkage or expansion of the range, yet ecologists have often devalued them precisely because they often experience different conditions than in the range core. To date, few generalities have emerged in terms of physiological tolerances, population dynamics, or genetic structure of peripheral populations. We argue this lack of generality arises because “peripheral population” is an artificial category that ignores key differences among types of peripheral population. We propose a classification for peripheral populations based on 2 criteria: 1) edge type (trailing, relict/stable, leading) and 2) cause of edge (barrier, physiological limits, ecological interactions). Edge type divides peripheral populations based on the dynamics and movement of the range edge. Cause of edge partitions peripheral populations based on what prevents further range expansion. This classification will enable better conservation decisions because it recognizes substantive differences in how peripheral populations form and persist.

286. LANDSCAPE EFFECTS OF ORGANIC FARMING ON BUTTERFLIES

Hodgson, Jenny, University of Leeds, United Kingdom; **Gabriel, Doreen**, University of Leeds, United Kingdom

One of the aims of organic agriculture is to benefit wildlife, but existing studies show ambiguous results: the benefit of organic farming appears to vary between taxa and between studies, and to be confounded by the effects of landscape context. This study attempts to separate the effects of local management and landscape context by using matched pairs of landscapes (10x10 km) in central and southern England. We report the results of surveys of the butterfly community on organic farms, conventional farms and unmanaged semi-natural grassland (SSSI grassland) in these landscapes. Butterfly density was highest in SSSIs, followed by field margins, then field centres. Organic fields had higher butterfly density, especially in the centre, compared to conventional fields. Although there are strong correlations between different landscape metrics that complicate interpretation, it seems that landscapes with a high proportion of organic farming have higher butterfly density even in conventional fields. The effects of organic farming on butterfly species richness, after controlling for abundance, are less pronounced but still positive. The striking difference farms of both types and SSSIs suggests that organic management could not compensate for the loss of semi-natural habitats, and this should be considered in land-use incentives in the future.

287. STRATEGIES TO REVERSE THE HEDGEHOG (*ERINACEUS EUROPAEUS*) DECLINE IN GREAT BRITAIN: CHANGES IN OCCURRENCE AND BENEFITS OF AGRI-ENVIRONMENT SCHEMES

Hof, Anouschka, Royal Holloway, University of London, United Kingdom; **Bright, Paul**, Royal Holloway, University of London, United Kingdom

The European hedgehog (*Erinaceus europaeus*) has recently been included in the UK Biodiversity Action Plan, due to evidence of significant decline. Agricultural intensification and increased predation pressure are mentioned as possible reasons for this decline. We conducted a nationwide survey to determine the current distribution of hedgehogs and to compare this with past data on occurrence, using a new approach by randomized resampling of presence-only data. Additionally, with use of radio-tracking data we studied the habitat utilization of hedgehogs in an arable dominated area in England to examine the value of agricultural nature conservation for hedgehogs. Our results show that hedgehogs are still widely distributed throughout England. However a clear division in hedgehog occurrence between eastern and the western regions of England can be observed, which may relate to differences in badger abundance and characteristics in the agricultural landscape. Agri-environmental features such as hedgerows and field margins are highly valuable for the conservation of hedgehogs. Not only were they intensively utilized by hedgehogs, they provide them with more secure travel ways, necessary to escape the threat of an increasing number of predators.

288. DEMOGRAPHY, LIFE HISTORY AND STRESS LOAD OF EUROPEAN GROUND SQUIRRELS (*SPERMOPHILUS CITELLUS*) VARIES WITH HABITAT ALTERATION

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While the European ground squirrel in Austria is threatened due to loss of its natural habitat, aggregations in altered habitats often achieve conspicuously high densities. In an effort to assess the potential consequences of this unsteady state, we compared five focal populations exposed to increasing human impact. The respective habitat types were: secondary steppe, semi-arid grassland, a meadow renaturated from arable land, a wine-growing area, and a meadow altered by alfalfa. Populations were examined from 2006-08 by capture-mark-recapture and observation. Ground squirrels were marked individually; body mass, head length and reproductive state were recorded, and individual faecal samples were collected. Nonjuvenile population densities seemed to increase with anthropogenic influence, whereas sex ratios varied inconsistently among study plots.

Each focal population contained reproductive yearling males. Their highest and lowest percentages, respectively, occurred on the alfalfa meadow and in the vineyards, indicating that habitat alteration might both accelerate and delay puberty. Anthropogenic influence may have beneficial effects on European ground squirrels in terms of population growth. However, this conclusion is ambiguous on long terms, as cortisol analyses indicate elevated stress load in anthropogenic habitats such as vineyards and leisure areas. This research is supported by the Austrian Science Fund (FWF, P18108-B03).

289. DIVERSITY PATTERNS AND POLLINATION SERVICES PROVIDED BY BEES IN AN ARID AGRO-NATURAL LANDSCAPE ACROSS THE JORDANIAN-ISRAELI BORDER

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Bee pollination is essential for fruit set of many crop plants. Modern agriculture relies on a small number of commercial pollinators, although wild bees may provide substantial pollination services in some ecosystems. Little is known about the contribution of wild bees to crop pollination in arid ecosystems. In this research we studied diversity patterns and potential pollination services of bees in the Arava Rift Valley, an arid agro-natural landscape across the Israeli-Jordanian border. Bees were sampled in natural habitats, gardens, open watermelon fields and semi-open watermelon tunnels, using nets and water traps. Honey bees were sampled mainly in gardens and in agriculture habitats. Wild bees were sampled mostly in natural habitats at the beginning of the season and in anthropogenic habitats (gardens and agriculture) later on. Wild bee species richness was highest in natural habitats, while their abundance was highest in the gardens. We found different species composition in the gardens and in the natural habitat. Open agriculture fields had higher proportion of wild bees compared to honey bees while the opposite was found in the watermelon tunnels. In our ecosystem the contribution of wild bees to watermelon pollination is very limited, and adversely affected by agriculture intensification.

290. ESTIMATING THE CHARACTERISTICS OF EURASIAN OTTER (*LUTRA LUTRA*) POPULATION WITH DIFFERENT NON-INVASIVE METHODS: THE COMPARISON OF RESULTS

Hönigsfeld Adamič, Marjana, Lutra, Institute for Conservation of Natural Heritage, Slovenia; **Smole, Jakob**, Lutra, Institute for Conservation of Natural Heritage, Slovenia; **Gregorc, Tatjana**, Lutra, Institute for Conservation of Natural Heritage, Slovenia; **Jontez, Hana**, Department of Animal Science, Biotechnical Faculty, University of Ljubljana, Slovenia; **Sušnik, Simona**, Department of Animal Science, Biotechnical Faculty, University of Ljubljana, Slovenia; **Dovč, Peter**, Department of Animal Science, Biotechnical Faculty, University of Ljubljana, Slovenia

In the frame of LIFE-NATURA project AQUALUTRA, running from Nov. 2004 till the end of April 2009 in Landscape Park Goričko (462 km2), Slovenia, different non-invasive methods have been used to estimate several characteristics of the population of Eurasian otter (*Lutra lutra*) in the project area: population structure, the number of individuals, genetic variability of population, sex ratio etc. We have applied three methods in monitoring otter population in the course of the project, i.e. standard method with collecting spraints, passive remote cameras and DNA fingerprinting. Very similar results have been obtained regarding estimation of the number of individuals: according to the genetic method, a total of 15 genotypes present in the investigated population during the three seasons of sampling were determined; according to the photos obtained with remote cameras the population was estimated to 15- 17 individuals. Besides, we have gained the information of number of cubs in the litter (2 to 3), frequency of the litters and their space distribution. In the end of the project, comparing the results of all three methods, a useful tool for otter conservation in Natura 2000 site with the otter as a qualifying species was obtained. Keywords: Eurasian Otter, *Lutra lutra*, non-invasive methods, population structure, remote cameras, spraints, DNA fingerprint

291. THE MEDITERRANEAN FRUIT BAT: BIOGEOGRAPHY, HISTORY AND CONSERVATION STATUS

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Appearance of the fruit bat *Rousettus aegyptiacus* in the E-Mediterranean presents for several reasons a puzzling fact deserving special analysis. The areographic characteristics of its Mediterranean range differ markedly from those in any other Mediterranean bat species and/or chorologic groups composing the bat fauna of the region. It is the only offshoot of the family from its tropical range. It is restricted onto a narrow strip of the thermomediterranean zone where, of course, the species may locally reach a very high abundance and can present a serious agriculture pest, eventually. To answer some incipient questions we (1) summarized all available records and compared the situation in different parts of the region. We analyzed (2) the patterns of genetic divergences among local populations and (3) the historical factors possibly responsible for the areographic specificities in question. Based on these results we discuss the conservation status of the Mediterranean population of the species and propose current measures, including a monitoring scheme, already applied in practice in some countries.

292. WHEN SPECIES FINDS NATURE ITSELF: A SAPROXYLIC BEETLE *CUCUJUS CINNABERINUS*

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Cucujus cinnaberinus is a threatened saproxylic beetle listed in the Habitats Directive and many Red lists throughout its European distribution area. We studied distribution pattern and habitat requirements of this species at three spatial levels: (i) landscape, (ii) tree and (iii) microhabitat. Generalized linear model with the binomial distribution of response variable was used to estimate occurrence probabilities of *C. cinnaberinus* in relation to investigated habitat variables. Our results show that *C. cinnaberinus* prefers fragmented line stands with soft-wooded broadleaved trees, such as withering poplar lignicultures, riparian stands or alleys. Sufficient sun exposure seems to be one of the crucial factors increasing occurrence probability of *C. cinnaberinus* in these open canopy stands. Moreover, wood-decaying fungi were present on most of the colonised trees. Advanced stage of bark peeling and presence of decaying black bats were found to be the most important factors at the microhabitat level. Contrary to some previous studies, we do not consider this species as a primeval forest relict. We consider it as an umbrella species for habitats with

large quantities of dead wood. *C. cinnaberinus* is very good example of species that do not play our game about what nature is, and find wilderness themselves.

293. DRAMATIC DECLINE OF THE WHINCHAT *SAXICOLA RUBETRA* IN SWITZERLAND: CAUSES AND EVALUATION OF CONSERVATION MEASURES

Horch, Petra, Swiss Ornithological Institute, Switzerland; **Rehsteiner, Ueli**, BirdLife Switzerland, Switzerland; **Grüebler, Martin**, Swiss Ornithological Institute, Switzerland; **Spaar, Reto**, Swiss Ornithological Institute, Switzerland

The Whinchat mainly breeds in hay meadows. It disappeared from most of the Swiss lowlands. Breeding distribution is now restricted to montane and subalpine regions. This decline in range and numbers is due to an increased farming intensity of grassland. This implies an early first mowing date coinciding with the bird's breeding cycle. Thus, formerly suitable habitats turn into ecological traps: high proportions of nests are destroyed and females on eggs or broods are killed by mowing machines. Within the Swiss Species Recovery Programme for Birds, we tested several schemes: (1) protection and creation of suitable habitat on a regional scale, (2) local habitat improvements and (3) specific measures such as nest protection. The only promising scheme to conserve the dwindling Whinchat populations is a late mowing date over larger areas. At least plots or strips within meadows should be cut late on at least 15–20 % of a suitable grassland area. They should be inter-connected and extend over a minimum of 10–20 ha. These spacious demands are hard to meet in modern agriculture. The promotion of suitable Whinchat habitat is therefore complex and needs a close cooperation of policy and agriculture with farmers and conservationists.

294. THE FATE OF THE GRASSHOPPERS DURING MEADOW HARVESTING

Humbert, Jean-Yves, Agroscope Reckenholz-Tänikon Research Station, Switzerland; **Ghazoul, Jaboury**, Swiss Federal Institute Technology Zurich, Switzerland; **Walter, Thomas**, Agroscope Reckenholz-Tänikon Research Station, Switzerland

Agricultural mowing techniques have evolved considerably in recent decades, yet scientific knowledge on their impacts on field fauna is limited. There remain considerable uncertainties that need to be addressed to develop effective guidelines for the conservation of diversity rich meadows. With a capture-mark-resight experiment we measured the proportion of grasshoppers killed during the meadow harvesting stages (mowing, processing and removing the grass). More than 80% of the individuals were killed by the harvesting process. The removal stage had the strongest impact. Therefore we also investigated two different mowing schemes: one with an uncut grass refuge in the center of the meadow and one without. While the grasshopper density drastically decreased in the cut areas, the density in the refuges doubled. The results showed that most grasshoppers that found refuge during the mowing stage, remained within these refuges until the end of the harvesting process, thereby keeping them safe from the post-mowing stages. Because no practicable harvesting processes are damage free, leaving uncut grass refuges is a simple and good practice that will benefit grasshoppers as well as other organisms. The project was initiated on a large interest from the stakeholders and is supported by local authorities (13 Swiss cantons).

295. WHOSE ANIMALS? THE POLITICS OF POWER IN TANZANIAN COMMUNITY BASED WILDLIFE MANAGEMENT

Humphries, Kathryn, University of Cambridge, United Kingdom

The development of Community Based Wildlife Management (CBWM) in Tanzania has, since 1986, emphasised the roles of both community management and the channelling of economic benefits and incentives for conservational to the local level, following the model of Community Based Natural Resource Management (CBNRM). This presentation examines the extent to which the rhetoric of devolved rights to the local level and receipt of benefits are achieved in practice in Tanzania's Wildlife Management Areas (WMAs). The question of how power is retained at the district and national levels is addressed, exposing legislative and institutional complexities and inadequacies that permit this to occur. These issues are also thought to contribute to the disillusionment with the policy, often associated with the limited potential income attained by WMAs to date. The administrative procedure involved in establishing and maintaining a WMA is uniquely complicated, and it is argued that this presents a barrier to community autonomy in WMAs from the outset. The presentation contends that administrative and legislative issues surrounding WMAs serve to produce an extension of state control and authority within a policy of CBNRM, rather than devolving power to local communities and providing win-win solutions.

296. SOIL SEED BANK IS OF LITTLE RELEVANCE FOR THE RESTORATION OF OVERGRAZED SUB-MEDITERRANEAN PASTURE WOODS

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The restoration potential of the soil seed bank of a thermophilous deciduous oak forest was studied in NW Greece. Forest sites subjected to overgrazing by ruminants and wild boar were studied and compared to non-grazed ones. Both seed bank size and species diversity were estimated. Grazing reduced both density and species diversity of the soil seed bank. Data analysis has focused on the herbaceous forest layers depleted by grazing. Within the upper (0-5 cm) and deeper (5-10 cm) soil layers the seed bank consisted of few forest herb species in both grazed and non-grazed forests. We differentiated between transient and persistent soil seed bank components and found that only a few forest herb species appeared in the persistent one. The seed bank of non-grazed sites is more akin to the above-ground vegetation than in grazed sites. Species dominance ranking has been found significantly different between grazed and non-grazed seed banks. The overall conclusion is that restoration of overgrazed sub-Mediterranean pasture woods cannot rely on the soil seed bank alone.

297. CROP GENETIC DIVERSITY BENEFITS IN-FIELD ARTHROPOD SPECIFIC DIVERSITY

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Farmland wild biodiversity provides numerous ecosystem services such as pollination, biocontrol or nutrient cycling, and is therefore essential to agroecosystem functioning. However many species associated with rural landscapes are threatened by agricultural intensification, in particular through crop homogenization resulting from the use of a few highly selected varieties, leading to extreme crop genetic uniformity both at field and landscape scale. Previous studies in ecological genetics demonstrated that genetic diversity of the dominant plant species of a natural ecosystem could benefit specific diversity in the whole associated community. Consequently we propose that crop genetic diversity could promote in-field wild biodiversity and thereby constitute an easy-to-implement solution to preserve farmland wild species and associated ecosystem services. In an organic farm near Paris, France, we compared wildlife specific diversity in plots sown with a genetically pure winter wheat variety, to plots sown with a combination of many different varieties of wheat. We studied vascular plants, potentially influenced by competition and allelopathic interactions with wheat, collembola and epigeal arthropods, sensitive to above- and belowground vegetation structure. We show a positive effect of wheat genetic diversity on the specific diversity of several arthropod taxa.

298. FACTORS RESPONSIBLE TO WIPE OUT BENGAL TIGERS - PANTHERA TIGRIS FOREVER FROM BANGLADESH

Chowdhury, Mohammad Mohsinuzzaman, PARADE Foundation, Bangladesh

Bengal tiger-Panthera tigris is a keystone species in Sundarbans of Bangladesh. In 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 etc were main methods. Result demonstrates that relative abundance of tiger and its prey-base is higher in western-side of Sundarbans. Man-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. Tiger kill men and men kill tiger – 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.

299. ANIMAL BIODIVERSITY OF LOWER MORAVA BIOSPHERE RESERVE AND IT CONSERVATION

Chytil, Josef, ORNIS, Comenius Museum, Czech Republic; **Schlaghamerský, Jiří**, Institute of Botany and Zoology, Faculty of Science, Masaryk University Brno, Czech Republic

In 1995-2002, seven books were published, containing lists and status report of invertebrate and vertebrate species of Lower Morava Biosphere Reserve (South Moravia, Czech Republic). This unique prodromus includes nearly all invertebrate systematic groups, with the number of species over 13,050; i.e. over 40% of the Czech invertebrate list (the area under study presents only 0.3% of the area of Czech Republic). 447 vertebrates species present 78% species of Czech Republic. Altogether 129 authors used on 1,536 pages the same way of proceeding of systematic groups including history of research, noteworthy records, monitoring, species conservation, published sources and list of species. The species list includes data as ecological demands, abundance, food preference, stage of hibernation, geographical distribution, the period of occurrence and others. The unique character of the territory is also proved by the fact that 101 new species for science were described from this area. This enormous biodiversity is highly protected by various way, including Protected Landscape Area Pálava, three SPAs and 17 SACs localities of Natura 2000 and 23 reserves. World Heritage Site Lednice-Valtice area is also a part of this area. Lower Morava BR became one of the best known protected areas all over the world.

300. EFFECTS ON WOLF MOVEMENT PATTERNS AND HABITAT USE CAUSED BY THE CONSTRUCTION WORKS AND FUNCTION OF THE "EGNATIA" HIGHWAY IN NORTHERN GREECE

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Objectives of the study were to evaluate any effects on wolf movement and habitat use caused by construction works and function of the "Egnatia" 6-lane, closed highway, in Northern Greece. 44% of the alignment (34 km) corresponds to tunnels and bridges. We monitored movements of a territorial wolf pair with the use of satellite collars, at 90 minute intervals, from 1/2008 to 1/2009. Evaluation on habitat use patterns was aided by additional in situ field examinations. Wolves occupied a 550 Km^2 sized territory (90% MCP) entirely bisected by the highway alignment. Wolves crossed the alignment regularly (n= 178), mainly during night time (77% of cases). 80% of total crossings (n= 10) at the constructed/fenced highway segment (7 km), were associated with a 300 m long river bridge. Crossings of wolves at the under -construction segment (27km) were more frequently associated with disturbed areas, like highway surface and construction sites (69% of crossings), rather than the less disturbed tunnel superjacent areas (31% of crossings), ($\chi 2 = 10.3$, $p<0.01$). Construction works in unfenced segments seemed to have little effect on wolf movements. Wolf habitat use was influenced more by prey (livestock) availability and forest cover in the adjacent to highway areas.

301. RARE BIRD SPECIES IN NATURAL AND MAN-MADE ECOSYSTEMS IN ST. PETERSBURG: LIMITING FACTORS AND CONSERVATION MEASURES UNDER CONDITIONS OF THE MEGALOPOLIS

Iovchenko, Natalia, St. Petersburg University, Russia

The geographical features of St. Petersburg determine main directions in rare bird species protection: protection of breeding birds; protection of migrating birds on stopover sites. Within the framework of the Russian-Finnish project "GAP-analysis in Northwest Russia", we have carried out field investigations aimed to estimate the modern status of 55 species listed in the Red Data Book of St. Petersburg and to reveal the role of SPAs in the protection of every species. The majority of rare birds inhabit forests (14 species) and wetlands (28 species). Our studies have shown that existing SPAs are not sufficient for protecting rare birds especially on stopover sites. The analysis of the status of rare species on SPAs under design has shown that the majority of rare species found in natural habitats will be protected in the improved SPAs network. 9 species inhabit only or mainly anthropogenic ecosystems and are found in low numbers or not found at all in SPAs. These species are the most vulnerable because of limited area of their natural habitats. Wellbeing of breeding populations of these species largely depends on the area of man-made habitats. We have revealed the key parameters of favourable biotops and elaborated special conservation measures.

303. SUSTAINABLE FOREST MANAGEMENT AND PROTECTION IN LOWER DANUBE FLOODPLAIN

Iovu Adrian, Biris, Forest Research and Management Institute, Romania; **Nicolae, Donita**, Forest Research and Management Institute, Romania; **Mihai, Filat**, Forest Research and Management Institute, Romania; **Marius, Petrila**, Forest Research and Management Institute, Romania; **Constantin, Rosu**, SC V.R. Ecoconstruct SRL, Romania; **Cristina, Munteanu**, WWF Danube-Carpathian Programme, Romania

Through the construction of over 1 200 km dikes and the wetland draining works conducted mainly during 1961-1970, the Lower Danube Floodplain landscape was profoundly modified in terms of geographic environment and biocoenosis. Large areas of the remained floodplain forests are profoundly modified due to a large scale use of hybrid poplar and willow clones, to the expansion of exotic tree species, and to intensive forest management practices. Important evolutions have been registered in the last 20 years in terms of management objectives of these forests, because all of them have been included among protective forests and most of them are part of the national work of protected areas and NATURA 2000 pan-European network. All these changes demand a new analysis and approach of forest management in relation with present requirements. In this paper we describe forest management measures for Lower Danube Floodplain aiming to preserve and reconstruct the forest ecosystems types and to ensure a balance among ecological, economic and social functions. The results obtained might be included among technical regulations for the management of floodplain forests.

304. JOINT OPTION VALUES OF ECOSYSTEM SERVICES

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Non-contaminated drinking water may become a scarce resource in the future and the protection of watersheds will play a significant role in ensuring the supply of clean drinking water as well as biodiversity. This study analysis the decision to convert natural areas into intensive land use and the implications of joint production of ecosystem services when the future values of biodiversity and groundwater protection are uncertain and conversion is irreversible. Usually, the options have been analysed separately. In this study we extend the literature by modelling additive options of ecosystem services, the question of whether to continue timber production in a forest or set up a reserve securing biodiversity and groundwater when these two latter are uncertain. The problem is solved numerically using dynamic programming for various drift parameters, variances and co-variances. It is concluded that conventional expected net present value analysis which treats conversion as a 'now or never' decision, may not lead to an optimal decision rule. It is shown how the option to postpone conversion and acquire new information should be included. An additive option value approach shows that the optimal decision strategy is more conservative when the option to postpone is recognised.

305. A CONSERVATION PHYSIOLOGY LESSON FOR GREEN-TREE RETENTION: SURVIVAL OF EPIPHYTIC LICHENS REQUIRES THEIR COMPLEX ACCLIMATIZATION

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Retaining of large live trees in timber-harvesting areas has been suggested to effectively support epiphytic lichen species in managed forests. However, a general and long-term perspective requires an integrated physiological understanding of the mechanism of how lichens resist the logging stress. We continued a study reporting high short-term survival of lichens on retention trees, and described changes in the individual condition of the thalli. Nine epiphytic taxa of various life-forms were sampled from birch and aspen in retention cuts 5 years post harvest and in adjacent forests. In laboratory, chlorophyll fluorescence parameter Fv/Fm, thickness of the upper cortex, photobiont to mycobiont ratio and the relative area of fruit-bodies were measured. A common pattern, broadly consistent among species, was found: while suffering from photoinhibition (indicated by low Fv/Fm values), the lichens had acclimatized to the open conditions in a few years by thickening the upper cortex and increasing the investment to sexual reproduction. The study highlights the value of physiological framework for conservation management by pointing out that (1) lichen survival is high-irradiation limited and heavily dependent on phenotypic plasticity; (2) a thin upper cortex may indicate the most sensitive species.

306. AVIAN POPULATION DYNAMICS AND HUMAN INDUCED CHANGE IN AN URBAN ENVIRONMENT

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The predominantly urban boroughs of Halton and Warrington straddle the river Mersey in northwest England. Since the 1970s there has been a major change in land-use associated with both innovative town design and the decline of manufacturing and chemical industries in the boroughs. Also, co-ordinated programmes have directly addressed water quality issues. The breeding birds of the two boroughs were surveyed in 1978-84 and 2004-06 as part of the bird atlases of Cheshire and Wirral, based on tetrads (2x2 km squares). The 77 tetrads in Halton and Warrington held 114 species breeding in one or both atlas periods, of which 62 had expanded or maintained

their range in the twenty years between the two surveys, while 52 were found in fewer tetrads. Most waterbirds (grebes, ducks, geese, Kingfisher and Grey Wagtail) have increased, as have many insectivores (including warblers and tits). Many woodland species are more widespread, as are most raptors, but breeding waders and most farmland birds have declined. We interpret these results in relation to improved quality of water and air following tightened regulation of emissions and the decline of the traditional chemical industry, and changing patterns of land-use in urban greenspace and the peri-urban agricultural environment.

307. ASSESSMENT OF THE POPULATION VIABILITY OF DANUBE STURGEONS IN A VORTEX SIMULATION MODEL

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Six sturgeon species, which originally inhabited the Danube River and the Black Sea, have experienced severe decline due to a whole spectrum of anthropogenic impacts, such as habitat destruction, over-fishing and water pollution. The risk of their extinction is further enhanced by the lack of efficient management, as well as by the serious lack of knowledge about their life history. Although population viability analysis could represent a valuable tool in addressing such problems, it has not so far been applied to the Danube sturgeon populations. In the present study, the computer simulation model VORTEX was employed to assess population viability of the six sturgeon species in the Danube River basin. Model parameter values were acquired from available literature and through experts on sturgeons in the region. Due to the significant discrepancy in life history parameter estimation among different authors, a sensitivity analysis with a wide range of values was conducted, in order to assess the model sensitivity to different sets of data and to identify the parameters which have the largest influence on the population viability. Scenarios with different harvest levels, stocking dynamics and other policy measures were developed, in order to assess the effect on population persistence and recovery.

308. GENETIC DIVERSITY OF BROWN BEARS (*URSUS ARCTOS*) IN SLOVENIA

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Brown bears in Slovenia form the northwestern part of the Dinaric bear population. These animals were the main source for bear reintroductions throughout Western Europe, and are the only possible source for a natural recolonization of the Alps. We evaluated the genetic diversity of this population using 22 microsatellite loci and 487 tissue samples of bears taken from the population between 2003 and 2008. We used three multiplex PCR reactions to obtain multilocus genotypes, and systematically checked for genotyping errors using blind repeats. All 22 loci were highly polymorphic and genetic diversity was relatively high (A = 7.13; Ho = 0.72; He = 0.74). 21 of 22 loci were in Hardy-Weinberg equilibrium (Holm-Bonferroni corrected $p<0.05$). Interestingly, 193 out of 231 pairs of loci were in linkage disequilibrium. Garza-Williamson M ratio indicates a recent population bottleneck (M=0.697, below the critical value for the sample size) that agrees with historical data. This bottleneck is also observed using heterozygosity excess method as implemented in program BOTTLENECK. Although genetic diversity levels are high compared to other brown bear populations, the observed genetic picture shows some interesting population genetic anomalies that require additional analyses to be fully understood.

309. IT ISN'T EASY BEING GREEN: INVERTEBRATES, PLANTS AND POLLUTION IN URBAN GREEN SPACES

Jones, Elizabeth, Imperial College London, United Kingdom; **Leather, Simon**, Imperial College London, United Kingdom; **Power, Sally**, Imperial College London, United Kingdom

This investigation looks at invertebrates, with particular focus on carabids and woodlice, and plants in urban green spaces in Bracknell, Berkshire, UK. The UK population is rising and more people are moving into urban areas. Thus as urbanisation increases urban green spaces may be the last reserves for biodiversity. Monitoring of vehicle emission levels, in urban areas in particular, is vital to allow predictions of change in vehicle pressure. Nitrogen dioxide (NO2) is used in this investigation as a surrogate for vehicle emissions. NO2 has been shown to influence plants, plant communities and invertebrates but other factors (including management, site age, fragmentation, surrounding land use and traffic density) also have important impacts. There are also significant difference in numbers and responses to different factors of plants and invertebrates away from the road edge. NO2 levels commonly exceed critical levels in urban areas and this has important implications for conservation and human health. Urban green spaces clearly make a valid contribution to the ecological value of an area but are constrained by human influences. These results will be used to provide simple management recommendations to Local Authorities to improve and/or optimise green spaces for biodiversity.

310. GRASSLAND DIVERSITY: SPATIAL SCALE PATTERNING AND CONSERVATION MANAGEMENT - A FIELD INVESTIGATION

Jones, Andrew, Fundatia Adept, United Kingdom

A field study at the heart of European grassland biodiversity within Romania, on pastoral landscapes still under low-input traditional farming management is finding high levels of plant species diversity at small, medium and high spatial scales. Measures of diversity at all these spatial scales, a noisy spatial patterning, show declines with increases farm intensification as a restricted range of tolerant species remain under adverse management including fertiliser application and reseeding and sensitive species are lost. As a result, relatively uniform semi-natural grasslands are now the usual situation across many parts of Europe. This paper considers the conservation implications of high spatial diversity in terms of landscape level conservation management and the processes involved in its maintenance including dispersal through livestock movement. It further considers that spatial diversity is not adequately included in conservation valuation systems, in reserve management planning and in the formulation of policy including habitat directive and rural development/ agri-environment.

311. HARVEST OF BIOENERGY WOOD AND EFFECTS ON WOOD LIVING INSECTS

Jonsell, Mats Jonsell, Department of Ecology, Swedish University of Agricultural Sciences, Sweden

To substitute fossil fuels, new assortments of wood are harvested as bioenergy, assortments formerly retained in the forest. Hitherto the main source in Scandinavia is logging residues: branches, twigs and tops. The last years the interest has expanded to clear felling stumps. Extraction

of more wood from the forest infer less habitat for organisms breeding in dead wood, among which hundreds of species are red-listed in Scandinavia. However, the fauna in these types of wood is vaguely known and therefore we asked: Is this wood used by species threatened by forestry? Is it necessary to formulate recommendations to mitigate negative effects on the wood-living insect fauna? Can recommendations be based on tree species and diameter classes? Data was collected by bringing in wood samples to lab and rearing out insects from them. Sunexposed deciduous logging residues, retained on clear cuts, may host many species, including several red-listed. For logging residues, we recommend that spruce can be harvested to a large extent, whereas deciduous wood, especially aspen and oak, should be retained on many areas. Diameter cannot be used for recommendations. Similar data on harvest stumps will be presented in September.

312. BIODIVERSITY OF BOREAL PINE FORESTS

Junninen, Kaisa, Metsähallitus, Finland

Boreal pine forests are not usually considered as rich in biodiversity. Several species of wood-decaying fungi, however, have specialized in the conditions of open pine forests. The future of these species seems filled with gloom, because the global climate warming and ongoing eutrophication affect most the northern nutrient-poor habitat types. To explore the biodiversity of pine forests, Metsähallitus (Natural Heritage Services) made a large-scale fungal inventory in 26 pine-dominated forest areas, representing a full north-south gradient in Finland. A total of over 10 000 records of 83 wood-decaying species of fungi were made on pine trees. Of these, 32 species, represented by 2150 records, are red-listed in Finland. The target species of the inventory, endangered *Antrodia crassa*, was recorded 127 times, only on dry and fallen, very old pine trees. This substrate provides a special habitat for several other species as well. The present range of these species was found to reflect the past forestry history: more species in the north and east. Interestingly, however, the number of species utilizing pine trees seems to increase from north to south within the northern boreal zone, reflecting the well-known global pattern of species richness.

313. DELAYED EGG MATURATION AS AN ADDITIONAL DEMOGRAPHIC LOAD IN A THREATENED BUTTERFLY, *CHAZARA BRISEIS*

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We studied the last population of Chazara briseis (Linnaeus, 1764), a critically threatened satyrinae butterfly, within its last population in the Czech Republic. It inhabits steep slopes on volcanic hills in Ceske Stredohori highlands. Using mark-recapture, we found that the area still hosts 10 subpopulations and over 2000 adult individuals. Egg laying was limited to short and sparse grasslands maintained by sod disturbance. Presence of other structures, such as shrubs for adult resting, was also required. Adults are long living and females exhibit delayed egg maturation, the interval between mating and egg laying was about 20 days. Because females suffer background mortality during this period, 50 – 75% of females do not survive till oviposition. This represents a considerable additional demographic load: a population of C. briseis must contain two to four times as many adults than a “normal” butterfly for equivalent effective population size. Using allozyme electrophoresis we also found high genetic diversity, which testifies that C. briseis used to live in large populations, without frequent bottlenecks, until very recently. This explains rapid losses of seemingly healthy populations of this species, and possibly other large satyrines associated with xeric habitats in northern and central Europe.

314. HOW MUCH SYSTEMATICS DO WE NEED IN ORDER TO PREDICT SPECIES RICHNESS?

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Halting biodiversity loss is one of the greatest environmental challenges and it requires effective tools that would allow to accurately assess the biodiversity status, detect key trends and identify spatial patterns of species richness. However, the development and use of such tools is hampered by the limited scientific knowledge about the systematics of many taxa and the decline of systematic experts. In this study we examine if the total species richness can be predicted from the richness of a limited number of higher taxonomic category (genera, families or orders). For this analysis we used data from 16114 quadrats from the Natura 2000 network of protected areas of Greece, containing 5148 plant species and subspecies. Our results show that we can predict total species richness just from the richness of half (30) the commonest orders, or one third (50) of commonest families, or one tenth (100) of the commonest genera. Including information on more orders, families and genera can only slightly improve the predictive ability of the higher taxon approach. In the absence of information on the commonness of each taxon, we may rank them according to the number of species they include, and the correlations fit the data equally well.

315. GINBUNA (*CARASSIUS LANGSDORFII*, TEMMINCK & SCHLEGEL, 1846); NEW FISH SPECIES IN EUROPE

Kalous, Lukáš, Czech University of Life Sciences Prague, Faculty of Agrobiology, Food and Natural Resources, Deprtament of Zoology and Fisheries, Czech Republic; **Šlechtová, Vendula**, Institute of Animal Physiology and Genetics, AVCR v.v.i. Libechov, Laboratory of Fish Genetics, Czech Republic; **Bohlen, Jörg**, Institute of Animal Physiology and Genetics, AVCR v.v.i. Libechov, Laboratory of Fish Genetics, Czech Republic; **Petrtýl, Miloslav**, Czech University of Life Sciences Prague, Faculty of Agrobiology, Food and Natural Resources, Deprtament of Zoology and Fisheries, Czech Republic; **Švátora, Miroslav**, Charles University in Prague, Faculty of Science, Deprtment of Zoology, Czech Republic

In our contribution we present molecular, cytogenetic and morphological evidence of the occurrence of a new non-native species *Carassius langsdorfii*, (Temminck & Schlegel, 1846) in Europe from the upper Elbe basin. The species was introduced probably by accident with commercial fish imports. Potentially, this introduced species may be of harm to native fish species. The study was supported by grants: IRP FAFNR, CULS No. MŠMT 6046070901, IRP IAPG No. AV0Z50450515 and 206/05/2159 of GA ČR.

316. IS ECOLOGICAL HETEROGENEITY AN ALTERNATIVE TOOL FOR RESERVE DESIGN? A CASE STUDY FROM DADIA NATIONAL PARK, GREECE

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Greece; **Dufrêne, Marc**, The Department of natural and rural ecosystem research (DEMNA), Public Sercie of Walloon Region, Belgium; **Halley, John**, Department of Biological Applications and Technology, University of Ioannina, Greece; **Korakis, Giorgos**, Department of Forestry and Management of the Environment and Natural Resources, Democritus University of Thrace, Greece; **Schindler, Stefan**, Department of Conservation Biology, Vegetation & Landscape Ecology, University of Vienna, Austria; **Dimopoulos, Panayotis**, Department of Environmental and Natural Resources Management, University of Ioannina, Greece

We present a novel approach that uses ecological heterogeneity in reserve design, taking as a case study Dadia National Park (Greece). We measured six ecological heterogeneity indices (EHI) for thirty sites and tested their predictive value for biodiversity (woody plants, orchids, Orthoptera, amphibians, reptiles, passerines). EHI were strongly correlated with the species richness of woody plants, birds and biodiversity. Two indices, one vertical and one horizontal, predicted best biodiversity (R2=61% and 54% respectively). These indices had also significantly higher values inside five out of the six complementary reserve networks designed for each biological group, than in the remaining sites not included in the respective networks. We compared reserve networks formed by choosing the sites based on this EH approach (network with the greatest vertical and then horizontal diversity indices) with standard species-based approaches (using scoring and complementarity) and with a random selection approach. The EH network was significantly more efficient than the random one and although it was, as expected, less efficient than the species-based networks, this difference was not statistically significant. Our results support the EH method as a novel alternative tool in reserve design, in particular in situations where no biological but accurate mapping data are available

317. REINTRODUCTION OF ENDANGERED GOITERED GAZELLE (*GAZELLA SUBGUTTUROSA*) AND ANATOLIAN MOUFLON (*OVIS GMELINII*) IN TURKEY: A GENETIC EVALUATION

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Having a wide distribution in Anatolia before 20th century, the goitered gazelle (*Gazella subgutturosa*) and Anatolian mouflon (*Ovis gmelinii anatolica*) continually declined until today. The conservation of goitered gazelle and Anatolian mouflon started in 1970s by the establishment of captive breeding stations. After successful breeding in these stations, the second phase of conservation was put into practice by implementation of reintroduction programs in 2005. This study aims to quantify the amount of genetic diversity and inbreeding in source (captive bred), reintroduced and wild populations to monitor the conservation program. For the gazelle, 40 microsatellite loci from domestic sheep, goat, cattle and other gazelle species were tested and 20 of these loci were successfully amplified for *Gazella subgutturosa*. Determination of the multilocus genotypes of 100 individuals from two captive-bred and two wild gazelle populations are continuing. The magnitude of genetic difference among source and reintroduced populations of Anatolian mouflon was evaluated by 11 microsatellite loci from 172 individuals. Study populations revealed close results: (mean±S.D) Bozdağ population mean number of alleles (nk) = 2.9091±1.1362, Ho = 0.3830±0.2717, Nallıhan population nk = 2.9091±1.1362, Ho = 0.4086±0.2977, and Karadağ population nk = 2.5455±1.1282, Ho = 0.3388±0.2775. Population differences for major genetic parameters were not significant ($p > 0.05$) by comparisons with paired t-test.

318. COMPREHENSIVE CONSERVATION IN URBAN ENVIRONMENTS: AN ECOLOGICAL FRAMEWORK FOR GREATER MANCHESTER, UK

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Ecological networks, utilising the patch-corridor-matrix concept, are the most widely applied planning tool aiming at conservation of species outside designated sites in human-dominated environments. However, the ambiguous evidence of corridor functionality and the lack of ecological data for species in cities, combined with the relatively high diversity of species in the urban matrix raise questions about the applicability of ecological networks in urban areas. In light of these doubts, different approaches to planning for conservation in cities are worth exploring. This paper presents such an alternative approach developed for Greater Manchester, UK: the Ecological Framework. This Framework is a set of area-specific strategies, applied to both public and private land and based on identification of areas considered the most valuable for biodiversity. These "biodiversity opportunity areas": natural and semi-natural habitats, private gardens and mosaics of habitats were identified with the GIS analysis of land use and land cover. The Ecological Framework has been developed as a result of collaboration between academia and urban planners, thus bridging the gap between science and practice. The strategies for maintenance and enhancement of the Ecological Framework are presented, and threats and opportunities for this approach in the context of spatial planning are presented.

319. THE TRUE ROLE OF PREDATORS IN MAN-MADE ECOSYSTEMS

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Insect predators are often assumed to significantly contribute to the regulation of insect pests in agroecosystems. The generation time ratio hypothesis, however, predicts that long-lived predators should not considerably affect the dynamics of their short-lived prey. This prediction is supported by the almost complete failure of artificially released predators in reducing numbers of their prey in hundreds of cases archived in the BIOCAT database. Manipulative hand-removal of predators did not result in an increase in peak pest numbers either, as reported in some studies. On the other hand, prey numbers in cage exclusion experiments were larger in cages, compared with uncaged plots, which the authors attributed to the effect of predators. Here we show, using a large data set, that some types of cages do not reduce the numbers of predators significantly and therefore the larger prey numbers in cages must be attributed to other factors than lacking predation. Our detailed analysis revealed that the impossibility for prey to emigrate from cages might account for the larger prey numbers inside the cages. Thus there is no proof of predator large efficiency in controlling insect pests. Understanding true value of predators in ecosystems is necessary for proper evaluation of ecosystem services.

320. THE ENVIRONMENTAL EDUCATION IN THE WESTERN DERBY ELAND CONSERVATION PROGRAMME IN SENEGAL

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The success of conservation activities in developing countries is strongly connected with the involvement of local population to the conservation effort. The development project of Ministry of Environment of the Czech Republic and Czech University of Life Sciences Prague "Support to natural reserves and national parks of Senegal" is focused mainly on the conservation of the Western Derby eland (*Taurotragus derbianus derbianus*), an endangered antelope subspecies from Senegal. In the frame of the project we organized educational programme for children from schools in the vicinity of the Fathala reserve, Senegal. A two-day educational programme included a day in the school with the involvement of Senegalese children into the campaign of European Association of Zoos and Aquariums (EAZA) and initiation of cooperation between Czechs and Senegalese schools. The second day we took children into the reserve, showing them wild animals in their natural habitat. After the excursion, children played various educational games strengthening the given information about nature conservation. Totally 250 children and 20 teachers from 10 schools passed the education programme (groups of 25 children and 2 teachers). The knowledge of children about the environment at the beginning and at the end of the programme assessed by questionnaires considerably increased.

321. CONSERVING TERRESTRIAL BIODIVERSITY IN LAKESHORE FORESTS: CHARACTERISTICS AND WIDTH OF THE RIPARIAN ECOTONE

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Riparian buffer zones have been traditionally left to protect water quality, but lately there has been an increasing attention on the importance of riparian ecotones for maintaining terrestrial biodiversity. The objective of the study was to evaluate the natural width of lakeshore-upland ecotone, using forest characteristics as indicators of change. Forest characteristics were studied along a 50-m edge-upland gradient in seminatural lakeshore forests in boreonemoral Sweden. Significant changes in the density of living and dead trees, as well as in their diameters, were observed along the gradient. The edge influence varied according to the tree species and structural element, but generally penetrated 20-30 m from the shoreline. Especially the densities of living and dead *Alnus glutinosa* and *Salix* spp. were higher in the immediate vicinity of the shoreline, whereas *Corylus avellana* and *Picea abies* showed the opposite pattern. Studied lakeshore forests are distinct from most managed and set-aside upland forests in terms of tree species composition as well as woody debris characteristics, and thus contribute to landscape heterogeneity. Wider buffer zones should be left along lakes to capture the entire riparian-upland ecotone and to increase their role in conservation of terrestrial biodiversity.

322. THREATENED AND PROTECTED FISHES OF SLOVAKIA

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The majority of hydrological systems of Slovakia belong to Black Sea basin (96%) and only 4% of the territory is dewatered into the Baltic Sea. During the last century, in the course of continuous environmental changes, many of native fish species in Slovakia became endangered. Main reasons of such species populations decline are the river regulations and fragmentations, destruction of suitable habitats or resource competition with allochtonnous species. The present status of fishes found in the Slovak Republic is presented. Three species of lampreys and 59 fish species native to Slovakia were evaluated. Four species and 2 forms are Regionally Extinct, 2 forms are Critically Endangered, 7 species are endangered, 8 species are Vulnerable, and 12 species are evaluated as Near Threatened. The remaining 28 species and 1 form are Least Concern. For 3 lampreys and 20 fish species, the territory of potential site of community interest (pSCI) has been limited and proposed. The selection of localities and examinations of population state in individual species of fish, presented in the Annex (II, IV and V) to the Council Directive No. 92/43/EEC, were carried out.

323. STAND-LEVEL GUIDELINES FOR SUSTAINABLE FORESTRY IN HEMIBOREAL EUROPE AS DERIVED FROM THE STRUCTURE OF ESTONIAN OLD-GROWTH FORESTS

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To improve silvicultural targets of ecologically sustainable forestry, we quantified structural features of biodiversity importance for the first time in a representative set of old-growth forests in hemiboreal Europe. Altogether, 23 preserved 2-ha patches of old-growth stands, representing four site types, were compared with mature commercial stands nearby in Estonian state forests that hold the FSC certificate of sustainable forestry. The mature and old-growth stands did not differ significantly in terms of tree-species diversity, the volumes of woody debris <20 cm in diameter and its decay-stage composition. The mature stands had a higher density and volume of live trees, due to abundant trees of diameters 10...39 cm at breast height. In old-growth, at least two-fold higher abundances were found for live trees ≥40 cm, standing dead trees ≥30 cm and downed dead wood ≥20 cm in diameter, any freshly fallen woody debris, and regeneration. Hence, several important characteristics of old-growth were present in the FSC-certified, mostly naturally regenerated, commercial stands. The main problem was the lack of large trees, for which well-planned retention cuttings and reduction of salvage logging are recommended. The dense regeneration in old-growth stands also indicated the potential for selection cuttings.

324. BIOCENOTICAL ROLE OF DOGS AND CATS IN RURAL AREAS OF CENTRAL POLAND

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Surveys revealed that dogs and cats, commonly kept at Polish farms, are not cared for and supervised properly. Therefore, we attempted to assess their biocenotical role in field and forest mosaic. Density was assessed from monthly (2005-2007) spot-light counts. Cat diet was studied by

prey collection together with scat and gut analyses (2 414 prey items). Scat analyses were used to study dog diet (417 scats). Average cat and dog densities were 3,9-6,1 and 2,4-2,7 ind./100 ha, respectively (higher than fox density). Cats caught mostly small mammals (rodents). However, other vertebrates were also preyed upon heavily: birds in spring (25% of prey items) and winter (in February - 44%) while reptiles in spring (30%). Also, some cats preyed upon hares regularly. Annual predation rate of one cat was from 26 (prey collection) to 358 vertebrates (scat and gut analyses). Cats could hunt between 132 and 1790 animals/ 100 ha/year. 40% of dog scats contained grains, remnants of roe deer were found in 12% and brown hare in 5%. These days cooling is the only way of limiting abundance of dogs and cats. Nevertheless, better law execution and higher awareness of owners are the real ways to deal with the problem.

325. THE APPROPRIATENESS OF NON-INTERVENTION MANAGEMENT FOR PROTECTED AREAS AND NATURA 2000 SITES - EUROPEAN CONCEPT OF WILDERNESS

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Outputs of scientific collouqium: Wilderness concept does not intend to replace Natura 2000 network, but represents a complementary approach. There is no conflict between Natura 2000 requirements (to maintain the favourable conservation status of habitats and species) and wilderness concept in case of primary habitat types (if real vegetation is identical with the potential one). It is necessary to respect natural dynamics of primary habitat types and to protect these habitat types in all stages of their natural succession cycle. Non-intervention management is the best way how to achieve favourable conservation status of primary habitats, including many keystone species. Moreover, it means to apply completely different approach for assessing changes in primary and secondary habitats. There is no area completely without any management and the definition of non-intervention management might vary site by site, it usually understood without direct human intervention. The main difference between non-intervention and management areas consists in different conservation objectives. In management areas, the main objective is to reach defined status, while in non-intervention areas the main objective is the process itself.

326. CONSERVATION MEASURES FOR RARE AND ENDANGERED *MALUS SYLVESTRIS* IN FLANDERS (BELGIUM) BASED ON GENETIC AND PHENOTYPIC DATA

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Malus sylvestris is a rare forest tree species. The autochthonous populations in Flanders are treatened. First, deforestation and intensive forest use that was focussed on economic important species during the last centuries lead to severely diminished population sizes. One larger population remains in Meerdaal forest. Apart from this, only relict individuals or small groups of trees are surveyed. A SSR analysis revealed that a second treat to the survival of the populations is introgression from cultivated *Malus domestica* trees. In Meerdaal forest 5% of the trees is hybrid. A morphological analysis proved that the distinction between pure species and hybrid is vague and cut-off values for characters to differentiate species and hybrid, as used in field flora's, are not applicable. As a conservation measure, the pure *Malus sylvestris* trees as revealed by SSR analysis, are propagated vegetatively and planted in a seed orchard. Future planting stock from this orchard will be used in directed reintroduction and restocking programs.

327. THE LAST ALPINE SNOWBELLS (*SOLDANELLA ALPINA*, *PRIMULACEAE*) RINGING ON THE PUY DE SANCY (MASSIF CENTRAL, FRANCE)

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We investigated the genetic structure and diversity of an isolated Massif Central (MC) population of *Soldanella alpina* in comparison to neighbouring populations from the Pyrenees and the Alps using Amplified Fragment Length Polymorphisms (AFLPs). Altogether, nine populations were represented by 192 individuals. Based on 365 polymorphic AFLP fragments three phylogroups corresponding to the three mountain ranges (AMOVA: 33.17% among-region component) were observed. As genetic divergence was lowest between the Massif Central and the Alps, successive vicariance, i.e., retreat into mountain ranges from south to north following the direction of postglacial warming, is the most likely biogeographical explanation for the present-day distribution. Measures of genetic variation within populations showed high genetic diversity (e.g., Nei's gene diversity, Shannon's index, number of private fragments) for the MC population. These observations not only indicate an independent history but also a high conservation priority of the isolated MC population. Moreover, in reaction to global warming, this population may not be able to move uphill because the highest peak ("Puy de Sancy") of the MC reaches only about 1885 m. a.s.l., and *S. alpina* today is found in the upper area of this massif already.

328. VEGETATION CHANGE IN SWISS MIRES WITHIN 5 YEARS: RESULTS OF THE SWISS MIRE MONITORING PROGRAM

Küchler, Meinrad, WSL, Switzerland; **Ecker, Klaus**, WSL, Switzerland; **Graf, Ulrich**, WSL, Switzerland; **Feldmeyer-Christe, Elizabeth**, WSL, Switzerland; **Bedolla, Angéline**, WSL, Switzerland; **Küchler, Helen**, WSL, Switzerland

Mires in Switzerland are protected by law. The Swiss Mire Monitoring program has to establish whether the mires are maintained in quality and quantity. The sampling design of the program is twofold. First: On the national level, a stratified random sample with 124 mire objects has been drawn from the national mire inventories, taking into account the biogeographic regions, the altitudinal belts, the size and type of the mires. Second: Within the investigated mires, samples of field plots have been selected taking into account the vegetation types modeled on the base of remotely sensed data and field records. The second survey of the Swiss Mire Monitoring program has been achieved in 2008. The present talk reports on changes in quantity and quality of the mire vegetation between the two survey periods, i.e. within 5 years. The mires have suffered exsiccation, nutrient import and encroachment by woody species. The total mire surface has approximately been maintained, but there are important shifts among the various mire types. Particularly, small sedge fens have heavily lost in favor of other vegetation types. The strengths and limitations of the methods and results are outlined.

329. CLIMATIC AND LAND USE CHANGES AND THEIR IMPACT TO DISTRIBUTION OF LEPIDOPTERA SPECIES IN ESTONIA

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We studied changes of climatic conditions, land use and distribution of some butterfly species during last 80 years in Estonia. Estonia is under impact of humid and warm polar marine air masses, continental polar air masses can bring dry and cold air in winter. Changes of atmospheric circulation during last decades resulted climatic changes in Estonia especially during winters when the average temperature has raised 2-3ºC. Remarkable land use changes resulted almost three times increased area of forest from 1940 to 2000, area of wooded meadows has dropped from 850000 ha to 800 ha, area of alvar meadows from 44000 ha to less than 10000 ha, area of flooded meadows from 83000ha to 12500ha. These changes have notable impact to the distribution of butterfly and moth species. Warmer winters and changed plant cover (increased area of bushes) create better conditions to hibernate for several southern and eastern species. In period 2000 - 2004 new findings of at least 18 moth species were found that have main population areas in Southern and Central Europe or in Central Eurasia. There has been increase in number of individuals of several butterfly species like *Apatura ilia, Apatura iris, Euphydryas maturna, Limenitis populi, Limenitis Camilla, Parnassius Mnemosyne*.

330. PROTECTING THE ALLIANCE FOR ZERO EXTINCTION GLOBAL BIODIVERSITY CONSERVATION PRIORITY SITES WILL ALSO PROVIDE VALUABLE HUMAN WELL BEING BENEFITS

Larsen, Frank Wugt, Conservation International, United States; **Turner, Will**, Conservation International, United States; **Brooks, Thomas**, Conservation International, United States

Efforts to conserve biodiversity can also ensure provision of valuable ecosystem services important for human well being, and thereby provide further conservation incentives and funding for conservation. However, the human well being benefits of protecting priority areas for biodiversity conservation remain poorly understood. In this study, we use the Alliance for Zero Extinction (AZE) sites to explore some human well being benefits of biodiversity conservation at the site scale. The AZE sites exist because they hold one or more species in imminent danger of disappearing. We find that there are considerable human well being benefits associated with conserving the AZE sites in terms of carbon emissions avoided (based on a global map of C stores and deforestation and plausible Reduced Emissions from Deforestation and Degradation mechanisms) and hydrological services (based on global modelling of flows, runoff, and demand for clean and abundant water). For example, mean carbon storage in the AZE sites (91 t C/ha) is much higher than that found outside of AZE sites within natural habitat of the AZE countries (42 t C/ha). Although results vary by service and region, conserving sites of global biodiversity importance will also provide considerable additional human well being benefits.

331. PRIORITIZING FISHERY MANAGEMENT FOR LOGGERHEAD TURTLE (*CARETTA CARETTA*) CONSERVATION IN THE NORTHERN ADRIATIC SEA FROM REPRODUCTIVE VALUE ANALYSIS

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Fisheries bycatch often affects particular size classes of turtles. Because of the late age at maturity, the reproductive value (RV) of small juvenile, large juvenile and adult loggerheads vary by orders of magnitude. RV provides a relative measure of value for individuals, thereby allowing us to estimate the effects of different stressors based on the number of animals killed. Using RV as a comparative index, we assessed the relative impact of trawl and gillnet fisheries operating in the northern Adriatic Sea on loggerhead populations. We tested several scenarios for bycatch in both fisheries which significantly differs in the size of captured animals and mortality. Despite high bycatch rates, bottom trawl fisheries result in direct death of fewer loggerheads (156-260 vs. 346-486 in gill nets), but affect individuals that are older and hence have higher RVs. Because of data limitations for vital rates and bycatch estimates, we looked at a distribution of potential impact for each fishery. Lessons learned include the need for relative impact assessment because of the sensitivity of adult RV to parameters such as clutch frequency, sex ratio and remigration interval. We anticipate that our analysis will help managers prioritize needs for regulation and mitigation among different fisheries.

332. LONG TERM TRENDS IN SURVIVAL RATES OF A DECLINING SPECIES: THE CASE OF LITTLE OWL (*ATHENE NOCTUA*) IN THE NETHERLANDS

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The Little Owl is associated with small-scale half-open landscapes and is considered to be an indicator for a healthy environment. This species has declined significantly all over Europe, and in the Netherlands the number of breeding pairs has decreased by 50-70% since the 1970's. Understanding the demographic mechanisms underlying this decline is crucial for relevant conservation planning. We used the long term and large scale Dutch ringing data set (35 years, >24 000 ringed owls) to estimate survival rates through multi-event capture - recapture modelling, taking dispersal into account. We investigated geographical and temporal variation in demographic rates. We tested whether survival rates were correlated to climate, habitat quality, road traffic, or vole availability. The best model assumed time effects on both juvenile and adult survival rates. Juvenile survival rates decreased with time and no covariate model explained this trend. Combination of global change related factors is more likely to explain this decline. Adult survival rates fluctuated between years and the best covariate model contains temperature and precipitation: dry and cold years led to low survival rates. Population viability analysis, integrating these parameters, revealed that conservation efforts should be focused on increasing early life-stage parameters to reach a self-sustaining population.

333. SPECIES DISTRIBUTION MODELS AS USEFUL TOOLS FOR ASSESSING SPECIES THREATS?

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Spatial criteria provided by IUCN to establish the species threats' status can be difficult to apply and interpret in some situations, due either to methodological limitations or to the incompleteness of species occurrence databases. We used the modelled distributions of 975 endemic species across four southern African countries to illustrate how predictions from species distribution models can provide complementary information to those of traditional IUCN criteria. We developed a standard procedure to derive, from the species occurrence data and the potential distribution maps, some indices that are complementary to the standard IUCN criteria "Area of extent" (AOO) and "Area of occurrence" (EOO). Our results support the use of these new indices to distinguish various species' threat situations. Some indicators highlight the lack of knowledge on the species distribution, promoting complementary analyses or fieldwork. Some others especially help into understanding the threats coming from the spatial configuration of the suitable habitats network. We conclude that, to support an accurate assessment of the species threats and the associated conservation strategies, such new indicators could be efficiently used to complete the standard methods.

334. BUGS, BIRDS AND ROUNDABOUTS - URBAN GREEN SPACES AS CONSERVATION HABITATS

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Since 1999 we have examined the role of traffic roundabouts (urban green spaces) as reservoirs of biodiversity. Initially our studies were based on the ground beetles associated with these features, but we have since extended our studies to include other arthropod taxa and more recently birds. Generally speaking we find that the size of the roundabout has a marked influence on the number and abundance of species present, acting as biogeographical islands. For some groups, e.g. hemiptera, management in the form of grass cutting frequency has a stronger effect than island size. In summary, the larger the green space, the more complex the habitat present and the less intensive the management, the more species of invetebrate present and the more individuals of those species. Some uncommon and invasive species were found. It appears that relatively small urban green spaces do indeed have the potential to be used as conservation features.

335. BIOLOGICAL DIVERSITY PLAN ACTION FOR COPPER-COBALT FLORA IN THE TENKE FUNGURUME MINING AREA (KATANGA, DRC)

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The South of the Democratic Republic of Congo (Katanga) and adjoining regions in the North of Zambia comprise some of the largest ore bodies of cobalt and copper in the world. Katangan copper hills harbor about 40 endemics as well as particular steppic plant communities. This Biological Diversity Action Plan (BDAP) is an activity program for the conservation of copper-cobalt flora and vegetation and mitigation of potential species extinction risk, during the early construction phase of the Tenke Fungurume Mining Corp. (TFM) project. Six potential taxa of concern (IUCN criteria) have been identified in the TFM concession. In situ conservation is fulfilled through the setting of a single large reserve. In parallel, important efforts have been devoted to ex-situ conservation strategy to re-establish vegetation and species after mining activities cessation. This includes: - Translocation of 3500 individuals of plants of concern to the nature reserve. - Ecosystem engineering with the reconstruction of an artificial copper/cobalt ecosystem. - Ex-situ seed bank with 300 seed samples (at least 50 seeds) collected belonging to 40 species and used for short and long term conservation, germination tests and micro-propagation tests. All these efforts represent an important step towards the conservation of copper-cobalt flora.

336. TRANSBOUNDARY COOPERATION IN ESTABLISHING ECOLOGICAL NETWORKS: THE CASE OF GERMANY'S EXTERNAL BORDERS

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Ecological networks represent a conceptual approach to increasing the connectivity of habitats, plant and animal populations and their communities. It is often discussed as a key strategy to halt the global loss of biodiversity. The issue of ecological networks is becoming ever more salient against the backdrop of climate change which forces many species to shift their ranges towards the poles or to higher altitudes. Many international policy papers and academic publications include claims for better transboundary coordination and management of ecological networks. The objective of the present research is threefold. First and foremost there is the descriptive interest to gain an empirical overview on transboundary cooperation in establishing ecological networks at Germany's external borders. The second main research question is of explorative and explanatory nature and refers to the reasons why such cooperation is launched and why some border regions seem to be more active in this than others. Thirdly, from a prescriptive point of view, shortfalls of the current practice and potential options to remedy these were analyzed. The findings are mainly based on a comprehensive internet survey in combination with exploratory expert interviews and on a series of semi-structured open ended in-depth interviews.

337. INBREEDING, OUTBREEDING AND THE EVOLUTION OF PLANT DEFENCE STRATEGIES IN FRAGMENTED PLANT POPULATIONS

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Habitat fragmentation reduces population size and increases isolation resulting increased inbreeding and genetic differentiation of populations. Inbreeding can result in inbreeding depression. Genetic differentiation raises, in turn, the question of outbreeding depression. Yet, inter-population crosses and transplantations are used to restore genetically eroded populations. Interactive effects of environmental and genetic factors on inbreeding and outbreeding depression are unclear and not investigated in plant-herbivore interactions. I investigated inbreeding and outbreeding effects on herbivore resistance and tolerance in fragmented plant populations, and how these effects are influenced by population history. The results revealed that both inbreeding and outbreeding effects on herbivore resistance and tolerance and on plant fitness vary among plant populations depending on the history of inbreeding, levels of past herbviory

experienced in field and on past abiotic environmental conditions. Moreover, inbreeding and outbreeding effects on the considered plant defence strategies seem to be influenced by complex allocation trade-offs, firstly, between fitness and resistance, secondly, in the case of tolerance, between allocation to growth or reproduction, and thirdly, between the different defence strategies, i.e., resistance and tolerance. These provide novel information about fragmentation effects on plant defence strategies and increase our understanding on fragmentation effects on species interactions and biodiversity.

338. BIODIVERSITY RESEARCH FOR CONSERVATION IN MARAMURES (ROMANIA)

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Maramures is a biodiversity rich area in the Carpathians (Romania). Its preserving large carnivores (brown bear, lynx, wolf), chamois, beavers in a diversity of habitats from 211 m Tisa River to 2303 m Rodnei, the highest point of the Eastern Carpathians. Danube salmon is an emblematic species in rivers. Here are the Rodnei Mountains National Park and Biosphere Reserve, Maramures Mountains Nature Park, 12 smaller reserves and 6 Natura 2000 sites based on the EU's Birds and Habitats Directives. There is a need to scientifically evaluate the situation of biodiversity. A EU financed program was initiated, involving Romanian universities, natural science museums and NGOs. It was established the Central European Biodiversity Conservation Center (building, off-road vehicle, research equipment etc). The 2008 research was focused on wetlands, understanding of fish and wetland macro-invertebrate assemblages of the area. Baseline survey of two Natura 2000 sites was initiated and a monitoring program on biodiversity was started; management plans were designed and agreed with local community representatives. Leaflets, brochures, posters, 3 major books were realized: Ecosystems of Maramures, Biodiversity Research in Maramures, and Wetland Biodiversity of Maramures. It was created a successful scheme of interdependent biodiversity research, monitoring, management, ecological education and public involvement for biodiversity conservation on a landscape level.

339. THE DYNAMICS OF HUMAN PERCEPTIONS OF WOLVES DURING A PERIOD OF RAPID SOCIAL CHANGE: THE CASES OF MACEDONIA AND KYRGYZSTAN

Lescureux, Nicolas, Norwegian Institute for Nature Research, Norway; **Linnell, John**, Norwegian Institute for Nature Research, Norway

The conflictful nature of human-wolf relationships is important for conservation biologists. As conflicts are often more intense than expected considering the economic impact of wolves on human activities, some authors suggested these conflicts are due to the persistence of negative perceptions from previous times and disconnected with reality. To the contrary, we suggest that local people's perceptions are often linked to wolf behaviour through direct observations and interactions. We conducted ethnological investigations on human-wolf relationships in countries belonging to Kyrgyzstan and Republic of Macedonia, which have been subjected to rapid social changes that are impacting livestock husbandry and hunting practices. Our surveys showed that changes in hunting and husbandry practices have led to modifications of wolf-human interactions which has reduced the acceptance for wolves among local people and made them more vulnerable to wolf damage. All those changes contribute to changes in the perception of the wolf and to increase the conflicts, even in countries where humans and wolves have continuously coexisted. Those studies show the dynamic nature of human-wolf relationships and the necessity to understand the evolution of the social context in conflict studies.

340. MANAGEMENT CONCEPT FOR RESTORING FLOODPLAIN FORESTS COMBINING ECOLOGICAL AND HYDRAULIC MODELLING

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Softwood floodplain forests are one of the most endangered ecosystems in the world due to regulation and fragmentation of river-floodplain systems. Their restoration, though highly desirable is problematic since softwood vegetation structured by floodplain willow species and black poplar is thought to intensify flood risks by hydraulic effects. Therefore, sites have to be identified being ecologically suitable and hydraulically harmless for softwood forest plantings. Within an interdisciplinary project of biologists and hydraulic engineers two different modelling techniques were combined to develop an innovative approach to reach this aim. Ecological suitability of sites was assessed using a habitat modelling approach based on the occurrences of species / vegetation types and hydrological variables. A two-dimensional hydrodynamic numerical model based on laboratory experiments was used to estimate the hydraulic effects of softwood vegetation on surface water levels. Coupled by a GIS, appropriate sites could be identified and the maximum size of plantings could be assessed. Model area was a 12 km reach of the Middle Elbe River, Germany, for which we analysed in different scenarios a potential of about 45 ha reforestation sites without inducing a significant increase of water levels.

341. CAN THE ECOSCAPE CONCEPT ENHANCE CONSERVATION BIOLOGY?

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The ecoscape concept formalizes a level of organization in biology above the level of the community (biocoenosis). As such it emphasizes the emergent properties that are generated when two or more community-types are juxtaposed in an ecosystem of interest. Many of these properties and processes are currently addressed within the discipline of landscape ecology. However, the term "landscape" is almost universally used to express a focus on large spatial dimensions. While spatial scale is clearly an important aspect of ecological and conservtion investigations, ecoscape, as a level of organization (or of complexity), is not defined by spatial scale. Hence it directs attention to the all important properites and processes inherent in heterogeneous landscapes and not to spatial scale itself. I argue that the ecoscape concept therefore provides a conceptual context of critical relevance to investigations in conservation biology, and thus ultimately to effective policy applications. Moreover, it connects research at the level of organization above the community level with traditional ecology focused on individuals, populations, or communities.

342. REGIONAL AND LOCAL DETERMINANTS OF THE DISTRIBUTION OF ENDEMIC SPECIES: THE CASE-STUDY OF *NARCISSUS CYCLAMINEUS* DC

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Faculty of Porto University, Portugal; **Moreira, Francisco**, Research Center In Applied Ecology "Prof. Baeta Neves", Superior Institute of Agronomy, Technical University of Lisbon, Portugal; **Honrado, João**, Biodiversity and Genetic Resources & Science Faculty of Porto University, Portugal

Identifying the ecological determinants of species, communities and ecosystems is crucial for the establishment of conservation and management strategies. Species Distribution Models (SDMs) are most valuable in the case of rare/endangered species, since the knowledge of factors determining their distribution is essential for mapping habitat suitability, deciding on habitat management, preventing population decrease, and planning reintroduction actions. Species distributions are often not coincident with their modeled potential distribution, suggesting the existence of determinants acting at different scales and related to distinct processes. *Narcissus cyclamineus* DC., a narrow endemic daffodil occurring in riparian habitats of Northwest Iberian Peninsula, is a good example of such pattern, since its scattered distribution represents a minor part of its modeled suitable range. In this research we provide insights on the ecological constraints driving the distribution of this rare species, by applying a multi-scalar SDM approach to two distinct occurrence datasets. We show that (i) the Iberian range of the species is well predicted by a restricted number of climatic predictors, (ii) land-use related predictors assume higher relevance in explaining the regional distribution of the species, and (iii) land-use and human disturbance are important determinants of the local presence and abundance of the species. This study was financially supported by FCT (Portuguese Science Foundation), through PhD grant SFRH/BD/31576/2006 to A. Lomba.

343. WHERE AND WHEN: IDENTIFYING KEY MARINE AREAS FOR THE CONSERVATION OF THE VULNERABLE WANDERING ALBATROSS *DIOMEDEA EXULANS*

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Marine top predators forage within heterogeneous and dynamic environments, where their dispersion is influenced by the interaction of complex physical and biological processes. Moreover, the increasing awareness of the serious threats that marine top predators face at sea (e.g. fisheries bycatch) has triggered the development of conservation measures to ensure the protection of important key marine areas. Therefore, understanding the dispersion patterns and habitat associations of these highly-mobile organisms is critical to effectively monitor and implement conservation measures. Being this especially true in the Southern Ocean, we developed habitat suitability models for defining the seascape of the Wandering albatross breeding in the sub-antarctic Crozet archipelago. Based on long-term tracking data, we developed a three-step procedure in order to identify key marine areas. In a first step, we estimated the seascape of albatrosses based on the time spent at sea as a measure of habitat use. Secondly, we relied on first passage time analyses in order to asses the time invest searching for food. Thirdly, we studied the feeding habitat based on stomach temperature recorders. Finally, we discussed the implication of our results within the current conservation scenario which involved different conservation agencies and fisheries commissions.

344. DOES URBANISATION HOMONGENISE CARABID ASSEMBLAGES?

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Urbanisation is a world-wide phenomenon, and progresses through similar steps: the original habitat first becomes suburbanised, then gradually more fragmented and interspersed among high-density housing in urban areas. These changes cause alterations in habitat conditions, and constitute powerful filter acting on the original flora and fauna. Urban environments favour specific, often non-native species, causing potential impoverishment and homogenisation. To test if these occur in ground beetles (Coleoptera, *Carabidae*), we compared ground beetle assemblages along a standardised urbanisation gradient, starting from a forest habitat, in nine temperate locations in Europe, Canada and Japan. Overall biodiversity (compared by species richness) showed inconsistent trends by either urbanisation intensity or geographic position. However, when only forest species were compared, an impoverishment of the original rural (forest) fauna in urban forest fragments was found. Urbanisation did not homogenise ground beetle faunas across the studied locations because the rural faunas were more similar to the urban ones within the same location than similar urbanisation stages to each other. When only species recruited into urbanised habitats were compared, homogenisation was detected.

345. METHODS OF CREATION OF ECOLOGICAL NETWORK IN THE CZECH REPUBLIC

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Ecological networks represent a spatial concept used for the purposes of sustained landscape development planning as well as the main instrument for maintenance of biodiversity on the landscape level (Opdam et al., 2005). The concept of ecological networks is based on landscape corridors – functional features in the landscape alleviating the effects of fragmentation (Hobbs, Willson, 1998). The ecological networks in the cultural landscape of Europe are an important tool of nature conservation planning (Jongman, 1995). This article deals with using of unique method for creation and definition of target state of ecosystems in the ecological networks in the landscape of the Czech Republic. This method is based on biogeographical differentiation of the landscape from a geobiocenological perspective (Buček, Lacina, 1995) and it was used to the creation Terrestrial System of Ecological Stability of Landscape.

346. DECLINES IN COMMON, WIDESPREAD BUTTERFLIES IN A LANDSCAPE UNDER INTENSE HUMAN USE

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Analyses of species' population losses typically show a dichotomy between strongly affected, rare, and localized species and apparently unaffected, common, and widespread species. We analyzed 16 years (1992-2007) of butterfly abundances from transect count data in The Netherlands and

show that 55% (11 out of 20 species) of common species suffered severe declines in distribution and abundance. Overall, cumulative butterfly abundance declined by around 30%. Some of the species in decline used to be omnipresent in gardens and parks, and 2 of the species were previously even considered agricultural pests. Based on their declines over the last 16 years, 2 of the 20 species (*Lasiommata megera* and *Gonepteryx rhamni*) reached the IUCN (International Union for Conservation of Nature) population-decline criterion for endangered status in The Netherlands, and 2 species (*Inachis io* and *Thymelicus lineola*) met the vulnerable criterion. Butterflies in farmland, urban, and particularly woodland areas showed the largest decline in species abundance. The abundance of species associated with vegetation types found mainly in more open biotope types (dunes, heathland and, to a lesser extent, seminatural grassland) increased or remained stable. The decline of widespread species requires additional conservation strategies in the wider landscape.

347. CONSERVATION AND MANAGEMENT OF FLOODPLAIN FORESTS IN THE CZECH REPUBLIC

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This article deals with different types of management of floodplain forests in the Czech Republic. Thanks to the environmental conditions of floodplain forests as azonal ecosystems and the unique composition of their biota, this type of ecosystem has become one of the priorities of nature conservation in central Europe (KLIMO et al. 2008). A significant aspect in the ecology of floodplain forests is the instability of the floodplain terrain over time, due to which floodplain vegetation is exposed to constantly recurring several processes. The importance of floodplain forests for the biodiversity of the landscape has been emphasised by their inclusion in ecological networks, various regional nature conservation categories, international conventions (Ramsar, biosphere reserves) and the network of Natura 2000. Forest management of floodplain forests has a substantial impact on the biodiversity of these habitats and therefore it is important for nature conservation. This paper proposes some model forest management strategy, which could be develop in protected landscape areas and nature reserves of floodplain forests in the Czech Republic.

348. PUBLIC SUPPORT FOR LARGE CARNIVORE CONSERVATION IN MACEDONIA – WHICH CHALLENGES LIE AHEAD?

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Public acceptance is crucial for long-term survival of large carnivores in Europe. Three large carnivore species are present in Macedonia. Eurasian lynx (*Lynx lynx*) and brown bear (*Ursus arctos*) are protected, but frequently killed illegally. Wolves (*Canis lupus*) are hunted, and bounties of up to 50 € per killed wolf are paid. With Macedonia's potential accession to the EU, nature conservation legislation will need revision. The goal of this study is to investigate public support for large carnivore conservation in Macedonia. We interviewed 362 randomly selected inhabitants of areas where all three large carnivores occur; 16.3% of the respondents reported being active hunters. Although long-term conservation of all three species was favoured by majority of respondents, most of the respondents disagreed with legally protecting the wolf population. Close to 50% of the respondents favoured the idea of authorizing hunting of bears and lynx. Only 50.8% of hunters knew that it is not allowed to hunt lynx and 78.0% that it is not allowed to hunt bears. The main challenge ahead will be strengthening the implementation of the legislation, primarily through dialogue and information sharing with the public.

349. MONITORING OF SOCIO-ECOLOGICAL INDICATORS IN THE MEDITERRANEAN RIVER BASINS. A STUDY CASE IN THE TORDERA RIVER BASIN, CATALONIA (SPAIN)

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L'Observatori is a regional project, started in 1996, which has developed and adapted a set of indicator monitoring system -methodologies and tools- applied to the La Tordera River Basin, north east of Catalonia. The project proposes a holistic approach towards both the global comprehension of the fluvial ecosystem functioning and the dynamic transformation at which La Tordera river basin is subjected. It aims a continued and integrated evaluation of the ecological, hydrological and social status of the basin. The interdisciplinary research approach allows developing an integrated monitoring methodology based on environmental short-term and long-term indicators. These are tested and consolidated for each of the ten research subjects which are structured in four monitoring groups, as follows: Biological Monitoring (diatoms, riparian forest, macroinvertebrate, ictiofauna, amphibians and ornithofauna); Physical/Chemical Monitoring (thermal conditions, oxigenation conditions, acidification status, salinity, nutrient condition -toxicity and eutrophication-); Hydro morphological monitoring (hydrological regime, river continuity, morphological conditions, groundwater supply, risks of floodings/droughts); Political and Social Monitoring (social public participation, environmental education program, social perception, landscape change monitoring). The results obtained from 12 years data collected are used to increase the social awareness and to adopt management measures that promote the conservation of the fluvial ecosystems.

350. CROSS-TAXON CONGRUENCE TO ADDRESS CONSERVATION ACTIONS IN MEDITERRANEAN OLD GROWTH FOREST

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Although old growth forests are recognized as biodiversity hotspots and as useful references to develop approaches for sustainable forestry and for restoration programmes, little is known on cross-taxon congruence regarding those ecosystems in the Mediterranean basin. To asses and compare the response pattern of different taxa to management vs near-natural state forest ecosystems, we analyzed managed and old-growth stands in 36 squared plots areas of 2500 sqm in Cilento National Park (southern Italy), considering variations in forest structure, species richness and composition. Vascular plant data were plotted against data on lichens, invertebrates, vertebrates, bryophytes and fungi, to assess the congruence of diversity and community composition related to forest management. To summarize the conservation status, experts assigned to each plot a quality value ranging from 1 to 5. Hence, we assessed the correlation existing between different taxa using the qualitative conservation value expert-based. A good congruence were found for all pairs of taxa, excluding vascular flora and investigated vertebrates (i.e. dormhouse and birds), probably because chosen plot dimension was too small for vertebrates. Assessment of the responses of different taxa to forest management is crucial to coherently propose actions to conserve biodiversity in near-natural state forest ecosystems and promote sustainable forestry.

351. THE BIODIVERSITY OF CANOPY ARTHROPODS IN A RANGE OF FOREST TYPES IN IRELAND

Martin, Rebecca, University College Cork, Ireland; **Oxbrough, Dr. Anne**, University College Cork, Ireland; **Kelly, Dr. Thomas C.**, University College Cork, Ireland; **Irwin, Dr. Sandra**, University College Cork, Ireland; **O' Halloran, Prof. John**, University College Cork, Ireland

Over the last century 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. This research project aims to assess the canopy invertebrate component of this unexplored biodiversity, to identify suitable forest canopy biodiversity indicators and to provide detailed information on the basic ecology and species composition of canopy arthropods in Ireland. Canopy invertebrate diversity was assessed in six monoculture Norway spruce plantation sites, six polyculture Norway spruce plantation forests (mixed with oak or Scots pine), three native Irish oak woodlands and three native Irish ash woodlands using thermal fogging. Invertebrates from the orders Araneae, Opiliones and Coleoptera were identified to species level. Significant differences were found in relative species composition between Norway spruce plantation forests and native Irish woodlands, although overall abundances of invertebrates were similar. The results of this study provide a detailed inventory of the canopy arthropods present in a range of different forest types and will inform management decisions for future forestation programmes to optimise biodiversity and naturalness in forest ecosystems.

352. OCCUPANCY DYNAMICS OF A RECOLONIZING WOLF POPULATION IN THE ITALIAN ALPS

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The wolf naturally recolonized part of its former habitat in the Western Alps beginning in the late 1990s. Effective management of this species relies on estimates of wolf occupancy parameters, and on the development of a habitat suitability model. We applied a multi-season occupancy model to estimate wolf occupancy dynamics and detection probabilities based on a large scale monitoring program where multiple visits to sites were organized following a robust design over 5 years in the entire Piemonte Region, Italy. Human disturbance (β = -5.553, SE = 2.186) and rock-area cover (β = -4.129, SE = 1.392) had negative effects on occupancy, while the presence of red deer (β = 0.694, SE = 0.306) and forested-area cover (β = 0.596, SE = 0.458) had a positive effect. We documented that the wolf recolonization process is characterized by a Markovian change in occupancy and the sites are not in an equilibrium state, typical of an expanding process. Multi-season occupancy modelling allowed us to control for the issue of "pseudo-absence", modelling directly the detection probability. The wolf monitoring approach we designed could be applied on the long term and a large scale to provide the information needed to manage the species.

353. A NEW EDUCATIONAL TARGET IN CONSERVATION: PEOPLE FROM WHOM YOU WOULD NOT BUY A USED CAR

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Conservation Biology is a crisis science, merging biological with social and economic disciplines to achieve the overarching aim of preserving Earth's biodiversity. Conservation problems do not primarily derive from the ignorance of poorly educated people but rather from well educated and often wealthy people focussing on short term gain. The truth of this proposition was dramatically shown in late 2008, when the world financial crisis abruptly caused a number of European governments to step back from their committments regarding climate change. An old slogan suddenly came to our minds: "Would you buy a used car from these men?" The answer is not that simple. Conservation of biodiversity is more than ever an issue of ethics than science alone. We not only have to serve those in need of a general education and aspiring conservation professionals; we also have to expand our educational activity to reach people well beyond the normal sphere of influence of conservation biology. There is a clear need to develop strategies for gaining wider influence with the present and future economists, technocrats and politicians. This is a challenge to be mastered if we do not want to educate just those who do not need our education.

354. REINTRODUCTION OF THE EUROPEAN GROUND SQUIRREL (*SPERMOPHILUS CITELLUS*) IN CENTRAL EUROPE – A REVIEW

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This review describes twelve attempts to conserve the threatened European ground squirrel in Central Europe (Czech Republic, Poland and Slovakia) by reintroduction during the period 1993 to 2008. Within these 12 projects more than 3,000 ground squirrels were released on 19 sites. Most of the reintroductions ended in failure. Only in six cases were the new populations established (at least temporarily) and natural reproduction of released individuals was able to be observed. The reintroductions were generally poorly documented - wildlife managers sometime even neglected to mention the exact number and sex ratio of released individuals. The most frequent failure is an absence of data about the future development of the reintroduced population. The success of the reintroduction of ground squirrels appears to depend critically on the number of reintroduced individuals, the method of release and the management of vegetation cover. A higher number of released individuals and the release of the ground squirrels into artificial burrows and provisional enclosures support the success rate of reintroduction. However, the long term success of reintroduction can't be ensured without subsequent regular management of vegetation cover at the release site. The study was supported by the grant no. VaV/620/1/03.

355. SPATIAL ASSESSMENT OF WHITE-TAILED SEA EAGLE COLLISION RISK AT THE SMOLA ON-SHORE WIND FARM

May, Roel, NINA, Norway; **Nygård, Torgeir**, NINA, Norway

Energy from renewable sources has become increasingly important as part of energy policies in Europe. Energy and environmental management authorities, and the energy industry, have stressed the need for additional knowledge about environmental impacts of wind turbines. Impacts may be due to direct mortality caused by wind turbines, but also due to habitat loss and displacement. During the last three years, 21 white-tailed sea eagles have collided with wind turbines in the Smøla on-shore wind farm in central Norway. In this study we investigated habitat requirements and possible displacement effects in white-tailed sea eagles. We constructed a statistical collision model using Brownian bridge methodology for estimating collision risk rates. The study was based on GPS telemetry data from 27 sub-adult sea eagles equipped with backpack transmitters. Habitat utilization was investigated employing individual spatio-temporal kernel utilization distributions and resource utilization functions. Sea eagles had clear habitat preferences and showed an avoidance of the wind farm area. Also, there were clear seasonal patterns in collision rates. The proximity to wind turbines apparently mediated eagle movements and consequent resource selection. Our results show the importance to consider the complex interactions between landscape patterns and resource selection to assess impacts of wind energy structures.

356. PHENOLOGICAL CHANGES AND VARIATION IN NESTING TRENDS AND REPRODUCTIVE ABUNDANCE OF SEA TURTLES AS CLIMATE CHANGE RESPONSES

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Climate change is affecting species phenology and population dynamics. Although there is substantial evidence that sifts in marine turtle breeding phenology are linked to variations in sea temperature at the breeding areas, there is limited documented evidence that phenological changes are related to sea temperature at the foraging areas in a similar way. Here, we analyze how variations of sea surface temperature(SST) at both feeding grounds and the breeding area are related with nesting trends, reproductive output and breeding phenology of Mediterranean loggerhead marine turtles (*Caretta caretta*). We use nesting data on loggerheads collected at Zakynthos Island, Greece during a 20 year period. Our results clearly show that warmer foraging grounds SST trigger an earlier onset of nesting, indicating that climate conditions at foraging areas may act as an environmental cue to initiate the migration of loggerheads towards their breeding grounds. SSTs at foraging ground affected the number of nests laid during the next nesting year, with higher SSTs leading to fewer nests. Increasing spring SSTs at the breeding areas further resulted in a decrease in clutch size and an increase in hatching success. The results clearly demonstrate that climate change affected the reproductive phenology and output of marine turtles.

357. CHANCE PUTS CURRENT SCIENTIFIC RESEARCH DATA INTO THE HANDS OF TEACHERS AND STUDENTS

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The CHANCE program (Connecting Humans and Nature through Conservation Experiences) is a coordinated effort and partnership between The Pennsylvania State University (PSU) and the Pennsylvania Department of Education (PDE) that addresses the need to train Pennsylvania 9^{th} – 12^{th} grade teachers in environmental science, ecology and conservation practices on an international level, and to develop teaching strategies that capture the true nature of scientific research (www.chance.psu.edu). This professional development program was designed to transform the eye-opening field-based research experiences of high school teachers in Costa Rica into multimedia learning materials for their students. Bolstered by funding, secured from PSU, the PDE, and from private donations, CHANCE has filled a void in the standards-driven and textbook-based environment of American public science education. As unique learning modalities, the CHANCE “research modules” offer authentic peer-reviewed research data from laboratories around the world that relate to real-world environmental issues like global warming, invasive species, and species extinction. Assessment data from Pennsylvania high schools, analyzing the actual degree to which the CHANCE “research modules” exceed student learning beyond text-based instruction, as well as the modules’ ability to enhance instruction in and knowledge of conservation practices and stewardship, will also be presented.

358. GENETIC CONSEQUENCES OF POPULATION FRAGMENTATION IN THE HABITAT-SENSITIVE ENDANGERED DUPONT’S LARK (*CHERSOPHILUS DUPONTI*)

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Man-induced demographic changes can result in negative genetic consequences in wild populations that might compromise their long-term survival. Habitat fragmentation may lead to the loss of genetic diversity and the accumulation of inbreeding in populations due to increased drift and reduced gene flow. We analyzed the effects of the historical and contemporary population fragmentation on genetic variability and structure in the endangered Dupont´s lark. This bird is restricted to Mediterranean natural steppes, one of the most fragmented and threatened European habitats, and shows limited dispersal abilities. Our aim was to gain insight on the genetic consequences of this fragmentation at three spatial scales: local (Ebro Valley), regional (Iberia), and the species distribution range. We developed D-loop and cytocrome b mitochondrial markers and 14 species-specific nuclear microsatellites. Populations from Morocco showed the highest haplotype and nucleotide diversity. Molecular variance analyses showed that 82% of the genetic differentiation among populations can be attributed to the geographic barrier between North-Africa and the Iberian Peninsula. Phylogenetic analyses also support this differentiation. However, distance among patches and population isolation also contributed to genetic differentiation within Iberia. We expect dramatic increases in genetic drift if current loss and fragmentation of steppes are not urgently reversed.

359. CONSERVING THE DIVERSITY OF WIDER-COUNTRYSIDE MOTHS: THE NEED FOR AGRI-ENVIRONMENT SCHEMES TARGETED AT A LANDSCAPE-SCALE

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Moths are a species-rich group and play significant roles in terrestrial ecosystems. Widespread declines have been recorded in Britain, even for the majority of common species. Agri-environment schemes (AES) are policy instruments intended to combat such declines across agricultural landscapes, but their efficiency is being questioned. We carried out a large-scale light-trapping experiment in four lowland agricultural landscapes, two of which were targeted to achieve higher overall AES-uptake. Effects of wide field margins and hedgerow trees on moth abundance and moth species diversity were tested. At a farm-scale, we looked at the effects of the same landscape features on a set of grassland species, using a mark-release-recapture experiment. It was only in those areas where we experimentally increased the AES-uptake that the hedgerow trees substantially increased moth abundance and diversity. Overall, wide field margins increased moth abundance, but at the farm-scale the effect was correlated with species-specific mobility, such that both experiments support landscape-scale targeting as a tool to increase the biodiversity reward of AES. We urge governments to improve AES in order to halt and reverse the biodiversity decline in agricultural landscapes.

360. THE COST-EFFECTIVENESS OF MANAGING NATURA 2000 SITES: AN EXPLORATORY STUDY FOR FINLAND, GERMANY, THE NETHERLANDS AND POLAND

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The management of Natura 2000 sites is of high importance as Natura 2000 sites shall assure the long-term survival of Europe's most valuable and threatened species and habitats. Next to goal attainment cost-effectiveness is increasingly recognised as a key requirement to gain social and political acceptance for costly conservation measures. We identify and qualitatively examine cost-effectiveness issues related to the design and implementation of management measures in Natura 2000 sites in Finland, Germany, the Netherlands and Poland. Given the large variety of management design and implementation options within the four countries our study is of an exploratory nature only. We derive recommendations for improving the cost-effectiveness of management in Natura 2000 sites and for future research. Examples of policy recommendations are to guarantee the availability of funds for longer periods, and to ensure the appropriate allocation of funds between the different tasks of designing and implementing management plans. Further research should examine the cost-effectiveness of controversial suggestions such as e.g. more tailored payment schemes for conservation measures which lead to higher ecological outputs but are costly to administer. Moreover, research is needed to better understand how rules for administrations as well as rules and governance structures for tasks within administrations should be designed.

361. SURVIVAL ESTIMATES OF THE REINTRODUCED OF EUROPEAN BLACK VULTURE (*AEGYPIUS MONACHUS*) IN FRANCE: A COMPARISON OF RELEASE METHODS

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The black vulture (*Aegypius monachus*) is among the largest scavenger European raptors and remained highly threatened across its distribution range. The species disappeared from France over the last century, and a reintroduction program has been conducted from 1992 to 2004. A total of 53 individuals have been released following two methods: the hacking method (fledglings released in dummy nests) and the aviary method (immature released after several months in aviary). We compared individual post-release fates such as potential costs on vital rates and effects of different release methods in order to improve reintroduction management. We estimated survival rates of the reintroduced black vulture in France through multi-state capture-recapture analysis, taking both resighting and recovery data as well as tag loss into account. We found very high adult annual survival rates (>0.98) and reduced survival for younger ages. Interestingly, immatures released through the aviary method exhibited first year post-release survival similar to wild born juveniles. These findings seem to confirm previous conclusions. Indeed a decreased survival the first year following the release has been highlighted for a relative species, the Griffon vulture (*Gyps fulvus*). Reintroduction biology needs such iterative and repeatable output measurements to validate specific hypothesis and future management recommendations.

362. COST-EFFICIENT MANAGEMENT OF BOREAL FORESTS FROM BIODIVERSITY PERSPECTIVE

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Funding for nature conservation tends to be limited, and thus it is of utmost importance to recognize the most efficient ways to use the limited resources. We aimed at revealing how to maximize biodiversity benefits in simulated managed boreal forest landscapes. We used dynamic landscape approach and compared four alternative scenarios with the current management scenario. The alternatives included investing the given amount of funding in 1) permanent large (tens of ha) reserves, 2) permanent small (few ha) reserves, 3) temporary (10 yr contracts) small reserves, and 4) green tree retention (very small patches retained on clear-cuts). We assessed short-term biodiversity benefits in terms

of landscape composition, availability of dead-wood rich forests, and using habitat suitability data base for threatened dead-wood associated species, the overall quality of the landscape from species perspective. In most cases the permanent large reserve scenario outperformed other scenarios suggesting that traditional approach of large reserves is the most cost-efficient. The results, however, varied somewhat among the species. Species that inhabit forest edges and reside on small diameter dead-wood seem to cope equally well in all scenarios implicating that these species can persist in managed landscape without additional conservation efforts.

363. HOW ARE SPECIES AND SITE GROUPS ASSOCIATED? IMPROVING INDICATOR SPECIES ANALYSES

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Associations between species and groups of sites provide information about species distribution patterns and their ecological requirements. Species with narrow ecological niches are particularly important because they are used as ecological indicators. These indicator species are usually identified using association indices which are computed for each single group of sites. However, species might be related to environmental conditions prevailing in two or more site groups rather than to a single one. In such cases, current methods may fail to reveal the real association, with the risk of misinterpretation of the species ecological requirements. We present a method that improves the analysis by considering all possible combinations of site groups and to select the combination that is mostly associated with the species pattern. The results show that: 1) Statistically, considering site group combinations is more powerful than performing multiple tests on single site-groups and avoids multiple testing problems. 2) From an applied perspective, the proposed combinatorial approach represents a promising tool for understanding the ecology of a species, particularly those of conservation concern, in addition to validating management procedures and monitoring the effect of environmental changes using indicator species.

364. INDEPENDENT EFFECTS OF HABITAT LOSS AND HABITAT FRAGMENTATION ON THREE SPECIES OF ARBOREAL MAMMALS: IMPLICATIONS FOR CONSERVATION STRATEGIES

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Habitat loss and habitat fragmentation are the most serious extinction threats to the world's mammals. Most studies don't disentangle the different processes included in the term "habitat fragmentation" such as habitat loss or habitat subdivision. This has crucial consequences since habitat loss implies habitat restoration as a conservation strategy, whilst fragmentation requires connectivity implementation as a conservation strategy. We carried out a landscape-scale study in central Italy choosing three arboreal species as models: the hazel dormouse, the red squirrel and the fat dormouse. We selected twenty-eight 4 km^2 squares, with a gradient in forest cover (ranging from 1% to 30-40%) with contrasting aggregation/dispersion of patches. With this study design, the correlation between habitat loss and fragmentation was eliminated. Presence/absence data were collected by using nest-boxes and hair-tubes. We analysed data using occupancy models to account for uncertainty in detection probability. Our results allowed us to quantify the relative contribution of habitat loss and fragmentation, with the first being more important in determining distribution patterns (variable weight w= 0.8). Fragmentation per se was less important but still included in top models (AICc<2), most importantly its effect was mitigated by an increase in connectivity. The important implications for conservation strategies will be discussed.

365. INTRODUCING NATURA 2000 NETWORK IN AN ACCESSION STATE – ISSUES, DIFFICULTIES AND APPROACHES IN THE IMPLEMENTATION PROCESS

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Natura 2000 networks were developed in central and western Europe, but have recently been implemented in several EU member states further east in the continent. The implementation process is legally mandated in the EU Birds and Habitats Directives. It depends both on comprehensive knowledge of the species, habitats and sites within a country and the capacity to document and assess this information in a European and national context. Crucially, however, the process requires a range of expertise, strong institutional structures and the engagement of key stakeholder groups to ensure that the national Natura 2000 network is a collaborative effort where both human beings and nature are valued and taken into account. All EU states have found the process complex and politically sensitive. Implementation in Romania began shortly before accession and the main effort was focussed within just 2 years. This short schedule coupled to the extraordinary richness of Romanian biodiversity and the recent rapid change in political and institutional structures meant that the process was particularly challenging. This paper draws on the authors' experience in Romania to describe the process, comment on the issues that arose and show how real progress toward the goals of Natura 2000 was achieved.

366. PASSIVE MANAGEMENT AND NATURAL DYNAMICS ALLOW RECOVERY OF SAPROXYLIC BEETLES IN A FORMER COMMERCIAL FOREST

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After intensive silviculture in Europe, most of saproxylic species are now threatened or extinct. We investigated the effect of a rapid increase in dead wood, by natural forest dynamics, on saproxylic beetles within a national park in Germany. Based on standardized data from 125 sampling plots, we analyzed the responses of assemblages, species richness, and functional substratum guilds to an increase in dead wood. We found no difference between assemblages in the core and management zones, but found a significant relationship between assemblages and habitat attributes of dynamic natural forests, especially dead wood abundance and canopy openness. The number of all saproxylic beetle species, critically threatened species, and Urwald relict species increased with increasing dead wood in a nonlinear fashion, with a strong increase from zero to 100 m^3/ha. A similar pattern of increase was found for dead wood diversity. For four rare species we found a striking increase in

population density along the dead wood gradient. Our results highlight the ability of passive forest management, where natural dynamics are permitted to operate within large areas protected from salvage logging, to restore the heterogeneity of dead wood and associated fauna typical of primeval forests.

367. PRIORITIES OF CONSERVATION IN VASCULAR PLANTS

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Number of endangered species in national floras is usually high and not all species can get the same level of protection. We thus need to develop criteria to select species that should get priority. We aim to identify traits responsible for species rarity in flora of the Czech Republic, identify traits of species that are declining and species that were always rare and use this information to decide which species should get the priority. We study all the critically endangered vascular plant species (483 species in total) and collect data on biological traits, current and past distribution of the species, habitat requirements, total distribution and rarity in other European countries. The results show differences between rare and closely related common species in biological traits, habitats occupied as well as distribution ranges. They also show that species that are really declining possess different set of characteristics than species that were always rare. They further show that many species categorized as critically endangered in the Czech Republic are common in neighboring countries. All this suggests that species categorized as critically endangered in Czech flora are a heterogeneous group and suggest which of these should get conservation priority.

368. LIMITED IMPACT OF INVASIVE SPECIES ON URBAN PLANT DIVERSITY

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Invasive species are thought to have negative impacts on the natural or semi-natural ecosystems they invade, but little is known of urban areas, which support numerous invasive species. Here, we study the impact of eleven widespread plant species on plant community composition in 98 wastelands, a typical urban habitat. We compared the mean species richness, rarity and indigeneity in uninvaded vs. invaded sites. The results suggest a limited impact of the invasive species we studied. Species richness was not impacted by the presence of invasive species. More surprisingly, the rarity index was significantly higher in sites invaded by *Reynoutria japonica* than in uninvaded sites. However this species is also associated with a decreased number of native species. Inversely, the proportion of native species was higher in sites invaded by *Artemisia verlotiorum*. Finally the floristic compositions differ significantly between sites uninvaded and invaded by one, two, three or more invasive species. These results point out that in urban environments with high level of disturbance and turnover, invasive species should have a relatively limited impact in comparison to other anthropogenic pressures.

369. HOW IMPORTANT ARE CLIMATIC CHANGES FOR WATER WINTERING BIRDS IN THE CENTRAL EUROPE

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The presentation will be based on analysis of mid-winter (IWC) population trend (computed by TRIM software) on 849 wetland sites and its relation to Czech (mean month temperature) and European (NAO Index) climatic condition. Trends in numbers were analysed in 37 most abundant water bird species wintering in Czechia in 1966 – 2008. Increase in wintering numbers was recorded in 18 species (49 %) and significant decrease was recorded in 7 species (19 %). Wintering population trend followed the Western Palearctic trend. The increasing population trend prevailed among fish-eating birds, geese and ducks. Climatic variation affected wintering population trends only in 5 species (local temperature in Czechia) and in 3 species (NAO Index). Positively correlated species increased in numbers in mild winters (i.e. Great Crested Grebe, Bean Goose, Green Sandpiper, Common Gull). On the other hand, negatively correlated species increased in numbers in severe winters (i.e. Goldeneye, Goosander, Dipper). Furthermore, we analysed long-term changes in Adult Sex Ration. We found that proportion of females increased in colder winter in northern species i.e. Goldeneye and Goosander and on the contrary deareased in southern species (e.g. Gadwall). The long-term pattern in urbanisation of particular species will be included in presentation.

370. FEEDING ECOLOGY OF WHITE-TAILED SEA EAGLES (*HALIAEETUS ALBICILLA*) IN NORTHERN GERMANY

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Lead intoxication is the most important cause of death for white-tailed sea eagles in Germany. The primary reason for intoxication is assumed to be lead fragments ingested while feeding on game wounded or killed by lead based bullets. To address this context, this study investigates the link between feeding ecology of the eagle and lead poisoning. During a two-year field period, data were collected from a study site in the lake district of Mecklenburg-Western Pomerania that was inhabited by six sea eagle pairs. We conducted field observations within the hunting ranges used by eagles and collected prey remains and pellets regurgitated by eagles. The food availability was investigated by monitoring prey populations. Our results showed that sea eagles preyed on fish, waterfowl, and mammals. The amount of different food types varied between seasons and mammals represented a remarkable proportion of the sea eagles‘ diet in winter. Consumed mammals were predominantly hoofed game with a higher body mass than sea eagles, what suggests that they were ingested as carrion. The food availability was correlated with seasonal changes in the diet. These findings suggest that carrion interspersed with lead fragments from lead based bullets constitutes a threat for sea eagles in winter.

371. ANALYSIS OF FRAGMENTATION BY ROADS IN THE IBERIAN PENINSULA

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Roads and agricultural activities are the main causes of habitat fragmentation. Roads have several ecological effects: main impacts extend to 100 m from road; dispersion corridors, traffic noise, and physical and chemical alterations extend outwards >1 km. The objectives were to quantify the total area affected by roads and the number of roadless fragments in the Iberian Peninsula, at three impact extensions. Three buffers of 100, 300 and 1000 m were calculated around roads. Areas impacted by roads and number of roadless fragments per 10 km squares were calculated for Portugal. A fragmentation index was calculated by dividing fragment total area by square area. Portugal had the 10, 30 and 70% of its total area impacted by roads, respectively for the three buffers. With buffers of 100 and 300 m, there were no squares without roadless fragments whereas with buffers of 1000 m, there were 10 squares lacking fragments. The areas more impacted by roads corresponded to the most populated zones. In buffers of 1000 m, the number of roads was so large that all the square area was impacted by those roads.

372. CONSERVATION OF CAVE-DWELLING BAT SPECIES: RESEMBLANCE AND DIFFERENCES THROUGH THE EXPERIENCE OF A LIFE-NATURE PROJECT IN NATURA 2000 SITES

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Cave-dwelling bats have been declining in most of the western Palaearctic since the late fifties. This decline has numerous causes which refer to the different phases of their life cycle. In underground roosts, where they often form mixed colonies, bats are usually very sensitive to physical factors (temperature, humidity, air flow, etc.) and human disturbance. Moving from hibernacula to maternity colonies, sometimes through transient sites, they often occupy a network of roosts within each season. Then, suitable underground roosts must be legally and often physically protected over large areas. Physical protection will adapt to the design of the entrance and the behaviour of bats. Foraging areas and commuting routes are also essential. Radiotracking studies on three species in southern France revealed huge differences in range size and habitat use. *Rhinolophus euryale* forage within 15 km around the roost along woodlands and pastures planted with trees. *Miniopterus schreibersii* forage up to 40 km from the roost along tree lines, in orchards and around street lamps. *Myotis capaccinii* forage up to 30 km from the roost along calm rivers and over water bodies. Analyses of diet were additionally used to publish differential guidelines for land managers and stakeholders beyond Natura 2000 sites.

373. CONSERVATION MEETS BELLMAN'S CURSE: A NEW APPROACH TO SOLVING HIGHLY COMPLEX METAPOPULATION MANAGEMENT PROBLEMS

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Stochastic dynamic programming (SDP) allows researchers to calculate the optimal strategy to manage a metapopulation. However SDP is plagued by Bellman's curse of dimensionality, which is the problem that adding new state variables inevitably results in very large increases in the size of the state space. Consequently, SDP models are frequently highly simplified and unable to capture complex dynamics. We present an application of an on-line sparse sampling algorithm which can be used to approximate the optimal solution for a given starting state. The algorithm is particularly attractive for problems with large state spaces as it has a running time that is independent of the size of the state space of the problem. We apply the algorithm to a fish metapopulation in Queensland, Australia, which is threatened by water extraction and sedimentation. We show that the approximation performs well against the optimal SDP solution and find that managers should prevent water loss when water is scarce, and only improve the patches when the probability of population extinction is small. This is the first time that on-line look-ahead approaches have been applied in conservation and will allow us to model much more complex metapopulation management problems in the future.

374. THE EFFECT OF TRADITIONAL EXTENSIVE GRAZING ON THE BIODIVERSITY IN PONOR MOUNTAINS, WESTERN BULGARIA

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The study aims to evaluate the role of traditional extensive grassland management for conservation of biodiversity in the uplands of Bulgaria. We tested the effects of traditional extensive grazing on plants, birds and mammals by comparing the community and population parameters of the model groups of organisms between moderately exploited and abandoned pastures. Data were collected from 194 study plots during the breeding season of 2008. A total of 139 phytosociological relevés comprising 280 plant taxa were collected, 1359 birds from 31 species were recorded and 359 holes of European souslik were located. Vegetation structure differed among the studied habitat types and this affected grassland bird assemblages. The latter were sensitive to the intensity of grazing in respect of species richness and diversity (both with higher values in exploited pastures) but the overall abundance of birds did not change. The European souslik also showed preference to moderately exploited pastures, having lower abundance indices in abandoned pastures. Indicator species for the intensity of pastures' use were identified and may serve as tools for future monitoring. The results suggest that the traditional extensive management of grasslands in the uplands of Western Bulgaria has a positive effect on biodiversity and should be promoted.

375. WHAT'S HAPPENED WITH THE EUROPEAN BISON (*BISON BONASUS*) POPULATION AFTER BOTTLENECK? THE GENETIC STRUCTURE OF SEX LINKED LOCI

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The contemporary population of the European bison (Wisent) is extremely valuable for European fauna biodiversity. After completely extermination of free- living animals (year 1919) the captive population started with only 54 individuals increased up to 140 in year 1942 and was strongly reduced again after II WW. The size of population is over 3500 individuals until now, derived from only 12 founders and divided into two genetically different group - Lowland and Lowland-Caucasian. The goal of our study was to estimate changes during last 60 years within the range of sex linked loci. The material for analysis was 84 Wisent born in 1950-70 ("initial" population) and 200 animals born after year 2000 (contemporary population).

For every male and female four microsatellite loci located on the sex chromosome were amplified (INRA30; INRA126; INRA189 and TGLA325). In result we observed two different tendencies: first general loss of allelic diversity within lines especially those represented by small number of progeny, and the second - larger genetic distance between maternal lines within contemporary population. The detection of new alleles within the contemporary population was an unexpected result of our examinations. Are the new one alleles the reason of the wider distance?

376. A NEW METHOD FOR DELINEATING VEGETATION BOUNDARIES FOR DETECTING SHIFTS AND COMPARING SITES

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We studied the emergence of vegetation boundaries across environmental gradients, applying dynamic simulation models. Our goal was to find an unambiguous, broadly applicable definition for a boundary, which would allow a comparison between vegetation types, sites, and years, thus, could contribute to the theoretical foundation of biomonitoring climate change. Earlier results in the theory of critical phenomena suggested to focus on the transition zone from the connected (high-density), to the fragmented (low-density) state. We applied numerical simulations with various local rules of colonization and extinction. The emergent vegetation patches were characterized in terms of connectivity with different step lengths (i.e. dispersal or migration distance) across patches. At every step length and every gradient (slope), the edge of the connected patch was found to be fractal with dimension 7/4. The length and width of this "hull edge" scaled as powers of the gradient with exponents that could be directly predicted from percolation theory. These results were the same for different spatial models suggesting that there are universal laws in the geometry of ecotones. In conclusion, we propose to use the hull edge for delineating the boundary of a vegetation type unambiguously, and detecting boundary shifts due to climate change.

377. THE EFFECT OF STAND STRUCTURE ON DIFFERENT ORGANISM GROUPS IN MIXED DECIDUOUS-CONIFEROUS FORESTS IN HUNGARY

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The effect of tree species composition and stand structure on the diversity and species composition of different organism groups was studied in mixed deciduous-coniferous forests in West Hungary. The studied organism groups were nesting birds, bryophytes, forest herbs, seedlings and saplings, the potential explanatory variables were tree species composition and diversity, stand structure (size distribution of trees, amount of dead wood), relative light conditions, amount of substrates (litter, open soil, dead wood), and landscape scaled variables. Species composition was explored by direct ordination, species richness by multiple regression. The explained variance in the species composition of birds was lower than in other groups. Tree size was prominent in the composition and diversity of birds and bryophytes, and the effect of structural heterogeneity, shrub and ground-floor cover was also considerable. Tree diversity was important in all plant groups. Light determine the diversity and composition of herbs and seedlings. The presence of Norway spruce within deciduous dominated stands increased the diversity of birds and herbs. Although the used models did not explore direct dependences in all cases they could successfully predict the biological variables of the organism groups by easily measurable stand structural variables, which is useful in local management planning.

378. BIODIVERSITY ACTION PLANS IN A SOCIO-ECONOMIC CONTEXT: MANAGING BIODIVERSITY IN VINEYARDS AND MONTADO WOODLANDS IN HERDADE DO ESPORAO (PORTUGAL)

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Vineyards and Oak (and) Montado woodlands represent important areas in the South of Portugal (Alentejo region) and go side by side in the landscape. Also, provide significant socioeconomic sectors in the Portuguese economy. Most of the vineyards and Montados are either inside or near Natura 2000 sites and protected areas. The importance of Biodiversity conservation is therefore very high. Biodiversity Action Plans (BAP) provide guidance tools and practices that aim to maintain or improve the ecological baseline for a given area or landscape. The Herdade do Esporao, Located in the Alentejo, is a rural property with 450 hectares of vineyards and 1100 hectares of Montado woodlands. Esporão is a top producer and exporter of premium quality wine. A BAP for the whole area has been in place since November 2007. The primary results are, in the case of the vineyards, enhanced set aside areas, cover crops and water runoff mitigation. In the Montado areas, the first actions were stopping the national predator control program, halt soil tillage, map habitats and protected species, restore streamside corridors and reforestation of degraded woodland. The Herdade do Esporão is signatory of the 'Business and Biodiversity' and 'Countdown 2010' initiatives.

379. IMPACTS OF CLIMATE CHANGE ON HABITAT ASSOCIATIONS OF BUTTERFLIES

Oliver, Tom, Centre for Ecology and Hydrology, United Kingdom; **Tom, Brereton**, Butterfly Conservation, United Kingdom; **Jane, Hill**, University of York, United Kingdom; **Chris, Thomas**, University of York, United Kingdom; **David, Roy**, Centre for Ecology and Hydrology, United Kingdom

Understanding climate-driven changes in species' habitat associations is important for dynamic conservation management and for making accurate predictions of species' ranges. Many species are thought to have more restricted niches towards their range boundaries, yet changes in species' habitat associations across space have rarely been quantified. Nonetheless, these effects are important in the context of understanding species' responses to climate warming where changes in niche breadth, and thus in the availability of breeding habitat, are important for making reliable predictions of species' current and future ranges. Based on an analysis of 117 British butterfly transects, I discuss how there is overall trend for southerly-distributed butterflies to be more constrained to their favoured habitats in cooler locations, in northern Britain. I discuss the implications of these results for dynamic conservation management and species distribution modelling.

380. RESTORATION FIRE AND WOOD-INHABITING FUNGI IN A SWEDISH *PINUS SYLVESTRIS* FOREST

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The growing awareness of the negative consequences of the long and efficient fire prevention has resulted in an increasing use of restoration fires in boreal Fennoscandia. The primary purpose is to recreate features of natural forests that have been lost during long periods of fire suppression. We used the occurrence of fruiting bodies from wood-inhabiting fungi to assess the conservation value of and gain ecological information about restoration fire in a Pinus sylvestris dominated forest. The general pattern for the majority of the species was a drastic decline the first two years after the restoration fire. However, our results clearly demonstrate that most of the species declining the first years increased four years after the fire and were frequently found on charred wood. Species that showed a positive response to the restoration fire and often recorded on charred logs were: Antrodia sinosa, Botryobasidium obtusisporum, Galzinia incrustans, Phlebia subserialis and Tomentella spp. In addition three threatened, red-listed and fire-favored species were also found on heavily charred logs: Antrodia primaeva, Dichomitus squalens and Gloeophyllum carbonarium. The present results show that fire disturbance per se provides a new type of dead wood, important for the variation and species richness of associated fungi.

381. VEGETATION CHANGE IN THE ENOT ZUKIM NATURE RESERVE

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Enot Zukim, an oasis on the shore of the Dead Sea, was originally prized for its diversity of herbaceous cover and meadow like landscapes. It has been monitored for about 20 years during changes induced by removal of Bedouin grazing, accumulation of combustible biomass, subsequent wildfires, decline in water quality and quantity, invasion by *Phragmites australis*, reintroduction of grazing by donkeys to reduce the *P. australis*, and expansion of *Tamarix* sp. species coverage. Monitored permanent plots failed to document the reduction in *P. australis* but did show the change in composition and decline of species diversity with *Tamarix* sp. species expansion. Management and restoration of the oasis vegetation is made difficult; when one pest species is removed, another expands.

382. BIOLOGICAL INVASIONS BY NON-INDIGENOUS FRESHWATER FISHES IN SARDINIA: HISTORY, CURRENT STATUS AND FUTURE PERSPECTIVES

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The history of non-indigenous fish introductions in Sardinia over a period of 110 years has been reconstructed on the basis of information acquired from published literature sources, reports and manuscripts. The latest data on the distribution and occurrence of freshwater species has been extracted from fisheries surveys undertaken between 1996 and 2008 at 150 sampling sites throughout Sardinia. The island's freshwater fish fauna consists of twenty species. Four of these are indigenous, two species are migratory fish, and the remaining fourteen have been successfully introduced. First introductions took place at the end of the 19th century, with a significant exponential increase during the last four decades. The non-indigenous fish species that, following introduction, have established self-sustaining populations in the wild belong to the families of *Cyprinidae*, *Centrarchidae*, *Salmonidae*, *Cobitidae*,*Ictaluridae*, *Percidae*, and *Poeciliidae*. Their origin is North American, Eastern European or Asian. Direct and indirect anthropic pressures have played and still play an important role in facilitating the spread and dominance of harmful invaders. This suggests that comprehensive policies, tools, and procedures are needed to support assessment of risk associated with invasive species introductions and to strike a balance between legitimate socioeconomic activities and adequate safeguards for the freshwater environment.

383. LOSS OF SOCIOECOLOGICAL HERITAGE IN MEDITERRANEAN LANDSCAPES. THE CASE OF THE MUNICIPALITY OF OLZINELLES (CATALONIA, NE SPAIN)

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We define the concept of socioecological heritage and use it in a local context to understand how to deal with wider processes of global environmental change. For socioecological heritage we refer to the distinctive set of accumulative patterns of socioecological interactions which yield a particular configuration in both cultural and biological diversities. Our research examines the processes of loss of socioecological heritage in one of the most critically threatened landscapes of the World –the Mediterranean. By focusing in the local context of the municipality of Olzinelles, we analyse a large array of documents, GIS data, and oral sources to reconstruct the unique environmental history of this location. Our findings show how the abandonment of the diverse agrosilvopastoral practices present in Olzinelles had very negative consequences on its biodiversity, as well as other negative effects such as an increase in fire hazard. We argue that the maintenance or even the reconstruction of such more conservation-prone practices is dependent upon a set of cultural beliefs-some of them even of animist character- which current dominant scientific and assessment practices lack, thus making it necessary the integration of science and policy with other sources of knowledge, including artistic languages or alternative nature-society cosmologies.

384. FUZZY LOGIC APPLICATIONS IN ESTIMATION OF THE PRODUCTIVITIES OF FOREST TREES FOR FORESTLESS LANDS

Ozkan, Kursad, Suleyman Demirel University, Faculty of Forestry, Turkey

This study was carried out for comparison of fuzzy logic applications with multiple regression analysis intended for estimation of site index of black pine in the Dedegul mountainous district from Mediterranean region, Turkey. In the study, firstly simple regression analysis was applied between site index of black pine and environmental factors. It was found that slope position, altitude and soil depth are significantly related to site index of black pine. Secondly, multiple regression analysis was performed (site index of black pine versus the predictors (slope position, altitude and soil depth)). Regression coefficient of the model was relatively high at 72.6%. Lastly, the memberships and the rules were determined for estimation of site index of black pine using Mamdani fuzzy logic methods according the relationships between site index and significant environmental factors. Proportion of variance explained by model (regression coefficient) was 85.79 % according to actual values of site index and predicted values of fuzzy logic applications. It is

clear that in comparison with multiple regression analysis, Fuzzy logic applications are much more successful in estimation of site index of tree species.

385. MULTI-SCALE CONSERVATION PLANNING FOR THREATENED LICHENS ON GIANT OAKS

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Habitat loss affects species diversity negatively, but few studies explicitly explore the effect of landscapes of varying sizes for the occurrence of threatened species, and even fewer studies interpret the results in the light of practical conservation. We related the occurrence of threatened epiphytic lichens on 50 giant oaks to the density of giant oaks in the surrounding landscape at varying distances (0-0.5 km, 0.5-2 km and 2-7 km) from the surveyed oaks by using multiple logistic regression analyses. Further, we compared the current median densities of giant oaks in the circular study landscapes with the predicted extinction thresholds of habitat for each species, at spatial scales most relevant for each species. The current median density of giant oaks was far below the extinction thresholds of three lichen species, and above the extinction threshold of a fourth species. Our results show that directed conservation actions towards landscapes of appropriate minimum size (13 km^2) and with appropriate minimum density of substrate (8 giant oaks with minimum diameters of 150 or 160 cm) could enhance the efficiency of conservation actions.

386. PUBLIC ATTITUDES TO THE MANAGEMENT OF INVASIVE NON-NATIVE SPECIES

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Invasive non-native species are one of the main threats to biodiversity. Consequently there is a need to control or eradicate species that are causing problems in order to mitigate their impact. Such management programmes can be controversial and in some cases have been delayed or halted because of opposition from pressure groups. Public support can be critical to management success, and understanding the underlying attitudes of the public can help inform outreach education activities. To assess attitudes towards invasive species management and investigate socio-demographic factors influencing such attitudes, a questionnaire survey of 600 randomly selected members of the public in Scotland was conducted, and a total of 248 completed questionnaires returned. The level of support for control and eradication programmes was, in general, high and was higher amongst men, older people, and people who had previously heard of control and eradication projects. The species to be managed influenced levels of support, and projects to control birds were the least supported. Respondents with prior knowledge of control and eradication programmes and members of conservation organisations, in general, showed higher levels of support, indicating the important role that awareness and education has in terms of increasing public support for invasive non-native species management projects.

387. RESOURCE-BASED CLASSIFICATION OF HABITATS OF CENTRAL EUROPEAN MACRO-MOTHS

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Studies of animal habitat requirements risk a bias arising because we study the animals in human-altered landscapes. It follows that predictive classifications of animal requirements should rely on resources that individual species utilise during their lifetime. Shreeve et al. (J. Insect Conserv. 5, 145-161, 2001) illustrated this for British butterflies. Test this approach for another insect group, we gathered resource use data for 164 species of Central European moths. We used multivariate analysis of 179 binomically coded resource use attributes, and compared resulting classification with external data. The moths formed five distinct groups: species associated with dense arboreal vegetation; species associated with sparse woody vegetation; species of non-wooded habitats; a group of highly mobile hawk moths; and lichen-feeding arctiids. First tree groups sustained control for taxonomic position, whereas last two did not. High number of sparse woodland species (which contains many endangered species) in Central European fauna, suggest that open canopy forests (forest-steppes, savannahs) would had been widely represented under hypothetical “pristine” conditions in C. Europe. It also points to a crucial role of restoring such habitats as coppiced or grazed woodlands for the representation of European biodiversity. Funded by Czech Ministry of Education (LC-06073, 6007665801).

388. WHY DO OUR CONSERVATION EFFORTS FAIL? RETHINKING CONSERVATION APPROACHES IN HUMAN ENVIRONMENTS

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Conservation policy attempts to counteract habitat loss and fragmentation and to maintain sufficient landscape heterogeneity. Yet, in the face of growing homogeneity of most human environments, it is striking that conservation policy overlooks a variety of situations where homogeneity occurs. Two forms of homogeneity that are scantly addressed are synchronization and landscape fixation. Synchronization refers to events that occur at the same time everywhere – such as farmers across entire countries mowing their fields during the same period. Landscape fixation refers to landscapes that may be spatially heterogeneous, but do not change over time. These two forms of homogeneity emerge due to a globalized economy but are also enhanced by simplistic policies and traditional planning approaches. Drawing on evidence from studies on butterflies, we show that failure to recognize these two forms of homogenization limits the efficacy of conservation policy, and may even culminate in counter-productive strategies when attempting to implement conservation in the private sector. We discuss the need to include socio-economic drivers of homogeneity in conservation planning, to target dynamics explicitly, and to enhance the implementation of dynamic approaches.

389. MONITORING BUTTERFLY ABUNDANCE

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Accurately monitoring the abundance of animal populations is of fundamental importance in ecology and conservation. Most butterfly monitoring protocols rely on transect counts, from which species abundance indices and population trends are derived. Because individual detectability may vary in space (sites) and time (years), it remains unclear how such counts truly reflect population sizes and trends. Using three different monitoring methods (transect counts, capture-recapture, and

distance sampling) on two ecologically contrasted species (*Maculinea nausithous* and *Minois dryas*), we demonstrate that detectability is highly variable, thus limiting the interpretability of count-based indices of population abundance. We further demonstrate that the accuracy of count-based methods heavily depends on the ecology and behaviour of the target species, as well as on the type of habitat that is being surveyed. We conclude that monitoring programs designed to assess the abundance of butterfly populations should incorporate a measure of detectability. We discuss the relative advantages and inconveniences of all three monitoring methods in respect to the characteristics of the species being under scrutiny and resources availability.

390. AVIAN DYNAMICS AND CONSERVATION IN MEDITERRANEAN LANDSCAPES AFFECTED BY WILDFIRES

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Despite the major role of fire in landscape dynamics, little is known on its large-scale effects on biodiversity. We conducted a long term research in Catalonia, a Mediterranean-climate region heavily affected by wildfires, and used birds as the focal group. We gathered information on burned and unburned areas of different bird census databases (capture-recapture, point counts, line transects and the Catalan breeding bird atlas). Over twenty open-habitat bird species occurred in recently burned areas, being mostly species of European conservation concern. The colonization of nine of these species was mainly a local process, limited by dispersal constraints. The ortolan bunting, in particular, a declining species in Europe, has increased its breeding range in Catalonia probably due to its colonization of large burned areas. Local survival of forest and shrubland species decreased after the disturbance and possibly depended on fire severity. Finally, the bird conservation value of burned areas depended on postfire management and time since fire. Further studies using a multiscale approach should increase our understanding of animal population dynamics in relation to wildfires in order to assess the conservation impacts of fire.

391. FARMLAND ABANDONMENT IN EUROPE: AN OPPORTUNITY FOR RE-WILDERING LANDSCAPES?

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Marginal farmland is being abandoned at high rates across Europe, particularly in mountain areas. There has been a heated debate on the implications for biodiversity conservation. Some argue that the disappearance of these systems will lead to the loss of biodiversity. Others defend that ecological succession will create a new set of habitats, which most species will be able to occupy. We argue that existing evidence supports the ecological succession hypothesis. Farmland abandonment opens the opportunity for re-wildering landscapes. This could support the goals of the Wild Europe initiative, from organizations such as PAN Parks and IUCN, which aim at dedicating 1% of Europe's surface to wilderness. We propose that re-wildering should be considered as possible goal for restoration ecology projects and for land-use planning in Europe, side by side with alternative goals such as active management to conserve the cultural landscape, and active management for provisioning ecosystem services. Re-wildering may imply management of the ecological succession towards the establishment of climax habitats or other self-sustaining habitats. We show that in some instances the re-wildering goal is preferable in economic terms and for a range of regulation and supporting services. We conclude with examples from Northern Portugal.

392. ACCURACY OF CLASSIFICATION OF REMOTELY SENSED DATA IN VEGETATION MAPPING PROCESS – A CASE STUDY OF CROATIA

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Vegetation is a fundamental variable that affects and links many parts of physical environments. Changes in vegetation cover have significant effects on basic processes (biogeochemical cycling, soil erosion) and thereby on biodiversity. In this study the thematic accuracy of classification of remotely sensed data in vegetation mapping process has been computed. The investigation area included the Nature Park «Žumberak – Samoborsko gorje». Tree thematic maps with different minimum mapping unit (2.25 ha, 9 ha, 25 ha) were used. Accuracy assessment was carried out at two levels: Level I – 2 categories: nonforest habitats and forest vegetation, and Level II – 5 categories: anthropogenic habitats, nonforest vegetation, fir forests, conifer forests, oak forests. The results show that overall accuracy at Level I ranges from 83% to 94%, and that KHAT values range from 63.54% to 87.06%. At Level II the results show that overall accuracy ranges from 49% to 71.50%, and that KHAT values range from 29.89% to 61.74%. This study shows that the accuracy of classification of remotely sensed data depends on both the minimum mapping unit and the number of categories used in classification scheme.

393. FUTURE PHYLOGENETIC DIVERSITY PATTERNS CHALLENGE CONSERVATION NEEDS IN A CHANGING WORD

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The use of species evolutionary history as a biodiversity measure has been very much encouraged over the last couple of decades, yet it is unclear whether this approach brings anything new to conservation. This paper examines for the first time the spatial relationship between predicted species richness (SR), the most commonly used biodiversity measure and phylogenetic diversity (PD) of several Southern African animal and plant taxa. Distributions are based on climatic-matching modelling and used to reconstruct present and future spatial patterns of SR and PD. Biodiversity hotspots are identified and the effect of future climatic changes investigated. Moreover, the coverage of protected areas and the PD contribution of uncommon species are quantified. A significant, non-linear relationship was found for PD and SR, at times resulting in contrasting spatial patterns for these two measures. Currently, 81% of SR and 90% of PD are well protected, but with climate change suitable habitat will diminish. Randomization procedures suggest that uncommon species do not contribute a disproportionate amount of PD.

394. A NEW METHODOLOGY TO CALCULATE COMPENSATION FOR OTTER DAMAGES IN THE CZECH REPUBLIC

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The Eurasian Otter (*Lutra lutra*) is a protected piscivour and thus causing conflicts between nature protection and owners of fishponds. In 2000 a national law came into force which provides the basis to pay compensation for losses causes by protected species such as the otter. We evaluated the existing conflict reconciliation measures including compensation system and collected new biological data concerning otter damages on fishponds. Existing compensation system based on proper damage calculation has serious short comes and was reviewed as uselessly expensive and bureaucratic with subjective assessment of compensation allowing mismatched compensations and misuse of the system. We have formulated concrete recommendations to improve the situation. However many improvements need changes of the law thus depending on acceptation of changes by decision makers which is generally long term task. Therefore recently only changes in damage assessment methodology don't requiring the change of the compensation law were implemented.

395. THE ROLE OF ORGANIC FARMING IN THE CONSERVATION OF GRASSLAND BIODIVERSITY

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Organic farming is expected to maintain higher species richness than conventional management as chemical pesticides and mineral fertilisers are not applied. A large volume of work has been completed on the effects of agrochemicals and farming system on botanical diversity in arable crop systems, yet few focus on intensive grasslands. Intensive grasslands are the dominant type of grassland in lowland regions, representing millions of hectares in Europe. Our study examines whether organically managed grasslands in Ireland have higher plant species diversity than conventionally managed grasslands. In addition, the question of whether farmer attitude to, and knowledge of, wildlife has a significant influence on the species diversity of their farm is addressed. Plant species diversity was investigated in grassland field edges and centres in 10 replicate pairs of organic and conventional farms. Results indicate that plant species number was significantly higher in organic than in conventional farms. Plant species number was also significantly higher in the field edges than in the field centres of conventional farms, however there was no significant difference in plant species number between field edge and centre on organic farms. These results are discussed with reference to maintaining both agricultural productivity and biodiversity in farm ecosystems.

396. PROBLEMS, POSSIBLE SOLUTIONS AND STRATEGY OF BIODIVERSITY CONSERVATION IN CONDITIONS OF INTENSIVE FORESTRY – EXAMPLES FROM LATVIA

Priednieks, Janis, University of Latvia, Faculty of Biology, Latvia; **Strazds, Maris**, University of Latvia, Faculty of Biology, Latvia; **Vilks, Kristaps**, University of Latvia, Faculty of Biology, Latvia; **Kerus, Viesturs**, Latvian Ornithological Society, Latvia; **Kuze, Janis**, Kemeri National Park, Latvia; **Aunins, Ainars**, Latvian Fund for Nature, Latvia

Biodiversity conservation in forests of Latvia encounters quite a few success cases during its long history. Microreserve concept was elaborated in 1970s and is implemented since 1977 with improvement in 2001, allowing creation of microreserves of 8-200 ha in size for 23 Vertebratae, 24 Invertebrate and over 100 forest plant species. Inventories and designation of woodland key habitats were carried out in state forests since 1997, appearing to be effective way how to protect management demanding threatened species outside Natura network, particularly saproxylic beetles like *Osmoderma eremita*, *Tragosoma depsarium* and *Ergates faber*. Obligation to maintain 5 retention trees per hectare came in force in 2000 resulting in over 130000 trees left growing annually. Simultaneously after restoration of independence forest industry became most significant branch of industry giving over 30% of export incomes. The total annual cut since 1999 fluctuate around 11,000,000 m^3. Such intensification has significantly affected certain elements of forest biodiversity — e.g. it caused over 23% of nesting failures for Black Storks so contributing significantly to population decline >50% since 1990. Authors propose several approved solutions for these conditions related to planning and regime of microreserves and buffer zones, and management methods, targeted to particular species and habitats.

397. FIRE SEVERITY AND EARLY POST-FIRE REGENERATION IN NATURAL BROADLEAVED FOREST AND PINE STANDS AFTER A WILDFIRE

Proença, Vânia, University of Lisbon, Portugal; **Pereira, Henrique**, University of Lisbon, Portugal; **Vicente, Luis**, University of Lisbon, Portugal

We analysed the response of natural broadleaved forest (*Quercus robur*, *Ilex aquifolium*) and pine stands (*Pinus pinaster*, *Pinus sylvestris*) to a single fire that burned more than 4000 ha in the National Park of Peneda-Gerês (NW Portugal). We addressed both components of ecosystem stability, resistance and resilience. Forest resistance was assessed using descriptors of fire severity, including tree mortality, and sapling persistence. To assess forest resilience we compared seedling abundance, diversity measures and community composition in burned and reference plots. Contrary to pine forest, fire severity in broadleaved transects was generally low and tree mortality did not differ between burned and reference transects. Saplings were equally affected in both types of forest. Plant communities in burned broadleaved forest were more similar to plant communities in reference plots than plant communities in burned pine forest. Species richness, evenness and Shannon-Wiener diversity were equivalent in burned and reference plots in broadleaved forest while burned plots in pine forest had less species and were less diverse than reference plots. Seedling abundance in burned and reference plots did not differ at either forest type. Overall our results suggest a higher resistance and resilience of natural broadleaved forest to fire.

398. PROGRESS TOWARD AN ERA OF EVIDENCE-BASED CONSERVATION

Pullin, Andrew, Collaboration for Environmental Evidence, United Kingdom

The concept of evidence-based conservation has been around for almost a decade. This talk will review the extent to which the theory, taken from health care, has been put into practice for conservation. The core methodology of systematic reviewing evidence on effectiveness of interventions is now well established and has been applied to a broad range of subject areas. The Collaboration for Environmental Evidence is now legally constituted as a not-for-profit organisation. A central library of systematic reviews has been established and submission rates are rising. Funders are recognising the value of systematic reviews and the funding base is now diverse and global. Publishers also recognise the value of reviews and are creating opportunities for publication. Despite these successes a number of challenges remain. Measures of impact of the evidence-based approach on

the effectiveness of conservation will be slow to emerge and this is likely to inhibit large scale investment. The scientific community is unsure of the rewards for investing time in systematic reviews and this discourages formation of subject review groups. Difficulty of access to data for collation and synthesis of evidence remains a significant barrier and still lacks the necessary structures and cultural practices.

399. EVIDENCE-BASED AGRI-ENVIRONMENT SCHEMES BENEFIT RARE AND COMMON SPECIES

Pywell, Richard, Natural Environment Research Council Centre for Ecology and Hydrology, United Kingdom; **Bradbury, Richard**, Royal Society for the Protection of Birds, United Kingdom; **Walker, Kevin**, Natural Environment Research Council Centre for Ecology and Hydrology, United Kingdom; **Heard, Matt**, Natural Environment Research Council Centre for Ecology and Hydrology, United Kingdom

Intensive agricultural practices have highly detrimental impacts on biodiversity. European agri-environment schemes (AES) aim to mitigate these negative effects over large areas by encouraging extensive management practices, and habitat protection and creation. Quantitative evaluation of the effectiveness of AES across the EU suggests their effectiveness is mixed and they provide few benefits for rare species. We present the findings of national monitoring of the English AES for plants, bumblebees and birds. We found that management prescriptions which were carefully tailored to the ecology and habitat requirements of target taxa were significantly more effective in the conservation of both rare and common species. In comparison, prescriptions with broarder environmental aims were ineffective in conserving rare species. Furthermore, there is evidence that the response of rare species to tailored management prescriptions is dependent on local and regional differences in species pools. This suggests the effectiveness of AES policies would be increased by geographic targeting.

400. ASSESSING ECOSYSTEM SERVICES THROUGH PLANT TRAITS DISTRIBUTION IN A CONTEXT OF AGRICULTURAL LAND ABANDONMENT

Queiroz, Cibele, Department of Systems Ecology, Stockholm University, Sweden; **Lindborg, Regina**, Department of Systems Ecology, Stockholm University, Sweden; **Pereira, Henrique**, Faculty of Sciences, University of Lisbon, Portugal

Land use change is the main cause of biodiversity loss. In Europe, abandonment of agricultural land has been drastically increasing in the last decades and the management of abandoned areas is an issue of major concern. Despite many studies were done on the consequences of land abandonment to biodiversity, not many assess the consequences for ecosystem services of different management options in former agricultural land. We assessed the condition of a group of ecosystem services (provisioning, regulating and cultural) over four different land uses in a context of land abandonment in two European countries, Sweden and Portugal. Our methodology to assess the condition of ecosystem services was based in the analysis of plant traits distribution over the different land uses. For each ecosystem service we selected a number of traits that are related with the functions assumed to be essential for the flow of that service. The information on the different selected traits was collected by field assessment over the four different land uses and literature review. The analysis of the final results is still ongoing. We expect with this study to develop a method for the measurement of ecosystem services that supports management decision taking in rapidly changing areas.

401. WILDLIFE CORRIDORS FOR RED SQUIRRELS; DEFINING CONTIGUOUS AND NON-CONTIGUOUS HABITAT FOR CONNECTING WOODLAND FRAGMENTS

Quigley, Cally, University of Cumbria, Centre for Wildlife Conservation, United Kingdom; **Ramsey, Andrew**, University of Cumbria, Centre for Wildlife Conservation, United Kingdom; **Nevin, Owen**, University of Cumbria, Centre for Wildlife Conservation, Uzbekistan

Red squirrel (Sciurus vulgaris) populations in the UK are increasingly confined to small isolated reserves and fragmented habitat, threatening demographic and genetic viability. Landscape and population viability modelling have indicated the need for increasing connectivity through the matrix, however, there is little or no empirical evidence to show what constitutes a corridor for this or indeed most species. Here we present findings of a systematic hair tube survey of a range of potential corridors in habitat throughout the North of England. Corridors were selected that link suitable patches of habitat and were classified based on their structure and composition and represented contiguous and non-contiguous habitat; these included mature woodland corridor, a range of hedgerow types and diffuse single trees. The results showed that whilst squirrels were found in a wide range of corridors, most activity was recorded in larger, more mature corridors. The findings were used to model effective and viable strategies for increasing connectivity for red squirrels in the fragmented woodlands of the Solway Plain in Cumbria.

402. THE URBAN ENVIRONMENT: QUANTIFYING ECOSYSTEM SERVICES AT THE NEIGHBOURHOOD SCALE

Radford, Kathleen, University of Salford, United Kingdom; **James, Philip**, University of Salford, United Kingdom

The degradation and loss of vital ecosystem functions and services are an uncontested result of urbanisation and have led to the need to quantify ecosystem services at a variety of temporal and spatial scales. Attempts to measure and value ecosystem services have been made, the most common of these methods being 'willingness-to-pay' which attributes economic gain to an environmental attribute, but such methods are subject to debate which has led to a lack of consensus between academics and practitioners. Current methods also focus largely on the landscape and global scales; failing to appreciate services provided at the neighbourhood scale and different levels of urbanisation. This paper critically examines a variety of extant methods for measuring ecosystem services at different temporal and spatial scales. The paper describes a new tool, based on a selection of previously used methods such as the Green Flag Award and Residential Environment Assessment Tool, for quantifying a selection of ecosystem services at the neighbourhood scale. The Tool has been applied to the Greater Manchester conurbation to assess ecosystem services at different levels of urbanisation. The uses of this method in planning for sustainable communities in an increasingly urbanised world are discussed.

403. DRAGONFLIES ON BRITISH FARMLAND PONDS: OPTIMISATION OF SURVEY METHODS FOR ECOLOGICAL CONSERVATION AND LANDSCAPE-SCALE STUDIES

Raebel, Eva M., School of Biological Sciences, University of Liverpool; Wildlife Conservation Research Unit , University of Oxford, United Kingdom; **Macdonald, David W.**, Wildlife Conservation Research Unit , University of Oxford, United Kingdom; **Riordan, Phillip**, Wildlife Conservation Research Unit , University of Oxford, United Kingdom; **Thompson, David J.**, School of Biological Sciences, University of Liverpool, United Kingdom

British Odonata began to decline with the intensification of agriculture in the 1950s but ponds, a primary habitat of 14 of the 43 British species, have been neglected by policy makers for the past century (an estimated 50% lost). It is essential to know current distributions of odonate species for effective conservation. Adult surveys are currently the most frequently used method for determining odonate occurrence. This study assessed methods for determining presence/absence of odonates at ponds and evaluated their validity as tools for conservation purposes. Surveys were conducted at three stages of the life-cycle: larvae, exuviae and adults, on 29 farmland ponds of the Upper Thames catchment. Results showed a positive association between exuviae and larval sampling (Fisher's exact; $p = 0.00013$) but both were independent from adult surveys ($p > 0.5$). Adults can still occur at sites where recruitment rates may be low/zero. Current records could have over-estimated the number of viable ponds. Misleading results may have jeopardised pond management by discouraging improvements to ponds falsely believed to be of good quality. Larval/exuviae surveys are necessary to confirm species presence and methods are being used to assess relationships between species richness, pond features and land-use at a landscape-scale.

404. A COMPARISON OF SIX PATCH CONNECTIVITY MEASURES USING DATA ON BEETLES AND PSEUDOSCORPIONS IN HOLLOW OAKS

Ranius, Thomas, Department of Ecology, Swedish University of Agricultural Sciences, Sweden; **Johansson, Victor**, Department of Ecology, Swedish University of Agricultural Sciences, Sweden; **Fahrig, Lenore**, Ottawa-Carleton Institute of Biology, Carleton University, Canada

From 281 oaks in southeast Sweden, we collected data on tree characteristics, density of hollow trees in surrounding landscapes, and presence/absence of eight beetle and two pseudoscorpion species associated with hollow oaks. We compared several different measures of patch connectivity, and for each measure the spatial scale was varying from 25 to 2,500 m. We found that species in the highest redlist categories were to a higher extent restricted to hollow trees with certain characteristics, and to localities with a high density of suitable trees, in comparison to species in lower redlist categories. A frequently used connectivity measure based on the negative exponential function was relatively poor in explaining species' presence/absence. The density of habitat within circles is a measure of habitat patch connectivity which is easy to understand and use. This study showed that this measure is useful, even though it is biologically less realistic. If a biologically more realistic connectivity measure is needed, it is important to consider the difference in dispersal biology between organism groups, for instance between plants and animals.

405. SUCCESSFUL LARGE-SCALE HABITAT RESTORATION FOR THREATENED AMPHIBIANS IN ESTONIA

Rannap, Riinu, University of Tartu, Estonia; **Lõhmus, Asko**, University of Tartu, Estonia; **Briggs, Lars**, Amphi Consult, Denmark

Large-scale restoration of high-quality habitats is considered essential for the recovery of threatened amphibians but only a few successful cases are documented so far. We describe a landscape-scale restoration project targeted at two declining species – the crested newt (*Triturus cristatus*) and the common spadefoot toad (*Pelobates fuscus*) – in six protected areas in southern Estonia (2005-2007). In a close co-work of managers and scientists, 230 ponds were restored or created in 27 clusters to (i) increase the density and number of breeding sites; (ii) provide adjacent ponds with differing depths, hydroperiods and littoral zones; (iii) restore an array of wetlands connected to appropriate terrestrial habitat. In only three years, the number of ponds occupied by the common spadefoot toad increased 6.5 times and by the crested newt 2.3 times. By 2008, successful breeding of the crested newt was recorded in 23 of the 25 clusters designed for this species (92%), and of the common spadefoot toad in 17 of 21 clusters (81%). Hence, populations of threatened pond-breeding amphibians can rapidly recover if their habitats are restored at the landscape scale, following the scientific knowledge on their habitat requirements and population connectivity.

406. EXPLORING MECHANISMS UNDERLYING THE EFFECTS OF CLIMATE CHANGE ON LONG-TERM POPULATION TRENDS OF CZECH BIRDS

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Birds with their abundance monitored for decades could serve as indicators of the current effects of climatic changes. Learning from these current effects could help us to preclude or overcome the future impacts of climate change. However, abundance of bird species is affected by number of factors and climate change could simply temporary coincide with other important drivers. Our previous analysis determined that both habitat change and climate change could affect bird populations in the Czech Republic. The aims of the present study are: (i) to disentangle their respective contributions and to (ii) search for underlying mechanisms. We have expressed levels of specialisation and habitat associations of particular bird species and several measures of their climatic niches and tested their relative contributions to explain interspecific variability in bird population trends. We found that climatic variables were more important than the habitat ones. In the next step, we tested the effects of predicted range shifts and adjustment of breeding phenology together with migratory behaviour and life-history variation. We found that migrants are not more affected by the climatic change than residents but that species with slow life-history strategies do better than species with faster ones.

407. AN ECONOMIC VALUATION OF MARINE BIODIVERSITY: A MULTI-CASE CONTINGENT STUDY

Ressurreicao, Adriana, University of the Azores, Portugal; **Gibbons, James**, Bangor University, United Kingdom; **Dentinho, Tomaz**, University of the Azores, Portugal; **Kaiser, Michel**, Bangor University, United Kingdom; **Edwards-Jones, Gareth**, Bangor University, United Kingdom; **Zarzycki, Tomasz**, University of Gdansk, Poland; **Bentley, Charlotte**, Bangor University, United Kingdom; **Burdon, Daryl**, University of Hull, United Kingdom; **Atkins, Jonathan**, University of Hull, United Kingdom; **Austen, Melanie**, Plymouth Marine Laboratory, United Kingdom

Economic studies exploring the value of marine systems are far less common than those on terrestrial systems. This difference is puzzling as there is no a priori reason to suspect that marine systems are less in need of valuation or in any way less valuable. Moreover, economic valuations based on benefits people place on marine biodiversity provide useful information that can be integrated into the decision-making process, promoting sustainable management of systems whose integrity is highly threatened. Here, we report the results of a contingent study undertaken in 4 European locations: Azores islands (Portugal), Gulf of Gdansk (Poland), Isles of Scillies and Flamborough Head (UK). The study considered the value of species richness of five marine taxa (mammals, fish, algae, birds and invertebrates) as an indicator of marine biodiversity. Respondents were asked to value the prevention of either a 10% or 25% decrease from the current level. Results indicate different Willingness to Pay (WTP) for species conservation between locations, though no significant differences were identified between marine taxa or between the potential levels of biodiversity loss. These results throw doubts on suggestions in the literature that charismatic/ utilitarian taxa influence WTP and provide further insights into human preferences for biodiversity conservation.

408. HERP-ROBINSONS: AMPHIBIANS, REPTILES, METROPOLITAN AREAS AND ISLAND ECOLOGY

Ribeiro, Raquel, University of Barcelona, Spain; **Carretero, Miguel Angel**, Research Center In Biodiversity and Genetic Resources, Portugal; **Sillero, Neftalí**, Remote Sensing, Image Processing and SIG Group, Departement of Applied Mathematics, University of Porto, Portugal; **Llorente, Gustavo A.**, University of Barcelona, Spain

Habitat fragmentation is one of the strongest menaces to nature conservation worldwide. During the last 50 years, European populations have suffered a massive redistribution process which is concentrating human occupation in urban areas. Such process is rapidly isolating small portions of natural habitats surrounded by environmental matrices adverse to wildlife dispersal. Natural life surviving in those patches is prone to local extinction, amphibians and reptiles being especially vulnerable due to the low dispersal abilities. To determine the nature and intensity of such process is crucial for designing realistic management strategies for minimising or reversing the biodiversity lost. We selected 38 habitat patches (natural or semi-natural vegetation) in the metropolitan area of Porto (Portugal) where amphibians and reptiles communities were inventoried. Patches were characterised for microhabitat diversity, surrounding matrix, size and isolation time and related to their community composition and specific richness. Results reveal that species richness is correlated not only with patch area (MacArthur and Wilson' theory of island biogeography) but also with the microhabitat heterogeneity (Choros model). Conclusions derived from this study have major conservation implications and provide guidelines for wildlife management in highly fragmented and urbanized areas.

409. MANAGEMENT OF AQUATIC INVASIVE SPECIES IN CATALONIA

Rodríguez-Labajos, Beatriz, Autonomous University of Barcelona, Spain; **Delclos, Jaume**, Catalan Water Agency, Spain; **Dittmer, Kristofer**, Autonomous University of Barcelona, Spain; **Manzanera, Marta**, Catalan Water Agency, Spain; **Munné, Antoni**, Catalan Water Agency, Spain; **de Torres, Mariona**, Catalan Water Agency, Spain

Watershed authorities increasingly recognise aquatic invasive species (AIS) as a pressure to water quality, as an element to assess ecological status and as the likely target for ad hoc programmes of measures. The objective of this communication is to report the consideration of AIS in the regional management of the river basins and coastal areas in Catalonia (NE Spain) after the Water Framework Directive (WFD). In this process scientists had a role as planners, advisors, and persons in charge of engaging multi-stakeholder coordination. Methods include participant observation, and the review of official data, notably that of WFD-related participatory activities. Facts observed over time are organized according three aspects: identified problems, proposed solutions, and further needs. Pre-WFD action against AIS in Catalonia was pushed by the reaction to emerging threats posed by charismatic species (e.g. *C.taxifolia* or *D.polymporpha*). As a consequence of such cases, public awareness has increased slightly. The directive provided an integrated view on AIS as a pressure on water quality. Still, the implementation of management measures is conditioned by 1) the prioritization of physico-chemical and hydro-morphological improvement; 2) conflicting social views about some IS and the need of their control (e.g. fish invaders).

410. MODELLING THE THREE-WAY INTERACTION AMONG ACACIA TREES, UNGULATES AND BRUCHID BEETLES ANT THEIR CONSEQUENCES FOR PLANT DEMOGRAPHY

Rodríguez-Pérez, Javier, Helmholtz Centre for Environmental Research, Germany; **Wiegand, Kerstin**, Ecosystem modelling, University of Göttingen, Germany

The tree-way interaction between plants, vertebrate dispersers, and bruchid beetles strongly determines the regeneration and the diversity of many plant communities. The low regeneration capacity of many *Acacia* species in Middle East is consequence of a combination between browsing, reduction of seed dispersal (due to extinction of ungulates) and high seed predation by bruchids. We investigated how ungulates and bruchids modulate the population dynamics of *A. raddiana*. We developed two simulation models of *A. raddiana* demography: the first included seed dispersal and seed predation, whereas the second model additionally incorporated herbivory by ungulates. Simulations showed that the negative effect of seed predation by bruchids on *Acacia* population size was compensated by the positive effect of ungulates when ungulates were between 30% to 50% in relative abundance, under scenarios without and with herbivory, respectively. The proportion of seedlings increased with ungulate abundance in the model with herbivory, but not in the model without herbivory. In order to conserve *A. raddiana* populations, it is necessary to manage and restore its seeds dispersers because they are directly affecting the regeneration capacity of plant populations.

411. FINE-SCALE PRIORITIES FOR THE CONSERVATION OF THE WORLD'S MAMMALS

Rondinini, Carlo, Sapienza University of Rome, Italy

The current global system of protected areas is insufficient to ensure the conservation of the world's mammals. Here expert-based habitat suitability models are used to identify high-priority conservation areas for the world's mammals through systematic conservation planning. The dataset is derived from the IUCN-SSC Global Mammal Assessment (5487 species). For each species, the habitat preferences have been assessed and used to generate habitat suitability models inside the geographic range, based on at least three environmental variables: type of land cover, elevation, distance to water. The suitable 300m grid cells inside geographic ranges provided an estimate of the area occupied by each species, which underwent an area selection analysis through the software MARXAN. Minimum sets of areas that achieved a variety of minimal conservation targets (for the world's mammals and for threatened mammals only, according to the 2008 IUCN Red List) were looked for. Depending on the scenario, the total area to be protected in order to achieve minimal conservation can be up to twice the existing protected areas.

412. STIMULATING INTERDISCIPLINARITY AND INNOVATION IN DESIGN SOLUTIONS FOR WILDLIFE CONSERVATION

Root-Bernstein, Meredith, Department of Ecology, Pontifical Catholic University of Chile, Chile; **Ladle, Richard**, Oxford University Centre for the Environment, Oxford University, United Kingdom

Environmental education for skilled professionals is an underutilized but potentially powerful approach to stimulating multidisciplinary collaborations on conservation projects. We present the results of workshops for industrial design students on the design of products for wildlife conservation. In situ wildlife conservation frequently involves the use of products such as barriers, road crossings, feeders, and nest boxes, while puppets, cages, and other apparatus are used in ex situ conservation. The fabrication, aesthetic values and functionality of these products could potentially be improved by industrial designers. The attitudes of students at industrial design schools in Santiago, Chile towards design for wildlife conservation were assayed through before- and after-workshop surveys. As part of the workshop, students created maquettes of wildlife conservation products relevant to conservation in Chile (photographs of these will be shown). Overall, participants were positive towards design for animals both before and after the workshop, but the workshop did not consistently increase positive attitudes. Students with more positive attitudes towards conservation had less positive attitudes towards design for animals. We will put these results in the Chilean context, and suggest how further environmental education for industrial designers could lead to fruitful collaborations around the world.

413. FRESHWATER BIODIVERSITY UNDER CLIMATE PRESSURE: THE WINNERS AND THE LOSERS IN ALPINE STAGNANT WATERBODIES

Rosset, Véronique, University of Applied Sciences of Western Switzerland, Switzerland; **Oertli, Beat**, University of Applied Sciences of Western Switzerland, Switzerland

Climate change is expected to have significant impacts on freshwater biodiversity. Small waterbodies, as ponds and small lakes, are abundant and widespread, and because of their small size they shelter simple communities, particularly in altitude. Therefore, alpine ponds should play a central role as sentinel and early warning systems in the assessment of the future changes in local biodiversity. Using predictive models built with biodiversity data from 113 ponds from Switzerland, we forecast for 2100 the potential response to climate warming of aquatic macroinvertebrates, Odonata, amphibians and vegetation for alpine ponds. The predictions evidence potential strong species enrichment, particularly for local species richness. This results from a positive balance between numerous colonization events by lowland species (the "winners") and sparse extinction events of cold stenothermal species (the "losers"). Taking the Odonata as example, only 12% of the Swiss species pool is composed of cold stenothermal species, at risk of extinction. The other 88%, currently living in lowland, are potential colonisers of high altitude ponds. Furthermore, Mediterranean species have already colonized Switzerland these last 20 years and contribute to an enrichment of Odonata regional richness. The same trends are also underlined for the other taxa, with a global enrichment masking the extinction events.

414. THE RED CORAL CASE STUDY: THE DECLIVE OF ANIMAL FORESTS IN THE MEDITERRANEAN SEA

Rossi, Sergio, ICTA-UAB, Spain; **Tsounis, Georgios**, ICM-CSIC, Spain

Precious corals are important structure forming organisms, so called ecosystem engineers, that provide shelter for other organisms and increase biodiversity. Among the most important species of these cnidarians, red coral has been commercially exploited for many centuries all over the world. Precious coral fishery is generally characterized by the "boom and bust" principle. In the Mediterranean Sea, virtually all known stocks are overexploited. There is enough available information of this renewable resource to make a harvesting model based in its short larval dispersion distance, low recruitment, low growth rate and overharvested population structure. The last decade data demonstrate that overexploited populations vulnerable to local extinction, and that the resource is beyond the limit of economical viability (i.e. is no longer profitable). This presentation compares the ecology of red coral, as well as the socioeconomy of their fishery, and evaluates various management models that may improve precious coral management and conservation. The present studies show that a paradigm shift is needed in precious coral exploitation, not only to conserve habitats of high biodiversity, but also to achieve sustainable fisheries and stabilize a traditional jewelry industry. Furthermore, gaps in knowledge are identified and the need for further research highlighted.

415. THE CONSERVATION REQUIREMENTS OF AN ENDANGERED HOVERFLY, HAMMERSCHMIDTIA FERRUGINEA (*DIPTERA, SYRPHIDAE*) IN THE BRITISH ISLES

Rotheray, Ellen, University of Stirling, United Kingdom

Hammerschmidtia ferruginea is an endangered hoverfly restricted to 8 sites in Scotland, UK. It depends upon a temporary and declining breeding site, wet decay under the bark of fallen aspen *Populus tremula*. Due to winds and storms the amount of dead wood fluctuates causing population swings. Work began in 2006 to discover the requirements of *H. ferruginea* which are needed to devise a conservation plan aimed at recovering this species. Using emergence traps and re-sighting marked flies, dispersal, longevity and population dynamics were investigated. In total, 339 *H. ferruginea* individuals emerged from 17th May until 16th June, and were on the wing until 15th July. The number emerging from traps was three times the number predicted from larval surveys. Male and female maximum longevity was 32 days and 51 days respectively. Adults fed sequentially on flowering Bird Cherry *Prunus padus*, Rowan *Sorbus aucuparia*, and Hawthorn *Crataegus monogyna*. These results provide the first data on

the dispersal abilities and adult ecological requirements of *H. ferruginea* which will be taken into account in prescriptions for managing this species. Emergence traps and observations of adults visiting decaying aspen represent effective ways to investigate the ecology of this and probably other dead wood insects.

416. PATTERNS OF IMPACTS OF FOUR HIGHLY INVASIVE PLANTS SPECIES ON NATIVE VEGETATION IN BELGIUM

Saad, Layla, Gembloux Agricultural University, Belgium; **Mahy, Grégory**, Gembloux Agricultural University, Belgium

There is a need to improve our ability to predict species responses to human-induced global change, such as the consequences of plant invasions, given their ecological, economical, and societal deleterious effects. It is often suggested that diverse communities are less likely to be invaded, but both negative and positive relationships, between native flora richness and invasion, have been reported. Invaders may induce differential impacts on different species, resulting in fundamental changes in community structure. We investigated the patterns of impacts of four highly invasive species (HIPS) on native plant species richness, structure and composition in Belgium, with a particular focus on sites of high biological value. Our results showed that the four target species tended to invade diverse habitats or vegetation communities. Disturbances appeared to be the main cause of invaders establishment. The reduction in native plant richness/diversity was a common pattern to invasion. However, the magnitude of impacts were species specific. Although sites of high biological value were targeted, no endangered species or species of concern was found to be directly impacted by invasion. Indirect consequences on whole communities should be further studied and taken into account in order to produce an integrated ranking of HIPS impacts.

417. ACTION VERSUS RESULT-ORIENTED SCHEMES: A DYNAMIC MODELLING APPROACH LINKING GRAZING AND BIRD POPULATIONS IN A GRASSLAND AGRO-ECOSYSTEM

Sabatier, Rodolphe, French National Institute for Agricultural Research, France; **Doyen, Luc**, National Museum of Natural History, France; **Tichit, Muriel**, French National Institute for Agricultural Research, France

In Europe, most agri-environment schemes are action-oriented. However recent assessment indicates mixed benefits for biodiversity. It has been suggested that the development of result-oriented measures could improve their efficiency. The objective of this study was to assess whether result-based measures could be more efficient in conciliating production and conservation outcomes. We focused on a grazed grassland agro-ecosystem which is the breeding habitat of two wader species. A dynamic model of grass and bird populations was developed to predict grazing strategies ensuring bird conservation. Viable control approach was used to identify out of the whole set of possible grazing strategies, those respecting constraints at any time. To compare both agri-environment schemes, the model was run with constraints either defined to represent action-oriented (threshold on maximal stocking rates) or result-oriented measures (threshold on minimal bird population size at horizon). Model simulations show that result-oriented measures were more efficient in conciliating production and conservation because they made it possible to alternate grazing intensity between years. This strategy was not feasible with action-oriented measures. These results could contribute to define alternative agri-environment schemes with better profit for both production and conservation goals in agricultural grasslands.

418. MALE'S SEXUAL ORNAMENTS REFLECT FERTILITY AND SURVIVAL OF THEIR PROGENY: APPLICATION TO CAPTIVE BREEDING AND REINTRODUCTION

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In captive breeding programmes involving small populations, minimising genetic drift is obtained by equalizing founder representation while minimizing inbreeding. Therefore, females have no choice of their mate. Because maximizing genetic diversity does not distinguish between beneficial and deleterious alleles, some authors have suggested that ensuring that all individuals breed may not be the best management strategy and that when effective population sizes are adequate, it might be better to allow females to choose the best mate. In order to assess the potential benefits of mate choice in captive breeding we used a houbara bustard (Chlamydotis undulata) supportive breeding associated with restocking of populations in Morocco. In this lekking species, using an immune challenge experiment we empirically verified that by assessing male courtship display, females may gain insight into the current phenotypic quality of mates and gather direct benefits in terms of fertilization power and indirect benefit in terms of "good genes" for their progeny. By releasing 120 offspring sired by 15 males, we found that males of high quality sired a progeny that better survived once released into their natural habitat. Therefore, Houbara bustard's displaying activity may reveal a general immunocompetence that would be transmitted to their offspring.

419. A MULTIPLE-ANALYSIS APPROACH FOR HIGHLIGHTING CONSERVATION OPPORTUNITIES IN AN URBAN LANDSCAPE

Scott, Anna V., University of Salford, United Kingdom; **Armitage, Richard P.**, University of Salford, United Kingdom; **James, Philip**, University of Salford, United Kingdom

Towns and cities are often considered to be disconnected from the wider natural landscape. However, these regions play an integrated role in the delivery of ecosystem services. Biodiversity is an ecosystem service that in urban regions has the potential to be fulfilled in a higher capacity. The objective of this research was to investigate ways in which landscape scale conservation could be more fully implemented to enhance biodiversity in urban regions of the United Kingdom. A multiple-analysis approach was used to assess landscape permeability and habitat density. Research focused on the predominantly urban Borough of Halton, Northwest England. Landscape permeability was assessed for ten umbrella species and used to create cost distance maps using GIS. This method was based on comprehensive habitat data produced using the UK Phase 1 Habitat Survey procedure. A moving window-based statistical analysis was then used to highlight areas with enough habitat to potentially support viable populations of the umbrella species. The results of these analyses were combined to produce opportunity maps illustrating where conservation and restoration efforts should be targeted. This approach can be used by urban conservation managers to determine where to direct resources for enhancing habitats within the context of the wider landscape.

420. CONSERVING BIODIVERSITY AND ECOSYSTEM SERVICES BY MARKET ORIENTED METHODS

Seják, Josef, J.E.Purkyne University, Czech Republic; **Pokorný, Jan**, Inst. of Systems Biology and Ecology, Czech Republic; **Cudlín, Pavel**, Inst. of Systems Biology and Ecology, Czech Republic

Sustainability consists in understanding the biogeochemical processes and respecting the self-organizing roles and services of natural ecosystems that provide humans and other species with basic existence conditions enabling their lives. Referring to conservation biology target as protection of species, habitats and ecosystems from excessive rates of extinction, in this paper, two interdisciplinary expert methods of systemic monetary valuation of biotopes and ecosystem services are presented. Biotope valuation method identifies the carrying capacity of individual biotope types as specific environments for plant and animal species. Biotope monetary values reflect the average restoration costs necessary for sustaining and improving the landscape quality and are mainly aimed at quantifying environmental damages from land cover changes. Ecosystem service valuation method is based on monitored energy & water; & matter; flows that within autotrophic ecosystems produce the main life supporting services - benefits - for humans and other heterotrophic species. Our estimations show that the main life-supporting annual services of natural ecosystems are at the level of €100-150 per m^2, highly surpassing economic values from traditional land uses. They also prove how important is to keep a sensitive equilibrium of water and vegetation in landscape for dissipation of solar energy.

421. MANY-YEAR BIRD ARRIVAL TERMS IN UKRAINE AND THEIR CHANGES

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The observations on the bird arrival term in Kiev area has being conducted since the second half of XIX centaury. The same systematic observations are organized and going on the whole territory of Ukraine since 1975. The analysis of long-term phonological data shows the existence of different trends of their changes. Along more than 100-year period, some bird species used to arrive earlier and other more lately at Kiev area. The same picture is characteristic to the all territory of Ukraine in whole and to its separate regions in particular during 1990-2009 years in comparison with 1975-1989 period. So if these trends are the results of global climate warming then they appear differently in the different places on the territory of Ukraine.

422. RECORDS ON INVASIVE ALIEN FRESHWATER SPECIES IN ALBANIA AND ASSESSMENT OF THREATS TO BIODIVERSITY

Shumka, Spase, Agriculture University of Tirana, Faculty of Biotechnology and Food, Albania; **Paparisto, Anila**, University of Tirana, Faculty of Natural Sciences, Albania; **Trajçe, Aleksander**, Protection and Preservation of Natural Environment in Albania, Albania

Following direct habitat destruction, invasive alien species are considered as the second most important cause of global biodiversity change. A major problem in evaluating biological invasions is lack of information on distribution and failed non-native species introductions. In Albania, alien freshwater fish are steadily continuing to increase in number of species, abundance, and distribution. In general however, their impacts are not well quantified either in environmental or economic terms and current management to reduce their impacts is limited and lacking direction. The invasion process is accelerated due to historical and economical reasons. Based on the field surveys conducted it is clear that the introduction and establishment of invasive species are of increasing concern for national biodiversity. While their establishment and spread are occurring at an accelerated rate, the introductions can be characterized as either deliberate or unintentional. With a new integration policy of open trade and accession in European Union further species are likely to be inadvertently or deliberately brought to Albania. There is needed more controls to protect Albanian's aquatic ecosystems if further high impacting species are to be prevented from arriving.

423. DIACHRONIC VARIATION IN MEDITERRANEAN POPULATIONS OF ORCHIDS

Schatz, Bertrand, CEFE, UMR 5175 CNRS, France; **Geniez, Philippe**, CEFE, UMR 5175 CNRS, France

Among the various effects of global changes, plants are often affected by changes in their habitat. In this context, orchids are often considered as good bio-indicators because they are dependant on pollinators and mycorrhize symbionts for their survival. They have been already used for this in some diachronic studies but only for year-to-year comparisons and in northern European countries. We investigated here the diachronic variation in Mediterranean populations of orchids between an old period (1981-1989) and a contemporary one (2006-2008). In 47 sites located in four southern French departments, we compared the species number, the individual numbers per species, and the habitat. Main results are a marked habitat closure by growth of bush and forest; we also recorded a reduction of 45% of orchid species richness and 57% of total orchid abundance. These changes however varied according to orchid genus, and they were more pronounced in rare species (but nectar production was not a significant factor). These novel results for the Mediterranean provide informative results for the conservation of orchids, and we showed that the reduction of orchid presence could be linked to a rapid closure of their habitat.

424. INVENTORY SHOWS THAT LOGGING AND RIVER REGULATION THREATEN THE NORTH-WESTERN-MOST POPULATION OF THE ANT *LIOMETOPUM MICROCEPHALUM* (PANZER, 1798)

Schlaghamerský, Jiří, Masaryk University, Faculty of Science, Dept. of Botany and Zoology, Czech Republic

The arboricolous ant *Liometopum microcephalum* (*Hymenoptera: Formicidae*) is threatened throughout its range but we lack comprehensive data about its frequency and abundance. Not being listed in the appendices of the EU Habitats Directive, it stands for the many species potentially neglected by conservation managers. It is thermophilous, often associated with floodplains and widely dependent on ancient oaks. Its colonies are very numerous and protect their nest trees aggressively. Despite reaching the north-western border of its range in South Moravia (south-east of the Czech Republic), the population in this area is possibly the largest remaining. In 2003-2004 we conducted an inventory of colonies and analysed nest tree characteristics in South Moravia. In total 850 colonies were recorded, leading to an estimate of a population size not exceeding 900-1000 colonies. The species highly prefers large but live oaks. Historic records show that the species has lost ground in the north during the 1900s. River regulation and logging of the area's floodplain forests were identified as major causes of its decline. Since 2004 intensive logging operations have continued in the area, leading to further nest tree losses and habitat fragmentation. Immediate conservation of the present nest trees and of habitat connectivity is required.

425. SPATIAL CHANGES IN DE ABUNDANCE OF EUROPEAN FARMLAND BIRDS; SERVING EUROPEAN POLICY INITIATIVES

Sierdsema, Henk, Dutch Centre for Field Ornithology, Netherlands; **Brotons, Lluís**, Centre Tecnològic Forestal de Catalunya, Spain; **Jiguet, Frédéric**, National Museum of Natural History, France; **Foppen, Ruud**, Dutch Centre for Field Ornithology, Netherlands

Farmland breeding birds are amongst the most threatened group of (bird) species in Europe. Most species show a large-scale decline. The High Nature Value Farmland-initiative (HNV) of the EU intends to designate high-priority areas for the conservation of farmland birds and take conservation measures. However, information on the nature value of farmland has mainly been inferred from land use characteristics instead of distributions and trends of priority species. The EBCC monitors the change in the abundance of farmland birds (and many other species) with the Pan-European Common Bird Monitoring Scheme (PECBMS). This schemes offers perfect possibilities for the designation and monitoring of HNV-areas. Although the current resolution of the scheme (countries or sometimes regions) offers limited possibilities for the local or regional spatial analyses, the EBCC aims for producing output on a much finer scale. More detailed information on the driving forces on changes in local numbers may be also obtained from geostatistical models used to create abundance and trend maps. Results of a HNV pilot study for a number of countries will be presented, as well as provisional European maps for a selection of farmland bird species.

426. EFFECT OF HEAVY METAL CONCENTRATION ON SPECIES TRAIT'S OF GROUND BEETLE ASSEMBLAGES

Skalski, Tomasz, Jagiellonian University, Poland; **Laskowski, Ryszard**, Jagiellonian University, Poland

In this presentation we test five life traits of Ground Beetles to environmental stressors such as heavy metals. We have chosen four meadow and forest pollution gradients of heavy metals in Poland Wales and England. In each system, ground beetles assemblages were selected in relation to the distance to the smelter, reflecting heavy contaminated and uncontaminated assemblages. During field studies 30 000 specimens belonging to 127 species of ground beetles on 127 sites were collected. The relationship between the life traits of beetles and contaminated soils were analyzed using forward selection of canonical correspondence analysis. The concentration of main stressors, Zn, Cu, Ni, was highly statistically significant and explained most of the abundance, richness and biomass variability of examined ground beetles parameters. The competitive exclusion and replacement of some forms by another on contaminated soils was observed (C-score values higher than expected, $\Sigma = 0.07380$, $p<0.0001$). Species dominant on heavy polluted sites are of small size, high dispersal power, usually spring breeders, food generalists with preferences to plant food and habitat generalists. We conclude that the functional diversity of soil organisms appears an attractive measure of pollution effects on both the community structure and the ecosystem function.

427. RESULTS OF SIX-YEAR STUDY ON HURRICANE-CAUSED DISTURBANCE OF PINE FOREST ECOSYSTEM AND ITS SPONTANEOUS REGENERATION IN PISZ FOREST; POLAND

Sklodowski, Jaroslaw, Warsaw University of Life Sciences. Dept Forest Protection and Ecology, Poland; **Garbalinska, Paulina**, Warsaw University of Life Sciences. Dept Forest Protection and Ecology, Poland; **Tracz, Henryk**, Warsaw University of Life Sciences. Dept Forest Protection and Ecology, Poland; **Slawska, Malgorzata**, Warsaw University of Life Sciences. Dept Forest Protection and Ecology, Poland; **Slawski, Marek**, Warsaw University of Life Sciences. Dept Forest Protection and Ecology, Poland; **Rutkiewicz, Artur**, Warsaw University of Life Sciences. Dept Forest Protection and Ecology, Poland

Our survey aimed at: (i) recording the initial status of post-hurricane ecosystem and tracing the dynamics of its spontaneous regeneration, (ii) verifying the hypothesis regarding the degree of ecosystem regression as a function of its development prior to the disturbance, (iii) verifying the hypothesis concerning the regeneration rate as a function of the degree of ecosystem regression, (iv) comparing patterns of spontaneous and human-created forest ecosystem regeneration. The survey investigated pine forest disturbed by the hurricane in July 2002 and left "untouched" for observation. In spring 2003 thirty study plots were established in disturbed and control stands. Our study involved: *Carabidae, Collembola, Diplopoda*, under-bark and saproxylic beetles. Additionally CO_2 diffusion from soil, organic matter decomposition rate, carbon and nitrogen concentration in soil, soil pH, LAI index and forest floor vegetation were analyzed. The hurricane significantly decreased biological activity of soil; soil alkalization and desiccation were also observed. Increased nitrogen content enabled nitrophilous *Deschampsia flexuosa* to replace forest mosses. Changes in *Carabidae* and *Collembola* assemblages indicated 20-40-year regression in ecosystem state of development. Nevertheless, first symptoms of ecosystem regeneration were also noticed. Results obtained confirm the hypothesis (ii) conditioning the degree of ecosystem regression on its development before the disturbance.

428. POPULATION SIZE AND SEX RATIO OF BROWN BEARS IN SLOVENIA ESTIMATED USING NONINVASIVE GENETIC SAMPLING AND IMPLICATIONS FOR CONSERVATION AND MANAGEMENT

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Accurate estimates of population size and sex ratios are critical for conservation and management, but difficult to obtain. A promising new alternative is offered with noninvasive genetic sampling, and we used it to estimate these parameters for the Slovenian bear population. We substantially improved multiplexing genotyping protocols, performed a power analysis using simulations to estimate the effort required for a country-wide mark-recapture study, and planned and organized a large sample collection effort. Almost 1000 volunteers collected samples in a three-month intensive sampling throughout the bear range. We collected 1053 scat samples and 26 tissue samples of bears culled during the sampling, and achieved 88% genotyping success from scat. 354 unique bears were detected, and an estimate of 434 individuals (394-475; 95% CI) was obtained for December 2007 using mark-recapture. Detected sex ratio was 55% females and 45% males. The Slovenian bear population has been the source for reintroductions to Western Europe, and is the only possible source for a natural recolonization of the Alps. Recent controversial increases in cull quotas were largely based on questionable estimates of population trends. Our estimate has been used in setting of the 2009 quota, and is offering long-term population monitoring using noninvasive genetics.

429. LONG TERM BIODIVERSITY MONITORING OF NEW NATIVE WOODLANDS IN SCOTLAND

Smith, Mike, Forest Research, United Kingdom; **Cowie, Neil**, Royal Society for Protection of Birds, United Kingdom; **Atkinson, Sian**, Woodland Trust, United Kingdom; **Harvey, Gordon**, British Petrolium, United Kingdom

The restoration of native woodlands is one of the key conservation objectives in Scotland. The Scottish Forest Alliance (SFA) is contributing to this by regenerating 10,000 hectares of native woodland habitats at 13 key sites across Scotland. Demonstrating the value of the SFA sites for biodiversity requires monitoring of woodland ecosystem development over a sufficiently long time period on parts of the sites where trees are being planted or are colonising naturally. The objectives are to yield information on changes in biodiversity as the new woodlands develop to inform management planning, and to allow the SFA to assess progress in achieving biodiversity objectives. This is the first of a series of planned periodic surveys that will quantify changes as woodland at the sites develops over the next 100 years. Data from plots nested within section squares have been used in a pattern analysis to determine the relationships between different vegetation and species groups. The monitoring will identify interesting species, unusual patterns of biodiversity and their interrelationships between vegetation communities. This will improve the ability to predict future trends in floral and faunal development, particularly the impact of increasing tree cover and the progressive development of woodland ecosystems on each site.

430. TIME TO LANDSCAPE SCALE EXTINCTION OF AN EPIPHYTE METAPOPULATION

Snäll, Tord, Swedish University of Agricultural Sciences, Sweden

The aims are to increase our understanding of the spatial dynamics of epiphytes and their host trees, and to estimate the time to epiphyte extinction given no successful regeneration of its host trees – a known problem for certain broad leaved trees in Fennoscandian boreal forest landscapes due to moose browsing. Recordings of presence/absence of the epiphytic lichen *Lobaria pulmonaria* on mapped aspens and goat willows (host trees) in a 400 ha landscape in 1997 and 2008 were used to develop a landscape scale model for the metapopulation dynamics of the epiphyte. The probability of a tree to become colonized in 2008 increased with increasing tree diameter and with increasing spatial connectivity to trees that were occupied in 1997. Lichen extinctions from tress that remained standing were negligible. The epiphyte went extinct due to tree fall. The probability of tree fall decreased with increasing tree diameter. Trees that remained standing had increased their diameter. Based on simulations using models fitted to observed lichen colonization-extinction dynamics, and observed tree growth and tree falls, I will show the estimated time to extinction of this epiphyte and its host trees from a 2000 ha forest reserve that is protected for preserving biodiversity.

431. INVASIVE BIVALVES IN FRESHWATER EUROPEAN ECOSYSTEMS: ECOLOGICAL SIGNIFICANCE

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Non-indigenous freshwater bivalves can be responsible for great ecological and economic impacts. In this study we used *Corbicula fluminea* and *Dreissena polymorpha* (both listed in the 100 worst invasive species) European data to show dramatic changes in the ecosystem processes and functions after their arrival. In the Minho River (NW of the Iberian Peninsula), *C. fluminea* dominates the macrozoobenthic density and biomass, and the secondary production estimated for this non-indigenous invasive species (NIS) is one of the highest values ever recorded in a freshwater ecosystem worldwide. Given these results, *C. fluminea* is a fundamental element in the Minho River, sequestering a large portion of the carbon available for benthic production and altering the ecosystem functioning (e.g. changes in the abiotic factors, changes in ecosystem engineering processes and interference in important biotic processes). Similarly, our *D. polymorpha* data set collected in several freshwater ecosystems in the United Kingdom clearly show that this NIS affects significantly the condition of freshwater mussels (unionids) posing a serious threat to the conservation of these species. Both invasive species are widespread in Europe and ecological changes described in this study can also occur in similar aquatic ecosystems.

432. SYSTEMATIC CONSERVATION PLANNING IN PRACTICE: A CASE STUDY FROM URUGUAY

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Uruguay is implementing its National System of Protected Areas (NSPA) from scratch, a unique opportunity to apply Systematic Conservation Planning principles in an actual case right from the beginning. Here we provide a case study on the integration of results from assessments at the system level into the design and management of the first site incorporated to the system: Quebrada de los Cuervos (QdlC). The first step in the design of the NSPA consisted in setting conservation targets at the landscape, ecosystems and species level. We then conducted a gap analysis to assess the contribution of a subset of sites selected as the initial core of the system to the fulfilment of the NSPA targets. For each of these areas we then set conservation objectives based on the systems' targets that they contribute to fulfil. In QdlC we used a modified version of TNC's CAP methodology to develop the area's management plan. Five focal objects were selected to ensure the protection of the 74 target species and 7 target ecosystems found in the area.

433. A FAILURE OF CONSERVATION PAYMENTS: AGRIENVIRONMENTAL AND AFFORESTATION SUBSIDIES JOINTLY DESTROYING THE BIODIVERSITY OF CARPATHIAN GRASSLANDS

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Owing to their remoteness, westernmost slopes of Czech Carpathians (Vsetínské and Javorníky Mts.) represent a stronghold for endangered biota associated with traditional

land use. The regional metapopulation of the HD-directive butterfly *Phengaris arion* is the largest in the country. The butterfly offers umbrella for extremely rich entomofauna, including critically endangered butterfly *Argynnis niobe* and Rattle Grasshopper *Psophus stridulus*. Survival of the system depends on continuation of small-scaled, diverse and temporally variable sheep-based farming, but has receded, as a result of agricultural intensification, to the most rugged terrains of the mountains. With decreasing profitability of the mountain farming, the local rural communities increasingly depend on various forms of subsidies. Unfortunately, existing conservation-oriented payments, including the EU Agrienvironmental schemes, fail to provide for the temporal and spatial heterogeneity of land use, which appears as the crucial factor for maintaining the areas' biodiversity. Afforestation subsidies are probably even worse, because forests, once planted, cannot be converted back to non-forest land due to legal obstacles. An urgent revision of both the philosophy and practical implementation of conservation subsidies is needed.

434. ESTIMATING THE POPULATION SIZE OF THE BALKAN LYNX IN THE MAVROVO NATIONAL PARK, MACEDONIA, BY MEANS OF CAMERA-TRAPPING

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Less than 100 individuals of the Balkan lynx (*Lynx lynx martinoi*) remain in the Southwestern Balkans, making it the most endangered autochthonous Eurasian lynx population in Europe. The scarce knowledge about its status, biology and ecology needs to be improved in order to implement efficient conservation and management measures. The goal of this study was to estimate the number of Balkan lynx in the Mavrovo National Park, Macedonia, an area considered a stronghold of the population, by using photographic capture-recapture sampling. We defined 32 camera-trap sites covering an area of 436 km². At each site, two opposite Stealthcam camera-traps were installed in order to photograph both flanks of the animal. As an attractant, a pole treated with Valeriana extract was set between the two cameras. The sampling effort was 1796 trap-nights, producing a total of 29 lynx photographs. Model Mh of programme MARK fitted the data well and resulted in 7 ± 1,82 independent lynx, which corresponds a density of 0,84 ± 0,24 independent lynx/100km². This study provided the first insight into the status of the Critically Endangered Balkan lynx in its core area, paving the way for future research and conservation efforts.

435. SHEDDING LIGHT ON BAT BEHAVIOUR - THE IMPACT OF ARTIFICIAL LIGHTING ON THE COMMUTING BEHAVIOUR OF BRITISH BATS

Stone, Emma, University of Bristol, United Kingdom

Artificial lighting schemes can damage bat foraging habitat directly through loss of land and fragmentation or indirectly by severing commuting routes from roosts, polluting watercourses and foraging habitat. The impact of street lighting on bat activity was tested using experiments along lesser horseshoe bat commuting routes 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 ($p = <0.01$). Contrasts demonstrated that all light treatments were significantly different from controls ($p =$

436. RE-ORIENTING BIODIVERSITY GOVERNANCE IN ROMANIA: TOWARDS PARTICIPATION IN CONSERVATION AND PROTECTED AREA MANAGEMENT

Stringer, Lindsay, University of Leeds, United Kingdom; **Paavola, Jouni**, University of Leeds, United Kingdom

Since the collapse of Central and Eastern Europe's socialist regimes in the early 1990s, the region has experienced considerable change across environmental, social and economic dimensions. Transition and European Union accession processes have altered the dominant socio-economic conditions and resource use practices, while also having implications for the region's biodiversity. Although the changes have permitted new forms of multi-level governance to develop, a coherent participatory approach specifically tailored to managing biodiversity in the post-socialist context is yet to emerge. This paper takes up this issue and focuses on Romania, reviewing the changing approaches towards biodiversity and protected area governance during the country's pre-socialist, socialist, transition and current EU eras. Comparing Romania's institutional practices with dominant conservation governance paradigms at the international level and in other parts of the world over the same period, it is revealed that Romania, like other post-socialist countries, still faces many challenges in putting more inclusive and integrated approaches into action. The paper proposes that in order to re-orient biodiversity and protected area governance towards a more inclusive and multi-stakeholder norm that better links economic, social and environmental objectives, mechanisms need to be developed to institutionalise participation across all levels of governance.

437. DIVERGING LONG-TERM AND SHORT-TERM RESPONSES OF LAND SNAILS TO CLEAR-CUTTING OF BOREAL STREAM-SIDE FORESTS

Ström, Lotta, Umeå University, Sweden; **Hylander, Kristoffer**, Stockholm University, Sweden; **Dynesius, Mats**, Umeå University, Sweden

Effects of clear-cutting on biodiversity have mainly been studied in the short term, although knowledge of longer term effects are often more important for managers of forest biodiversity. We assessed relatively long-term effects of clear-cutting on litter-dwelling land snails. In a pair-wise design we compared snail abundance, species density, and species composition between 13 old stream-side stands and 13 matched young stands developed 40-60 years after clear-cutting. We identified all snail specimens in a 1.5 liter litter sample collected in each stream-side stand. From the young stands a mean of 135 shells and 9.5 species was extracted which was significantly higher than the 58.1 shells and 6.9 species found in old forests. Only two of the 16 species encountered showed a stronger affinity to old than to young forests. In short-term studies of boreal stream-side forests land snail abundance is reduced by clear-cutting. Our results indicate that this decline is transient for most species and within a few decades replaced by an increase. We suggest that local survival in moist stream-side refugia makes the land snails able to benefit from the higher pH and more abundant non-conifer litter in young than in old boreal forests.

438. COEXISTENCE NEEDED, BUT ERADICATION WANTED: IF WE CHOOSE TO LISTEN, HOW DO WE MANAGE VIEWS INCONSISTENT WITH CONSERVATION OBJECTIVES?

Sutherland, Maggie, Memorial University of Newfoundland, Canada

To achieve conservation, human dimensions research is needed to address complex human-wildlife conflicts. The challenge is how to manage views that may not be supportive of conservation efforts without public involvement becoming manipulation. Europeans have recently seen Bruno, JJ1, travel across boundaries where little was known about public attitudes toward expanding carnivores. Similarly, coyotes in 1985 arrived to Newfoundland, Canada. For some, this is a natural expansion requiring coexistence, but for others it is an alien, non-native species described as the “unwelcome intruder” that clearly must be eradicated. While JJ1 seemed perceived positively by farmers and the public, in Newfoundland coyotes have resulted in wildlife conflicts particularly with outfitters, hunters and sheep farmers. Data were collected from several European countries and Newfoundland through quantitative questionnaires to understand attitudes toward and beliefs about carnivore management. In Newfoundland, caribou numbers were perceived as declining but support for management options varied greatly across the two predators. In contrast, data from European countries show more support for such carnivores. As Europe struggles with how to integrate public attitudes toward expanding populations of wolves and bears, our comparative study offers insights on how to balance interest group views in making decisions.

439. RECONSTRUCTION OF THE HISTORICAL DEVELOPMENT OF THE SPRUCE MOUNTAIN FOREST

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The objective of this study was to reconstruct the history of disturbances and examine their effects on the dynamics of a mountain spruce dominated forest in the Šumava Mts., Czech Republic. Historical evidence documenting the occurrence of strong windstorms and bark beetle outbreaks was analyzed. The recent stand structure of a post disturbance stand was also analyzed on one site. Based on the historical evidence, several devastating windstorms, often followed by bark beetle outbreak, occurred in the region during the last several hundred years. Windstorms from the middle of the 17th century and the end of the 18th century were especially devastating and affected large areas of forest stands in the region. An analysis of the structure of a post disturbance stand revealed that the stand developed from natural processes in contrast with the traditional hypothesis of artificial origin. Based on these preliminary results and in light of other studies, the traditional paradigm about gap-phase dynamics of Central European mountain forests is discussed. The results have strong implications for the management of nature reserves and natural parks as well as managed forests.

440. GENETIC STRUCTRE AND DIVERSITY IN THE WESTERN POPULATIONS OF THE GLOBALLY THREATENED EASTERN IMPERIAL EAGLE (*AQUILA HELIACA*)

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The Eastern Imperial Eagle (*Aquila heliaca*) is a large raptor species of the the forest steppe regions of East Europe and Asia. In the western part of its distribution range, the species experienced rapid population declines during the middle of the twentieth century. Besides the strong westernmost population in the Carpathian Basin, remarkable populations are recently known from the Balkan Peninsula, Turkey, the Ukraine, and the Caucasus region. In the present study, we describe the current genetic status of these western populations of the Eastern Imperial Eagle and assess the levels of gene flow among them using seven nuclear microsatellite loci and a 345 bp long part of the MtDNA control region. According to our results, the historical bottleneck in the 20th century apparently had no effect on the genetic diversity of the Imperial Eagles in the Carpathian Basin, as this population shows a uniform genetic structure with a relatively high diversity. Additionally, we found evidences for gene flow between Central European and Balkan populations, and (despite the large geographic distances) this was also the case between Central European and Asian Eagles. Conversely, the neighbouring Macedonian and Bulgarian populations showed significant genetic separation.

441. RESTORATION OF DEGRADED SANDY OLD FIELDS BY USING COMBINED TREATMENTS IN THE FOREST-STEPPE REGION OF HUNGARY

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The area of Pannonic inland dunes and sand steppes has considerably decreased in the past century in Hungary due to intensive agricultural production. The abandonment of formerly cultivated fields in the 1990s resulted in large areas of degraded old fields especially in the nutrient-poor, sandy Kiskunság region. The natural regeneration of the sandy steppe vegetation is often hindered by limited dispersal of specialist species or by surplus nitrogen in the soil, thus the abandoned fields can remain at an intermediate state dominated by weeds for a long time. Therefore management techniques should be applied to facilitate the natural secondary succession of the sandy grassland. Field experiment started in 2002 on three old fields abandoned at different times to test the effectiveness of various treatments and their combinations (ploughing as a basic treatment, carbon source addition, seeding with target species and mowing) in plots of 1 m^2. Results of six years of treatments show that neither carbon addition nor mowing alone had no significant effect on the vegetation composition, but their combination had positive effect on the regeneration process. Seeding was successful, and the cover of sown species increased the most in plots receiving seeding and mowing in combination.

442. TOWARDS EVIDENCE-BASED MANAGEMENT OF ENDANGERED BUTTERFLIES: CASE STUDY FROM ŐRSÉG NATIONAL PARK, HUNGARY

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For the efficient management of endangered species scientific evidence on their ecology is necessary. In this study I collected data for the management plan of two protected meadow dwelling butterfly species, *Maculinea alcon* and *Euphydryas aurinia*. I mapped their populations in Őrség National Park (ŐNP), investigated their threatening factors and determined necessary action to assure the persistence of viable populations. I found that both species exist in small fragmented populations in ŐNP, and are at the verge of extinction. Both

species are most influenced by the management of their habitats and much less by the isolation of their populations. Their populations were largest on hay meadows unmown for the last four-six years. Furthermore, mowing in June-August destroyed 70% of the *E. aurinia* populations completely, and also many *M. alcon* populations. However, leaving a few stripes unmown allowed the survival of the populations in both species. Based on these results I propose that the conservation management of the two butterfly species should focus on the appropriate management of their habitats, i.e. mowing the meadows in late May and apply mosaic mowing regimes. To realise this management, agreements should be made between land owners/farmers and the ŐNP.

443. MECHANISTIC PREDICTIONS OF THE IMPACT OF CLIMATE CHANGE ON POPULATION TRENDS

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The uncertainty about the consequences of climate change on populations highlights the importance of anticipating its effects and the potential for mitigation. Most studies have focused on directly predicting future species distributions or extinction risks without necessarily understanding the underlying mechanisms. We use the European wild rabbit as model species to investigate population responses to future climatic conditions by first examining the effect of climate functional controls on individual population processes. We used reproduction controls to project European scale changes in breeding season from 1961-1990 to 2071-2100. Then, we modelled the impact of those reproductive changes at the population level. We found that breeding periods will tend to become shorter and more variable in the south, especially in the Iberian Peninsula, where the rabbit is autochthonous. However, in Northern and Eastern countries reproductive seasons are expected to stabilize and increase in length. According to our simulations these alterations alone strongly affect rabbit numbers, which would decrease in southern Europe where the species is currently vulnerable and increase towards the north and east, where it is an invader and considered as a pest. These results are especially concerning because the conservation-control dualism of wild rabbits would be strengthened by climate change.

444. CHALLENGES FOR GREATER SPOTTED EAGLE (*AQUILA CLANGA*) CONSERVATION IN THE BIEBRZA VALLEY

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The Greater Spotted Eagle (GSE) is a globally endangered species (included in IUCN red list and EU bird directive). In Biebrza Valley (NE Poland at the edge of distribution range), a stabile GSE population is monitored from 1988. Main threats and conservation issues for GSE are discussed in this paper. All GSE nest sites and home ranges are localized; nests are controlled for breeding success twice a year. There is no danger of direct nest damage of this species. The highest problem for GSE conservation is the high level of hybridization with Lesser Spotted Eagle *Aquila pomarina* (LSE). In 2008, within 20 GSE nests, 12 appeared to be hybrid. The hybrids are also fertile. Both GSE and LSE breed in forest stands. Feeding area however, shows some differences. Food analysis showed, that GSE mainly lives on waterfowl (wet habitat), while the LSE on smaller birds (Passeriformes), rodents, amphibians (dryer habitats). During the last 30 years Biebrza Valley is getting drier, the traditionally cut wet meadows, peat bogs are transformed. We believe, that habitat management (return the traditional meadow management) could prevent the frequent formation of the hybrid pairs, thus save GSE population.

445. BIODIVERSITY ASSESSMENT AS A TOOL FOR PARK PLANNING AND MONITORING. PRESENTATION OF TWO CASE STUDIES IN NORTH ITALY

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Information about the distribution and presence of different species (especially Vertebrates) are collected in many protected areas over time by different specialists. Parks usually have the results of these studies in form of distribution maps or data set, separated for each species or group of species, but when addressing biodiversity issues and more general planning a synthetic view of all this information becomes necessary. In this work is presented the process used to organise the all the available information to develop spatially-explicit indexes for two Italian Natural Parks, describing their landscape in terms of relative species richness, wildlife value, anthropic pressure and critical conservation areas. GIS and multi-criteria decision analysis approaches have been used to assess the most important areas for biodiversity conservation, that can be easily identified both by wildlife managers and decision makers. The maps and indexes developed in this work have been used to plan routine wildlife monitoring in the case of Adamello Brenta Park (Eastern Alps) and to support the decision process aimed at the revision of park zoning in Pineta di Appiano Gentile e Tradate Park (North Italy, Central Prealps).

446. POPULATION ECOLOGY AND CONSERVATION OF A SPECIALIST RAPTOR SPECIES, THE PALLID HARRIER *CIRCUS MACROURUS*

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The pallid harrier is a migratory raptor, whose breeding populations recently declined in its core areas (southern Russia and Kazakhstan), apparently because of a decrease in prey availability or breeding habitat alteration through the recent changes in land use. However, little is known on the breeding ecology of the species. During four breeding seasons in north-central Kazakhstan, we monitored vole abundance, breeding and foraging parameters of pallid harriers. We studied diet using pellets analyses and assessed interannual diet variations under fluctuating vole abundance. We show the species was highly specialized on small mammals (voles) but had a more diverse diet (passerine birds and reptiles) on low vole abundance years. We also found that hunting success (proportion of successful strikes) was worse than that of a closely related generalist species, the Montagu's harrier, in a low vole abundance year, when pallid harriers had to target alternative preys. This foraging strategy was linked to strong interannual variations in breeding parameters (breeding density, clutch size and breeding success). Our results indicate strong interactions between food availability, dietary specialization, foraging success and demographic strategies in this raptor species, which has important conservation implications for specialist predators in a highly changing environment.

447. PROFESSIONALISM - WHY LAWYERS GET PAID MORE THAN CONSERVATIONISTS

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Have you ever wondered why, as a conservationist, you don't get paid more, or why you are not always taken seriously? Ecology (including conservation) is not listed by the EU as a profession. Do you agree with this? You shouldn't, ecologists and conservationists are highly skilled and highly educated. Ecologists (including environmentalists and conservationists) are incredibly important professionals in the current scenario of economic downturn and global climate change – it will be their skills that enable ecosystem services and integrity to be maintained – and thus maintain life on earth. Conservationists need to be recognized as professionals, and it is vital that this is universal across the whole of Europe. They need to work to a system of standards, competency and best practice, and professional bodies have a role to oversee standards, codes of conduct, guidance, knowledge sharing, networks and continuing professional development. They need to contribute effectively to gaps in professional knowledge and practices - for example, Ecological Impact Assessment Guidelines, survey methodologies and databases of conservation evidence and good practice.

448. FIRE, LANDSCAPE, AND PHYSICAL ENVIRONMENT: A MULTISCALE ASSESSMENT OF A COMPLEX RELATION

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In this work we address the complex relation between fire regime the physical environment, landscape patterns and socioeconomic context in a multiscalar analysis. Specifically we address the question: What scalar factor blocks mediate the relation between fire patterns and landscape and socioeconomic dynamics? To address this we used a climatic stratification of mainland Portugal, based on cluster analysis of spatial data, and measure the competing explanatory power of each block (landscape structure and/or? composition and socioeconomic) within each defined strata through variation partition methods. As expected the scale has a major role in the outcome of the model prediction and in the variance explanatory power of the variables. At the regional scale and depending on the region variables relate with high fire occurrence could have the exact contrary connection in another region. At the local scale traditional fire relate variables i.e. road density, primary production performed poorly compared with landscape structure variables (interspersion index, large patch index). By contributing to a better understating of the characteristics and drivers of fire regime, results of this research should improve risk assessments at multiscale context and provide the foundations for land management strategies aiming the mitigation of the consequences of wildfires. João Torres is currently funded by FCT through grant SFRH/BD/24560/2005.

449. BRINGING IT BACK FROM THE BRINK - A PROGRAMME FOR THE RECOVERY OF THE BALKAN LYNX

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Following the massive declines of Eurasian lynx in Europe during the 20th century, 3 of the 4 surviving relict populations have begun impressive recoveries. In addition, many populations have been re-established through reintroduction. Only the relict in the southern Balkan mountains on the border of Albania, Macedonia, Montenegro and Kosovo has apparently not recovered. Although there is very little data available, all indications support its classification as a Critically Endangered subspecies (*Lynx lynx martinoi*). Since 2005 an international partnership of Macedonian and Albanian institutions together with Swiss, Norwegian and German partners, has been working to develop a research and conservation programme. This programme aims to improve data on the distribution and population status of lynx through the collection of local knowledge and camera-trapping. In addition, the programme facilitates the proclamation of a network of protected areas along the border regions within the IUCN Green Belt Initiative. In collaboration with the relevant authorities in Albania and Macedonia a cross border conservation strategy for the lynx has been developed. The results confirm that lynx are still present, but also indicate that its population size is probably very low.

450. TECHNICAL RECLAMATIONS VS. SPONTANEOUS SUCCESSION IN LIMESTONE QUARRIES: ARE WE CURING LANDSCAPE SCARES OR BURYING ITS CHANCE?

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The view of post-mining sites is changing rapidly among conservationists. The conservation potential of limestone quarries is well documented, but wider public still sees quarries as "scares in the landscape". This is mirrored in prevailing restoration routine, technical reclamations, consisting of covering by topsoil and sowing of herb mixtures and or afforestation. No comprehensive multitaxa study has assessed the potential of reclaimed mined-up sites for biodiversity conservation. We compared communities of vascular plants and several invertebrate groups (*Araneae*, *Auchenorrhyncha*, *Blattodea*, *Chilopoda*, Coleoptera: *Carabidae*, *Dermaptera*, *Diplopoda*, diurnal *Lepidoptera*, *Heteroptera*, Isopoda: *Oniscidea*, *Opiliones*, *Orthoptera*) of technically reclaimed and spontaneously restored limestone quarries in the Bohemian Karst, the Czech Republic. We recorded 692 species of targeted groups. A large proportion of conservation concern species (69 red-listed species, 96 rock and forest steppe

specialists) corroborated the great conservation potential of the quarries. Regression and multivariate analyses revealed the narrow affinities of both red-listed and xeric grasslands species to non-reclaimed plots, and avoidance of technically reclaimed quarries. Using spontaneous succession, instead of technical reclamations, represent an efficient restoration tool. The study was funded by the Czech Science Foundation (206/08/H044, 206/08/H049) and the Czech Ministry of Education (MSM 6007665801, LC06073).

451. PASTORALISM AND PROTECTED AREAS: FROM MONGOLIA TO THE GLOBAL PASTORALISTS' MOVEMENT

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Contemporary debates over Protected Areas (PAs) highlight the conservation community's increasing acceptance of diversity, in pursuit of still elusive synergies between poverty alleviation and conservation. Diversity encompasses not only the range of legitimate stakeholders, but, increasingly, their cultural and spiritual values, as evidenced by debates over Indigenous and Community Conserved Areas and Sacred Natural Sites. This paper addresses aspects of these key debates with reference to little-studied geographical contexts and to particular peoples; namely to post-Soviet Mongolia and to mobile pastoralists. In Mongolia the post-1990 influx of international donors transformed the nature and scale of conservation, with as yet poorly documented impacts on herders' practices and livelihoods around PAs. Empirical material is employed to explore how donor-driven and community-based initiatives have shaped the re-emergence and enactment of Mongolian pastoralists' 'traditional' conservation values, and with what effects. The paper proceeds to examine the broader relevance of these conclusions through reference to the emergent global pastoralists' movement and the role of conservation values and practices in pastoralists' attempts to maintain livelihoods and to forge a common identity. It thus exploits a unique opportunity to tease out livelihood as opposed to place-based commonalities and contrasts in critical debates over people and PAs.

452. MANAGEMENT OF URBAN NATURA 2000 SITES IN ESTONIA

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Estonia has designated 66 Special Protection Areas (SPA) and 507 Sites of Community Interest (SCI) under the Birds and Habitats directives, respectively. SPAs and SCIs form the national Natura 2000 network that covers 16% of Estonia's mainland. This paper describes the Natura sites in Estonian urban areas, their status and conservation objectives and analyses the efficiency of site management. All sites that entirely or partly lie within the town perimeter were included and sites that only border the towns were excluded from the study. The results show that 7 of 13 towns with a population exceeding 10 000 people host in total 11 Natura sites, with 1-3 sites per town. The prevailing habitat categories of Annex I of the Habitats Directive in these towns are forests, natural and seminatural grasslands, freshwater, coastal and halophytic habitats. Species listed in Annex II of the Habitats Directive include mostly fish, invertebrates and plants. SPAs have been designated mainly for the protection of habitats of waterfowl and waders. Management plans have been developed only for 3 sites in Tallinn. Protection rules have been established for 5 sites. Measures to ensure favourable condition of habitats are site-specific and management efficiency of Natura sites differ significantly.

453. GLACIAL RIVER CHANNEL STABILITY AND IMPACT ON DIVERSITY OF ALPINE FLORA COMMUNITIES, WITH IMPLICATIONS FOR ADAPTABILITY TO CLIMATE CHANGE

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Alpine flora is threatened by large scale changes in climatic regime, but may also be under additional pressure from less studied effects. Glacial retreat, at an average of 10 metres per year, has been documented in the Ödenwinkelkees glacial valley, Austria. A braided channel area has formed between two older moraines creating a highly dynamic environment with large fluxes in channel flow and sediment load, particularly during the growing season. Vegetation across this braidplain is subject to extremes of inundation, desiccation, and sediment deposition. We assess spatial patterns in plant communities and diversity across this area, and provide estimates of the impacts of channel instability on successional stage and diversity. Variation in floral species abundance, vegetation height, and sediment size distribution are examined across the braidplain. A chronosequence is calculated along the glacial valley, using dated moraines to age vegetation communities. This allows novel examination of the age of the braidplain communities, which is further related to fluctuations in channel flow (assessed using a series of high-elevation photographs). The implications of the future threat to this fragile community from further shifts in flow regimes are considered.

454. ON THE DIFFERENCE BETWEEN STRUCTURAL AND FUNCTIONAL HABITAT: LINKING BEHAVIOUR, ECOLOGICAL NICHE AND CONSERVATION IN BUTTERFLIES

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Vegetation types are usually considered to represent the environmental scene or habitat for animals. Therefore, appropriate habitat management is a key issue for conservation. However, resource-based approaches to define the functional habitat of an animal species more precisely as the spatial projection of the ecological niche that recognizes the fundamental ecological needs of the organism (i.e. consumables and conditions) have recently regained much attention, particularly for insects like butterflies. We show with butterfly case studies of heath land and peat bog systems the significance of taking into account functional habitat instead of structural habitat. The approach better allows to focus on thermal dimensions of habitat use, and hence, habitat management or restoration which is of growing interest in the era of climate change. The impact of changes in resource quality, quantity and configuration depends on the behavioural repertoire of the species considered, and its evolutionary potential. Historic resource distributions within and between particular vegetations have shaped behaviours, but they may no longer represent adaptive peaks under altered current environmental conditions. We discuss how one could promote population productivity of a threatened species by managing from a functional viewpoint resource quantities, qualities and configuration.

455. THE STATE OF EUROPE'S BUTTERFLIES

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In 2009 Butterfly Conservation Europe (BCE) will publish a new Red List of European Butterflies together with the IUCN. This Red List is based on 'the best information available' from national country experts. In some cases this information builds on thousands of volunteer recorders joined in monitoring and research projects, in other countries only a few individuals are active. For future work we want to raise the quantity and quality of the data. Distribution data can be brought together by online portals, making the information available immediately, not only to the recorders, but also to conservation organizations. For indicators using trend data, Butterfly Monitoring Schemes must be set up in more countries. These annual indicators will make it possible to keep track of the changes in butterfly diversity. Working together with colleagues from other species groups we hope to make this possible soon.

456. REMOTE SENSING AS A TOOL FOR NATURA 2000 HABITAT MONITORING: A NEED FOR CLEAR USER REQUIREMENTS

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The Habitats Directive (92/43/EEC) has been a great stimulus for nature conservation in the European Union. Member states made already important efforts, but real challenges remain. Establishing a monitoring system for protected habitats and species (Art. 11) and reporting on their conservation status every six years (Art. 17) is such a challenge to many authorities. Cost-efficient ways to acquire useful and up-to-date information are urgently needed. Remote sensing has a great potential to support the monitoring of Annex I habitat types. Yet, its use is still limited, and a more day-to-day use may be hampered by a lack of mutual understanding between what users need and what producers can deliver. We state that potential users of remote-sensing derived information can help to overcome these difficulties by making their requirements more explicit, in terms of characteristics directly related to remote sensing (e.g. thematic accuracy, spatial resolution). Within the Habistat-project (http://habistat.vgt.vito.be), we conducted a thorough requirement analysis for Annex I habitat mapping and monitoring and identified data requirements in which remote sensing can provide an added value. We illustrate how these user requirements can be subsequently exploited to tailor remote sensing products to the users' needs.

457. LAND ABANDONMENT AND BIODIVERSITY LOSS IN THE ALTA GARROTXA, CATALONIA (SPAIN): A PROPOSAL MODEL FOR RECOVERING OPEN AREAS

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The analysis of past and present patterns of agrarian areas using landscape metrics allow to characterize the influence of landscape heterogeneity on biodiversity, cultural heritage and fire forest hazard. We have estimated the reduction and isolation of these areas has led away from landscape heterogeneity towards a predominantly forest area in the Alta Garrotxa, a natural protected area, included in the Natura 2000 network. The progressive land abandonment supposes open areas with small size and bigger isolation with a big impact on biodiversity, cultural heritage and increase of risk of fire. Currently these areas require urgent management and modeling to provide alternative scenarios to maintain the actual habitats and recovery new ones. The sustainable development of this territory would have to make compatible objectives of conservation of biodiversity and the preservation of their Mediterranean features with support to agricultural activities. In this way, we have identified and prioritized these key areas for management action to maximize biodiversity and cultural heritage conservation and to minimize fire forest hazard and the management cost. We have developed a multicriterial analysis and GIS tools to create different proposed scenarios (suitability maps) and using model based on heuristics to create patches according to Mediterranean landscape patterns.

458. IBERIAN LYNX CONSERVATION BREEDING PROGRAM: A MULTIDISCIPLINARY APPROACH

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The Iberian Lynx Conservation Breeding Program follows a multidisciplinary approach, integrated within the National Strategy for the Conservation of the Iberian lynx, which is carried out in cooperation with national, regional, and international institutions. Main goals of the ex situ program include: (1) maintaining a genetically and demographically-managed captive population; (2) creating new Iberian lynx (*Lynx pardinus*) free-ranging populations through re-introduction. To achieve the first goal, the Program aims to maintain 85% of the genetic diversity presently found in the wild for the next 30 years. This requires developing and maintaining 60(30.30) Iberian lynx as breeding stock. Growth projections indicate that the ex situ program should achieve such population target by 2010. Once this goal is reached, re-introduction efforts could begin. Thus, current ex situ efforts focus on producing physiologically and behaviourally sound captive-born individuals. To achieve this goal, we use management and research techniques that rely on multidisciplinary input and knowledge generated on species´ life history, behaviour, nutrition, veterinary and health aspects, genetics, reproductive physiology, endocrinology and ecology. Particularly important is adapting our husbandry schemes based on research data to promote natural behaviors in captivity (hunting, territoriality, social interactions) and a stress-free environment that is conducive to natural reproduction.

459. VULTURES AND WINDMILLS: DO THEY FLY AT THE SAME HEIGHT? THE CASE OF THE ENDANGERED EURASIAN BLACK VULTURE (*AEGYPIUS MONACHUS*) IN THRACE, NE GREECE

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Vultures are thought to fly at high elevations, prospecting large areas during their movements. The objective of the present study was to make practical use of aspects of Black Vulture's (BV) Utilization Distribution Maps (UDM) for its management in relation to a number of proposed wind farm sites. We used high accuracy data from GPS transmitters placed on a sample of vultures. We hypothesized that there are no differences between the different individuals regarding flight height (FH) and ground altitude (GA) at the located positions, as well as

to the distances of those positions to an artificial feeding site (AFS). The vultures FH did not increase with the increment of the GA or distance to an AFS. Vultures choose to fly at similar heights and mainly rather low exploiting more the orographic lifts, like the wind turbines do, than the thermals. In the 68% of the records vultures were flying at a FH between 30 and 110 meters, that is to say inside the rotor swept area of the wind turbines used in the region. The BV's UDM is an important factor in the management of the species, and especially for the spatial planning of wind farms inside its home range.

460. TRANS-BOUNDARY COOPERATION – AN EFFECTIVE APPROACH TO CONSERVE BIODIVERSITY ALONG THE SAVA RIVER (BOSNIA AND HERZEGOVINA, CROATIA, SERBIA, SLOVENIA)

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The Sava River is the second largest tributary to the Danube River with outstanding biological and landscape diversity. The Sava River is shared by four countries (BiH, CRO, SER, SLO) with different levels of capacity and experience in biodiversity management. The quality of available data on distribution of Natura2000 species and habitats varies significantly. While CRO and SLO are advanced in data storing and processing in a central database, in SER it just started and in BiH is not in place yet. The countries are also at different stages regarding EU accession (Slovenia already EU member), including implementation of the Birds and Habitats Directives. During the last two years significant improvement in trans-boundary cooperation and capacity building has been achieved. Conservation institutions carried out field-mapping of Natura2000 species and habitats while using same methodology. Sufficient level of compatibility of existing databases recently used in the countries (Natura 2000, EMERALD) allows the data to be harmonized and further processed at the national as well as the overall basin level. However, there are different approaches regarding biodiversity and landscape management in the countries. Further strengthening trans-boundary cooperation and capacity building is essential to achieve long-term biodiversity conservation and sustainability in the area.

461. LIFE HISTORY PREDICTS ADVANCEMENT OF AVIAN SPRING MIGRATION IN RESPONSE TO CLIMATE CHANGE

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An increasing number of studies demonstrate that plant and animal phenologies such as the timing of bird migration have been advancing over the globe, likely as a result of climate change. Even closely related species differ in their phenological responses, and the sources of this variation are poorly established. We used a large, standardized dataset of first arrival dates (FAD) of migratory birds to test the effects of phylogenetic relationships and various life-history and ecological traits on the degree to which different species adapt to climate change by earlier migration in spring. Using the phylogenetic comparative method, we found that the advancement of FAD was greater in species with more generalized diet, shorter migration distance, more broods per year, and less extensive prebreeding molt. In turn, we found little evidence that FAD trends were influenced by competition for mating (polygamy or extra-pair paternity). These evolutionary correlations, coupled with the low levels of phylogenetic dependence we found, indicate that avian migration phenology adapts to climate change as a species-specific response. Our results suggest that the degree of this response is fundamentally shaped by constraints and selection pressures of the species' life history, and less so by the intensity of sexual selection.

462. BIODIVERSITY CONGRUENCE AT LOCAL SCALE: APPLICATIONS FOR LOCAL MANAGEMENT OF THE TERRITORY

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The creation of conservation areas traditionally has been considered a key to preservation of high value areas, in means of being a diversity hotspot or by the presence of interest species. However, the current social/political situation around the world requires declaring protected areas in a rapid way, so implementation of new methodologies is needed. In special those who led the decision makers and managers identify valuable areas without large budget efforts in terms of coordinating inventories and field sampling. These methodologies are best if are not geographic-dependant. We analysed the correlations between 5 taxonomic groups: birds, mammals, flora, amphibians and reptiles. We developed the study in a low mountain area, with a vegetation structure well distributed in the Mediterranean region. We sampled the richness and specific composition for the groups in 1 km^2 squares. The analysis show different correlations between the groups if we test the richness or composition. The same occurs if we test all the study area, or we divide it in natural/altered squares. Flora seems is the best richness bioindicator to detect bird and amphibians richness. Correlations between specific composition between taxonomic groups were detected, with interest in local-scale, but useless for application in distant areas.

463. FORECASTING IMPACTS OF CLIMATE AND LAND-USE CHANGES ON BIODIVERSITY: CAN WE PREDICT AND PREVENT THE LOSS OF RARE SPECIES IN PROTECTED AREAS?

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Multi-scale environmental changes, from global climate modifications to regional and local land-use dynamics, are nowadays the focus of much concern, since almost all ecosystems are predicted to be severely impacted by those changes. To address the impacts of environmental changes on rare species, we developed a Combined Modeling Approach (CMA) using subsets of predictors classified according to their scale of influence and the ecological context in which they are hypothesized to operate. The CMA framework is particularly useful to understand current and future distributions of species of conservation importance under climate and land-use changes. Here we illustrate

the CMA approach with models for rare species with contrasting distributions patterns in Northern Portugal. We compare the predictive power and the geographic projections of combined and non-combined species distribution models, "in and out" the Peneda-Gerês National Park, under current and future climate and land-use conditions. We show that the combined approach: (i) provides more informative predictions than traditional approaches, allowing refined prediction of changes in species distributions; (ii) provides the baseline for adaptive population management; and (iii) is a powerful tool to (re)-define reserve networks and for conservation planning. This study was financially supported by FCT (Portuguese Science Foundation), through PhD grant SFRH/BD/40668/2007 to J. Vicente.

464. CONSERVING GRASSLAND BIODIVERSITY BY RESTORATION: LOW-DIVERSITY SEED MIXTURES, WEED CONTROL, RAPID CHANGES, AND LANDSCAPE EFFECTS

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In a large-scale restoration project we studied the effect of sowing low diversity seed mixtures (containing 2-3 competitive grass species) on the vegetation regeneration on croplands previously used as alfalfa fields. In 10 restored fields (4 with alkali and 6 with loess seed mixture), in each field in 4 permanent plots the species covers were recorded between 2006 and 2008. In every year 10 phytomass samples were also collected before mowing near to the plots. We asked four questions: (i) Will weedy species flourish in the early period of secondary succession? (ii) Can weeds be suppressed by sowing competitive native grasses? (iii) Can succession towards the target native grasslands be accelerated by sowing compared to set-aside old-field succession? Our results suggest that sowing seeds of competitive grass species is an effective tool to eliminate weed domination. In a few years a perennial grasses dominated vegetation have developed, which prevent the establishment of weed species. The developed dense perennial grass cover and the accumulated litter both hamper the immigration of grassland specialists characteristic to reference grasslands. In restoration of species rich grasslands and also in the facilitation of immigration of specialist further management practices are needed (grazing, mowing and/or hay-transport).

465. LOCAL VERSUS GLOBAL PATTERNS: MATING BEHAVIOUR AND HABITAT CHANGES CONSTRAIN THE SPATIAL DISTRIBUTION OF AN ENDANGERED BIRD LEKKING-SPECIES

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While estimating the population dynamics and status of a given species, scientists have to accurately choose the spatial scales at which they assess population trends. Looking at a global scale without accounting for local effects would lead to misinterpreting results in the same way as looking at the same pattern in a much narrower window. The spatial dimension of population dynamics is thus essential to our understanding of biological processes. We illustrate this point with the case of the Little Bustard *Tetrax tetrax*, an endangered bird-lekking species whose last migrating population breeds in the agricultural plains of western France. Three complete censuses conducted in 2000, 2004 and 2008 on a 5000 km² area provided the number of displaying males, a good proxy of population size for this bird. The population decreased between 2000 and 2004, from 404 to 292 displaying males, but it now seems to have stabilized (280 males in 2008). However, the local dynamics showed much more contrast, with some leks completely disappearing while others increased. We investigate this complex pattern, assuming that males are highly mobile between years due to both a specific mating system and changes in availability of suitable habitats for females.

466. BEAVER'S (*CASTOR FIBER*) DEMOGRAPHIC EXPANSION IN THE CENTRAL EUROPE: SYNTHESIS OF CAUSALITIES

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The Eurasian beaver is considered as the best case of successful reintroduction. Spreading population are still settling new large regions and countries across Europe. Besides the sophisticated reintroduction programs expansion stands also on spontaneous migrations. The second mentioned case is slightly problematic because there can't be done or planned any PVA and other predictive analyses. These models should show how problematic the beaver settlement in specific region might be. And especially, cultural landscape of continental Europe is sensitive to changes made by beavers. We summarized main aspects responsible for huge demographic expansion of beavers. Our data and analyses are based on 30 years' existence of large herbivorous rodent in the central Europe. Main reasons of trouble-free existence and continuous dispersion stay on combination of high developed adaptive behavior (anti predation strategy, territorial defense, migratory potential, ability to modify environment, habitat and food opportunist) and well developed ecosystem conditions (no intra- and inter-specific competition, low predators density, sufficient riparian vegetation). Beyond that there are important conservational aspects (strong species conservation, reintroductions) which helped beavers reestablished their aerials. Only the concurrence of conservational aspect, ecosystem conditions and high level of adaptive behavior allowed large expansion in the second half of 20th century.

467. RESTORATION OF WETLANDS IN SOUTHERN IRAQ

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Wetlands between rivers Euphrates and Tigris, so called Mezopotamian marshlands, are situated in southern Iraq. The wetlands used to be typical floodplain wetlands with maximum extent during the spring snowmelt upstream while during the summer the wetland area decreased by 30-50% due to low precipitation and high evaporation. These wetlands originally extending over an area of 15,000 – 20,000 km2, have been devastated by the combined impact of massive drainage works implemented in southern Iraq in the late 1980s and the early 1900s and upstream damming. As a result, in 2003 only about eight percent of the original marshlands remained. In 2004, international program aimed at marshland restoration, was started. The early assessments suggested very poor

water quality, the presence of toxic materials, and high saline soil conditions in the drained wetlands. Despite that 39% of the former marshes were supposed to be re-flooded by the end of 2005. The field survey revealed high rate of reestablishment of native macroinvertebrates, macrophytes, fish and birds in re-flooded marshes. It is clear that water supply alone will not be sufficient to fully restore all the marshes and thus a goal of management should be to establish a series of connected marshes.

468. MEETING SPECIES-SPECIFIC MICROSITE REQUIREMENTS: A PREREQUISITE FOR ESTABLISHING SPECIES-RICH GRASSLAND OF HIGH CONSERVATION VALUE ON EX-ARABLE LAND

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Restored grasslands often fail to achieve the high species richness of their target communities. It is usually the habitat specialists from such target communities that fail in restorations, whereas habitat generalists characterised by wide ecological amplitudes perform much better. It has been assumed that the poor performance of specialist species in restoration projects may often be due to failure to create suitable microsites for their establishment during the initial phase of a project or to maintain such microsites in the longer term, thus effectively preventing the continued regeneration of habitat specialists. We established a large-scale experiment in species-poor grassland on ex-arable land to investigate a range of techniques and management options for creating and maintaining microsite types that allow the establishment and long-term persistence of habitat specialists known to perform poorly in restoration projects. Results from the first year of the project indicate that the specific microsite requirements of individual species strongly depend on whether they were introduced as seed or as plug plants. Successful establishment from seed tends to require more open microsites, e.g. created by strong mechanical disturbance, whereas successful establishment from seedling plugs requires more sheltered microsites, e.g. created by the band-spraying of herbicides.

469. ASSESSING CLIMATE CHANGE EFFECTS ON BUTTERFLY ABUNDANCE FROM WEATHER DATA

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Although the effects of climate change on biodiversity are increasingly evident by shifting ranges across taxonomical groups, the underlying mechanisms affecting individual species are still poorly understood. The power of climate envelopes to predict future ranges has been seriously questioned in recent studies. Amongst others, improved understanding of the effects of current weather on population trends is required. We analysed the relation between butterfly abundance and the weather experienced during the life cycle between successive years. We used data from the Dutch Butterfly Monitoring Scheme for 40 species over 15 years and corresponding climate data. We distinguished both average and extreme temperature and precipitation events and applied multiple regression to explain annual changes in population indices. Significant weather effects were obtained for 37 species, with the most frequent effects of temperature. Positive density-dependence suggested climatic independent trends in 11 species, however. Climatic warming is expected to affect the trends of 13 species, leading to an improvement for 8 species. Validation of short-term predictions reveals good potential for the adopted method in at least 14 species. However, data from the warm and dry year 2003 indicate that negative effects of climatic extremes are underestimated for butterflies in drought-susceptible habitats.

470. PLANT MIGRATIONS BETWEEN EUROPEAN MOUNTAIN RANGES AS INFERRED FROM PHYLOGEOGRAPHY OF *ARABIDOPSIS HALLERI*: BIOGEOGRAPHY AND CONSERVATION

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Arabidopsis halleri is a Central European mountain species occurring in Alps, Carpathians, Sudetes and Harz Mountains. Several studies were carried out in recent years in order to gain view into phylogeographic patterns of the species. Results of these studies have shown that natural range of *A. halleri* is geographically structured but have not enabled us to formulate detailed hypotheses on *A. halleri* postglacial migration routes in Central Europe. We carried out research on populations located in Sudetes, Southern Germany, and Carpathians in order to establish *A. halleri* migration routes within this area. In our study we used three non-coding regions of cpDNA: the trnK intron (trnK1-trnK2), and two intergenic regions (trnC–trnD and psbC–trnS) as well as ten nuclear microsatellite loci. Results have shown that Central European range of *A. halleri* is structured in five major groups. Our results revealed three main routes of postglacial expansion in Central Europe: (1) from Southern Germany nothrwards to Sudetes, (2) from the area of Tatra Mts. northwards to upland regions of Southern Poland, and (3) from Romanian Capathians nortwards to Eastern Carpatnians. In our presentation we will address biogeographical and conservation aspects of the phylogeographical patterns observed in investigated *A. halleri* populations.

471. MANAGEMENT TO CONSERVE BIODIVERSITY IS LIKELY TO INCREASE SOIL CARBON STORAGE IN UPLAND ATLANTIC OAKWOODS IN THE UNITED KINGDOM

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The objective of this research was to determine whether fencing to exclude grazing from upland woodlands to facilitate the natural regeneration of trees is likely to increase soil carbon storage. Permanent sample plots were established along a transect through Young Wood, the highest Atlantic oakwood in England, immediately prior to fencing and exclusion of sheep in autumn 2008. Plots outside the wood contained either heather (*Calluna vulgaris*), bilberry (*Vaccinium myrtillus*), gorse (*Ulex europaeus*), wavy hair grass (*Deschampsia flexuousa*) or mixtures of these species. The wood is 99% sessile oak (*Quercus petraea*) with woodland ground flora such as heath bedstraw (*Galium saxatile*). Soil samples were analysed for carbon and nitrogen content. Results indicated that more carbon is stored in soil under the oaks than in either heather, bilberry, gorse, grass or mixtures of these species. In conclusion, this study showed that fencing and excluding grazing to conserve Atlantic oakwoods at their altitudinal limit

in the United Kingdom is likely to have a carbon mitigation benefit as well as protecting and enhancing the biodiversity for which the management was initially intended.

472. FIRST ESTIMATION OF EURASIAN LYNX (*LYNX LYNX*) DENSITY IN GERMANY USING DIGITAL CAMERAS AND CAPTURE-RECAPTURE TECHNIQUES

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Conservation and management of lynx in Germany has largely relied on anecdotal evidence and presence-absence data because the elusive felids occur at very low population. These methods generally lack the scientific rigor necessary to accurately estimate population size and monitor trends. Lynx are individually identifiable by their unique spot patterns, making them ideal candidates for capture-recapture surveys. We evaluated the use of digital photography in capture-mark-recapture (CMR) techniques for estimating lynx population abundance and density within Bavarian Forest National Park. First we tested 6 available digital camera traps regarding trigger speed and detail quality to guarantee the individual recognition. In the second step we placed 52 camera traps on actively used travel path based on a systematic grid of 2.7 km. On each location two cameras were installed to document the coat patterns of each side. Until January 2009 we captured 7 different lynx (5 adult, 2 juvenile) and calculated lynx abundance estimates using the program MARK. Our results suggest that photographic CMR sampling may be a useful tool for monitoring demographic patterns. Therefore it is planned to extend the camera trapping across the adjacent Šumava National Park to enlarge the surveyed area and to implement a cross border monitoring.

473. A DETECTIVE'S GUIDE TO SOLVING ECOLOGICAL MYSTERIES: CONSERVATION IMPLICATIONS OF MULTIPLE IMPACTS ON RIVERINE FISH COMMUNITIES OF THE CZECH REPUBLIC

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Halting biodiversity loss depends on identifying causal links between declining biota and ecosystem impacts. Indicators of ecosystem status such as the Index of Biotic Integrity (IBI) or European Fish Index (EFI) frequently used for monitoring help identify where biota is impaired, but do not isolate reasons for their poor status. Riverine fish communities can be simultaneously affected by multiple impacts such as river regulation, habitat modification, water pollution, exotic species, land use, and severed migration corridors. These impacts are often correlated or causally linked, rendering univariate or even traditional multivariate statistical models irrelevant. We present our conceptual approach and preliminary findings using structural equation modeling (SEM)—a method for testing complex hypotheses and identifying causal pathways. At locations distributed throughout Czech Republic (Elbe, Danube, and Odra basins), we calculated the EFI and other fish indicator values, and developed models linking those values with environmental stressors. Our findings revealed that SEM is conceptually an appropriate tool for identifying stressors, but that interpretations depend heavily on the ecological indicator used and the kind of data available on human impacts. We believe this approach—identifying the "guilty" stressors from a lineup of suspects—is an important first step in prioritizing conservation.

474. COEVOLUTIONARY HISTORY OF A LICHEN SYMBIOSIS IN EUROPE AND ITS IMPLICATION FOR CONSERVATION STRATEGIES

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On a continental scale we studied the population genetic structure of the fungus and its green-algal symbiotic partner of the threatened epiphytic lichen *Lobaria pulmonaria*. We examined more than five thousand thalli representing more than 150 populations covering most parts of the European distribution range of the lichen, using eight fungus- and seven alga-specific microsatellite markers, respectively. Comparing allele frequencies among regions and computing the geographic centroids of non-randomly distributed alleles across Europe, we find a hotspot of geographically restricted alleles for both symbionts in Italy and the Balkans. This is evidence of a refugial area of *L. pulmonaria* where the coevolutionary genetic structure of the symbiosis has been conserved. On the other hand, there are also regions (Northwestern Europe, Ural Mountains) where the two organisms show an incongruent distribution of geographically restricted alleles. We stress that conservation strategies for symbiotic organisms should be based on an independent analysis considering the diversity and the level of differentiation of their single partners. This information can then be integrated towards a management strategy aiming to preserve the overall coevolutionary history of the symbiosis.

475. COSTS AND BENEFITS OF INFORMATION IN CONSERVATION PLANNING

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Information about both costs and benefits of different conservation actions is necessary for efficient conservation planning. However, the collection of information also carries costs and there is therefore a trade-off between investing limited funds into information or into actual conservation actions. We studied this trade-off and developed a general framework for analyzing it. One of the new insights from this framework is that the benefit from any type of information is higher when costs and benefits of conservation actions are negatively correlated but lower at positive correlation. We also explain why information about conservation costs is more likely to pay-off at low budget levels whereas information about conservation benefits is more likely to pay-off at high levels. As an example we describe under which circumstances detailed species inventories are likely to increase the species representation in a reserve networks. As species representation is non-additive but complementary, earlier analyses of information benefits have not covered this type of data. We conclude that detailed species inventories are more likely to pay-off at high budget levels, at high costs of reserves, when few and rare species are in focus, and when the species differ a lot in their distributions.

476. GENETIC CONSEQUENCES OF CAPTIVE BREEDING PROGRAMS FOR ENDANGERED SPECIES

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Captive breeding has become an important tool in conservation programs for endangered species. It is generally known that the genetic consequences of ex situ conservation can be substantial. However, empirical studies on its actual influence are still rather scarce. Possible problems associated with captive breeding include (1) loss of genetic diversity, (2) inbreeding depression, (3) outbreeding and gene pool swamping and (4) adaption to captive conditions. Here, we analyze the published literature on ex situ conservation genetics. Most studies were carried out for carnivores, ungulates or birds, whereas other taxa were strongly underrepresented. Microsatellites have become the dominant marker system for population genetic analyses. However, most studies did not provide all relevant parameters. Our data show that inbreeding can be avoided by a thorough management of the captive population. There seems to be a minimum number of founders (20) and a minimum size for the captive population (200) which are needed in order to avoid inbreeding and loss of genetic diversity. We conclude that more studies on the genetic effects of ex situ conservation and propose a general standard for the presentation of such studies. This would allow a better evaluation of the success of ex situ projects.

477. THE CHALLENGE FOR NATURA 2000: MANAGING HABITAT QUALITY FOR ANTS AND MACULINEA BUTTERFLIES

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Obligate myrmecophilic butterfly species, such as *Maculinea teleius* and *M. nausithous* that live as a caterpillar in the nests of the ant species *Myrmica scabrinodis* and *M. rubra*, respectively, have narrowly defined habitat requirements. Butterflies can only survive on sites with both host ants and the mutual host plant *Sanguisorba officinalis.* The butterfly population size is dependent on the density of host ants close to the host plants. In The Netherlands, *Maculinea teleius* occurs in a nature reserve while *Maculinea nausithous* is restricted to line shaped landscape elements like road verges and canal borders. One of the main factors influencing habitat quality for both butterfly species is the management of their habitat. It is of special relevance to the populations on road verges. Since their reintroduction in 1990, information on the population development and the ecology of the butterflies and the effect of management on the ant communities of the habitat have been collected. This information is now used to delineate Natura 2000 sites and develop management plans for these sites. In the future, sustainable populations of both endangered butterfly species will be realized on sites which are still corn fields and cattle pastures nowadays.

478. VALUATION OF MARINE BIODIVERSITY LOSS. APPLICATION OF BIOLOGICAL AND ECONOMIC VALUATION APPROACHES. GULF OF GDANSK – CASE STUDY

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Degradation and fragmentation of habitats lead to biodiversity loss and consequently, a decrease in the provision of goods and services that arise from healthy marine ecosystems. Therefore, there is an essential need to translate environmental change, such as marine and coastal biodiversity reduction, into monetary terms. The Gulf of Gdansk (Baltic Sea) was chosen as a case study area to implement the concepts and protocols of two different valuation approaches: socio-economic and ecological. Stated preferences method was used to estimate the value of biodiversity loss in the Gulf of Gdansk. The survey was designed to capture the Willingness To Pay (WTP) of inhabitants and visitors, to prevent a decrease in biodiversity in the region. For the purpose of biological valuation, the Gulf of Gdansk area was divided into a number of sub-zones and analysed by applying the assessment framework based on the following criteria: rarity, fitness consequences and aggregation. The intrinsic biological value of each sub-zone was assessed and scored relatively to each other and presented using GIS. The challenge is the integration of different scientific currencies but the unique connection between social and natural sciences is considered crucial for efficient biodiversity conservation.

479. DEMOGRAPHY AND GENETICS OF REINTRODUCED PLANT POPULATIONS: A CASE STUDY OF *ARENARIA GRANDIFLORA* L., AN ENDANGERED SPECIES IN THE LOWLANDS OF FRANCE

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The goal of re-establishment of the populations is to recover declining species, and to restore their evolutionary potential in a long-term self-sustained manner. *Arenaria grandiflora* L. (*Caryophyllaceae*) is common in southern and central European mountains. In France, it also appears in two locations of lowland regions (Fontainebleau forest and Loire valley) that are about 150 km apart. The populations of *A. grandiflora* in Fontainebleau forest have however, declined rapidly in the last two decades and it has been suggested that they might have suffered from inbreeding depression and/or fixation of deleterious alleles by drift. To preserve and restore *A. grandiflora* in the Fontainebleau forest, a reintroduction experiment was conducted in 1999 when six populations consisting of individuals originating from both the Loire valley and from the Fontainebleau forest were created. Since 1999, the reintroduced populations have been monitored for individuals' survival and reproduction success annually. In 2007, out off six reintroduced populations four were sustained and their genetic composition was assessed using microsatellite markers. In all four populations the individuals of both origins as well as 'hybrids' were detected. Significantly higher number of 'hybrids' than expected under random mating was observed. Our experiment highlights the benefit of mixing the origins for population restorations.

480. PROMOTING DEVELOPMENT, MANAGEMENT AND CONSERVATION OF UNDER –UTILIZED CROPS AND SPECIES OF NORTH WESTERN

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The Jammu and Kashmir State, located in the north western Indian Himalayan region, is bestowed with immensely rich land race diversity in major agricultural and horticultural crops, due to geographic features, ancient floristic and cultural richness. Its treasure house of wild economic plants, particularly wild

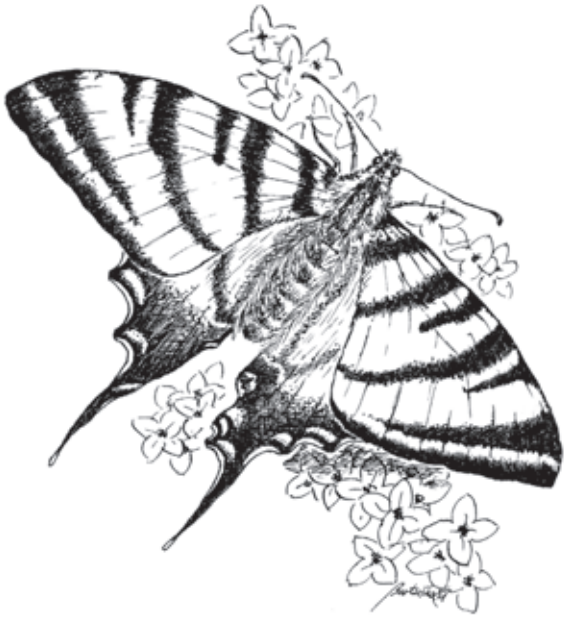
edible, medicinal and many lesser known plants which have been utilized locally since ancient times which are still supplementing useful sources of food, medicine. However due to modernization of agriculture and increasing intensification they have remained neglected and under utilized but have the potential to be more widely utilized, directly or developed as human food by genetic and agronomic improvements. In view of their socio-economic importance their management and conservation on long term basis will generate employment opportunities and guarantee food security for the people of the region. Realizing the importance of the rich biological diversity of the region a study on its development, sustainable management and conservation of its plant genetic resources has been initiated and most of the plant diversity of agri-horticultural significance has been estimated, documented, characterized and conserved. In the present paper the work done with respect to underutilized crops and species occurring in this part of the world is presented.

481. CALCAREOUS GRASSLANDS OF NORTH-WESTERN RUSSIA: VALUE AND CONSERVATION PROBLEMS

Znamenskiy, Sergey, Karelian Research Center Biology Institute, Russia

Calcareous grasslands are one of the most interesting natural objects in North Europe. They feature both high species pool and high species density, many relic and rare species of plants occur there. Calcareous grassland are especially rare still they occur only in geologically separated outcrops of limestone and dolomite. This investigation was carried out in 2005-2008 in three separated plots: Izborsk valley near Pskov, Izhora Ordovician plateau in Leningrad oblast (Znamenskiy et al., 2006) and Hiisjärvi-Kolatselga area in South-Western Karelia (Znamenskiy & Kuznetsov, 2006). All three areas are characterized as valuable for regional biodiversity. At the same tame conservation of these grasslands is complicated by several reasons. Basic problem is caused by fragmentation of grassland patches increasing with time. As it was shown fragmented habitats are less favorable for threatened species conservation to compare with not fragmented ones (Hanski, 1999). Comparison of communities observed with alvars of Sweden and Estonia confirms that conclusion. The second problem is related with legal causes. Russian environmental laws do not provide effective management for grassland preservation. The third problem is of economical nature. The organization of proper management for protected grasslands is complicated due to decreasing agricultural activities all across the Northern Europe.

ABSTRACTS OF SPEED PRESENTATIONS



Iphiclides podalirius
Graphics by Václav Bartuška

482. CONSERVATION AND ECOLOGY OF LADYBIRD COMMUNITIES

Ameixa, Olga, University of South Bohemia, Czech Republic; **Honek, Alois**, Res. Inst. of Crop Production, Czech Republic; **Kindlmann, Pavel**, Inst. Syst. Biol. Ecol. AS CR, Czech Republic

Conservation measures are usually carried out when species are endangered or in critical status. Ladybirds are not rare, but the conservation of their communities is now being discussed, especially after the establishment of an invasive species, Harmonia axyridis. Ladybirds are highly mobile and therefore it is unclear, what are the major habitats of individual species. A long-term survey from 1976 to 2008 was performed in order to study the community composition of coccinellid beetles and their relation with several kinds of habitats (trees, crops and wild herbs). The collections were performed by sweeping these habitats from May until the end of the summer. There seems to be a clear pattern of species associated more with trees and species associated with crops or wild herbs. In these collections the invasive species Harmonia axyridis has shown a clear deviating pattern since its relative abundances were higher than those of the native species after their establishment in the Czech Republic in 2006.

483. RABBIT DAMAGE TO VINEYARDS IN SOUTHERN SPAIN

Barrio, Isabel C., University of Córdoba, Spain; **Bueno, C. Guillermo**, Institute of Pyrenean Ecology, Spain; **Tortosa, Francisco S.**, University of Córdoba, Spain

Damages to crops caused by wildlife pose conservation challenges wherever they occur, causing conflicts of interest between local managers, hunters and farmers. The aim of this study is to assess the extent of rabbit damage to vineyards in an agricultural landscape in Southern Spain, and determine the factors that can alleviate the injury caused, in order to propose efficient management strategies. In spring 2008 rabbit damage was assessed with a browsing index on buds and shoots of vines, and rabbit abundance was estimated by pellet counting. In addition, the availability of diversionary feeding, i.e. natural herbaceous cover, was estimated in each zone, and the loss in grape production due to rabbit damage was calculated. Rabbit damage was positively related to rabbit abundance in the surrounding area, but decreased with increasing diversity of herbaceous plant species. Supplementary feeding or maintaining field margins in order to enhance food availability for rabbits, other than vines, may be proposed as a measure to lessen rabbit damage to vineyards in this area.

484. CITIZEN PARTICIPATION TO A SCIENTIFIC PROJECT: TOWARD A COMMON SCIENCE

Bergerot, Benjamin, Natural History Museum, France; **Julliard, Romain**, Natural History Museum, France

Recently, participatory Monitoring Schemes have become popular due to an increase in conservation awareness, which led to new requirements for tools improving our understanding of biodiversity changes. They allow the conciliation between public awareness and scientific projects. A wide scale participative experiment named “flowers for butterflies” was developed in 2008 in collaboration with the French Butterfly Monitoring Schemes. This program is based on pictures of feeding butterflies taken by amateur volunteers and validated by butterfly specialists. It permits to (1) assess adult butterfly food preferences and, in particular, evaluate whether butterfly species are specialist or generalist with respect to their focal resources; (2) understand which functional and ecological traits of the plants are predominant on butterfly attractiveness; (3) evaluate volunteer identification quality. Based on 4,288 plant/butterfly pairs, generalist and specialist butterfly species were categorized using a Species Specialization Index based on their flower preferences. The analysis showed that plant attractiveness was mainly explained by nectar quality. Data quality was also evaluated by using the comparison between amateur and specialist identification. Results indicated that 95% of species identifications were correct, which supports the use and reliability of the French Butterfly Monitoring Scheme to investigate species trends.

485. NEW CRYPTIC SPECIES OF RED WOOD ANTS IN THE SWISS ALPS REVEALED BY MULTIDISCIPLINARY APPROACH

Bernasconi, Christian, University of Lausanne, Switzerland; **Cherix, Daniel**, University of Lausanne, Switzerland; **Pamilo, Pekka**, University of Helsinki, Finland

Due to their importance in forest ecosystems, red wood ants (*Formica rufa* group) are considered as one of the best bio-indicator of forest stability and protected in many European countries. To date, the *F. rufa* group includes six species: *F. rufa*, *F. polyctena*, *F. lugubris*, *F. paralugubris*, *F. aquilonia* and *F. pratensis*. However, because of their morphological similarity and ability to hybridize, species identification can be very tough and the taxonomy of the group has been much debated. Since correct species identification is fundamental in conservation biology, more reliable methods for species recognition are strongly recommended. We therefore conducted a multidisciplinary approach, based on DNA, sex pheromones and behavior, to clarify the taxonomy of the group and to investigate their diversity within the Swiss Alps, where red wood ants are abundant. Our study provided new reliable tools for wood ant species identification, which will help in actual and future monitoring of these protected species. Furthermore, our data revealed the existence of an undescribed cryptic species within the Swiss National Park.

486. CHANGE IN ACCURACY OF DISTRIBUTIONAL RANGE MODELLING FOR RESTRICTED-RANGE PLANTS WITH DIFFERENT SAMPLE SIZES

Beton, Damla, Middle East Technical University, Turkey; **Bilgin, C. Can**, Middle East Technical University, Turkey

Spatial models of species distributions are increasingly used to predict ranges and assess future changes. Such predictions are especially important for restricted-range species. Many plant species with restricted ranges are under threat, and sufficient data for modelling is generally unavailable. Therefore, while modelling techniques produce acceptable results in general, for restricted-range species the output usually includes unacceptably large commission errors. We tried to observe the change of the models’ accuracy depending on the sample size. We used presence data for the Critically Endangered annual Centaurea tchihatcheffii from central Turkey to model its restricted-range using the maximum entropy based software Maxent. We improved through additional sampling the available presence data (only 5 occurrence records) up to 60 presence and 48 absence records. Then we compared the accuracy of the models constructed by using three different sample sizes of randomly selected 5, 10 and 20 points, with 20 of the remaining occurrence and 48 absence points used to test the models iterated 50 times. Although the mean accuracies of the models were all acceptably high (0.74, 0.76 and 0.77), the results showed that the models constructed by using 20 occurrences were significantly better than the models constructed by using only 5 occurrences.

487. ROAD, FOREST AND REGIONAL PLANNING AT EU'S EASTERN BORDER: HOW PLANNERS COPE WITH BIODIVERSITY CONSERVATION?

Blicharska, Malgorzata, Swedish University of Agricultural Sciences, Skogsmästarskolan, Box 43, 739 21 Skinnskatteberg, Sweden; **Angelstam, Per**, Swedish University of Agricultural Sciences, Skogsmästarskolan, Box 43, 739 21 Skinnskatteberg, Sweden

In contrast to many of the west EU Member States, eastern countries such as Poland that joined the EU in 2004 have a rich heritage of biodiversity. However, economic growth in terms of intensified agriculture, forest management and building of new roads pose threats to biodiversity maintenance. We investigated the extent to which Polish planners within sectors of transport infrastructure, forestry and regional planning understand policies aimed at biodiversity conservation and the underlying ecological principles. We made semi-structured interviews with planners in two Polish biodiversity hotspot regions. Our analytic framework was analysis of policy implementation studies and we focused on three questions about planners. Do they have adequate understanding on ecological issues as expressed in biodiversity policies? Are sufficient resources and data available for implementing it in practice? Are planners willing to act for biodiversity policy implementation? We also investigated the extent to which different approaches to planning, i.e. traditional sectoral or landscape approach are prevailing in planning. The study revealed severe gaps in the biodiversity conservation policy implementation process. The main barriers for biodiversity conservation in Poland were lack of relevant knowledge, resources and co-operation between various sectors. We suggest recommendations for improving the planning to support biodiversity conservation.

488. EFFECTS OF WILD BOAR ROOTING IN TRANSIENT AND PERMANENT SEED BANKS AT PYRENEAN GRASSLANDS (SPAIN)

Bueno, C.Guillermo, Institute of Pyrenean Ecology, Spain; **Reiné, Ramón**, University of Zaragoza, Spain; **Gómez-García, Daniel**, Institute of Pyrenean Ecology, Spain; **Alados, Concepción L.**, Institute of Pyrenean Ecology, Spain

Wild boar rooting is one of the main disturbances that directly affect seed bank structure and diversity in alpine grasslands. In these habitats the consequences of these disturbances have been scarcely studied, but are presumed to determine the successional process and ultimately the ecological recovery of the communities. In this study, our aim is to assess the impact of wild boar disturbances in seed bank diversity and structure. We stratified 200 samples at two depths to account for permanent and transient seed banks in the five most disturbed communities of Pyrenean grasslands. We also recorded vegetal cover, intensity of the disturbance and stocking density around the samples, to relate them with seed abundance in each area. We found that wild boar disturbances outstandingly increase the temporal seed bank in species-poor communities. Species-rich communities showed higher stocking densities and higher abundance of seeds in their seed banks that in turn did not seem to be altered by wild boar rooting. This would suggest that the dynamic of grassland communities is quite sensitive to recurrent animal disturbances, where wild boar rooting may play a key role in species-poor alpine communities.

489. POLLINATION ECOLOGY OF THE ENDANGERED *DRACOCEPHALUM AUSTRIACUM* L

Castro, Sílvia, Charles University in Prague, Czech Republic; **van der Meer, Sascha**, University of Amsterdam, Netherlands; **Dostálek, Tomás**, Charles University in Prague, Czech Republic; **Oostermeijer, Gerard**, University of Amsterdam, Netherlands; **Munzbergová, Zuzana**, Charles University in Prague, Czech Republic

Dracocephalum austriacum is a critically endangered species with discontinuous distribution across Europe. Seed set is low in all populations and is one of the transitions in the plant life cycle which most contributes to real changes in population growth rate. We thus aimed to study reproductive ecology of *D. austriacum* in order to identify potential actions to improve seed production. The plant is self-compatible but strictly depends on pollination vectors for fertilization. Dichogamy partially reduces the rates of spontaneous and mediated self-pollination (autogamy), although it does not prevent geitonogamy. The large flowers, which offer pollen and nectar as floral rewards, attract a diverse array of insect species. Pollinator assemblages, behaviour and abundance were variable among populations. Pollen limitation was observed in all populations and resulted from pollinator's scarcity and/or inefficiency. However, even after successful pollinations, seed production was significantly positively correlated with expected heterozygosity. Hand-pollinations revealed low seed production after selfing (inbreeding depression) but also after crosses between distinct populations (outbreeding depression). This agrees with high genetic differentiation among populations. The results provide new insights into the factors involved in the low seed production in this species and suggest that pollination services might be limiting its population growth.

490. TRADITIONAL ECOLOGICAL KNOWLEDGE IN CHANGING MOUNTAIN RURAL COMMUNITIES – A COMPARATIVE STUDY IN NORTHERN PORTUGAL

Cerqueira, Yvonne, University of Porto, Research Center in Biodiversity and Genetic ResourcesCentro de Investigação em Biodiversidade e Recursos Genéticos, Portugal & Faculdade de Ciências da Universidade do Porto, Portugal; **Honrado, João**, Centro de Investigação em Biodiversidade e Recursos Genéticos, Portugal & Faculdade de Ciências da Universidade do Porto, Portugal; **Pereira, Henrique Miguel**, Instituto Superior Técnico da Faculdade de Ciências da Universidade Lisboa, Portugal

The main objective of this study is to identify and compare the social changes, the level of Traditional Ecological Knowledge, the awareness of ecosystem services and the dynamics of agricultural practices in rural mountains of northern Portugal. Semi-structured interviews and questionnaires were conducted for all communities, and then combined with statistical data on land-use, population density and occupation, and landscape dynamics. A clear decrease in agricultural activities was found to be strongly correlated to the aging population, whereas in the past agriculture was the main economic activity in those areas. Results also indicate that most farmers still remember and some still practice traditional farming although many only do farming as a second occupation. Agrosilvopastoral mosaics, scrubland, terraced slopes, and forests are viewed by local communities as valuable and important in terms of ecosystem

services. Isolated communities were found to have a greater recollection of traditional ecological knowledge and to be less prone to modern farming technologies. Most farmers were able to identify land use changes in terms of ecosystem, technology, society and economy, rendering this type of information helpful for landscape oriented policies. Maintaining traditional agricultural practices in rural landscapes may be the strategy in sustaining these rich biodiverse biotopes. This study was financially supported by FCT (Portuguese Science Foundation), through PhD grant SFRH/BD/38031/2007 to Y. Cerqueira."

491. CARNIVORE V PEOPLE CONFLICT: THE MANED WOLF (*CHRYSOCYON BRACHYURUS*) IN THE SOUTHEAST OF BRAZIL

Consorte-McCrea, Adriana, Department of Geographical & Life Sciences, Canterbury Christ Church University, United Kingdom; **Nicholls, Michael**, University of Greenwich at Medway, United Kingdom; **Rubin, Rona**, Department of Allied Health Professions, Canterbury Christ Church University, United Kingdom

Conflicts between wild carnivores and people are a prime concern in carnivore conservation worldwide. The maned wolf is an endangered, endemic canid inhabiting the southeast of Brazil - highly populated, rich in biodiversity and endemism. The research investigates people's perception of the maned wolf around nature reserves; how that influences the species' status and conservation in such areas; and how such knowledge may improve conservation strategies for wolf and habitat. Questionnaires aimed to identify selected attitudes, beliefs and knowledge of target groups in relation to maned wolf, wildlife, conservation and to other target groups; and to compare these factors in urban and rural areas of three locations in the São Paulo state. Results suggested that most respondents have considerable knowledge about the maned wolf; have positive attitudes and beliefs towards the maned wolf and conservation; and value nature and wild animals. Results also indicated negative beliefs concerning maned wolf's feeding habits and mystical properties associated with parts of its body, as well as false associations between this and the European wolf *Canis lupus*, which need addressing. The research suggests that improving conservation strategies may depend on changes regarding conservation and education professionals' approaches to local people, to facilitate co-existence.

492. IS PARTICIPATION IN BIODIVERSITY CITIZEN OBSERVATORY A PLEDGE OF A BETTER IMPLICATION IN BIODIVERSITY CONSERVATION?

Cosquer, Alix, French Natural History Museum, "species conservation, restoration and populations studies" lab; Social Dynamics and Spaces Recomposition" lab, French national center for scientific research, France; **Raymond, Richard**, Social Dynamics and Spaces Recomposition" lab, French national center for scientific research, France; **Prévot-Julliard, Anne-Caroline**, French Natural History Museum, "species conservation, restoration and populations studies" lab; Communication Sciences Institute, French national center for scientific research, France

The growing anthropization of environments requires the participation of all citizens for an efficient conservation of biodiversity. Many authors deplore a growing disconnection of citizens with knowledge of ecosystems' functioning. They call for a better environmental education to increase public's commitment in favour of biodiversity conservation. Citizen science programmes propose to help achieving this aim. Participative sciences integrate citizens in scientific research mechanisms. They present a new approach of public's implication in biodiversity conservation. Thus, biodiversity observatories are based on the incitation to observe ordinary nature and on data collection. We propose to question the statement establishing a relation between knowledge and behaviour, showing that this affirmation is currently a non-demonstrated assumption in the field of biodiversity management. We will suggest some limits of this postulate, when it is included in a usual education structure. We propose to underline the original characteristics of the biodiversity observatory approach in citizen science and to show the expected advantages for the public's reconnection with surrounding nature. Our analysis model is the "Gardens' Butterflies Observatory" programme, set up by the Natural History Museum (Paris) and Noé Conservation. This question is the subject of an interdisciplinary thesis between human sciences (philosophy, geography) and conservation biology.

493. UNIQUE RODENT TAXON UNDER PRESSURE – STATUS AND DISTRIBUTION OF VOJVODINA MOLE RAT (*NANNOSPALAX* (*LEUCODON*) *MONTANOSYRMIENSIS*) (MAMMALIA: *RODENTIA*)

Csorba, Gabor, Hungarian Natural History Museum, Hungary; **Nemeth, Attila**, Eotvos Lorand University, Hungary; **Krnacs, Gyorgy**, Kiskunsag National Park Directorate, Hungary; **Czaban, David**, Eotvos Lorand University, Hungary; **Farkas, Janos**, Eotvos Lorand University, Hungary

In the Carpathian Basin 4 endemic chromosomal forms of mole rats are known which, due to their genetic isolation, satisfy the criteria of Evolutionary Significant Units. Based on the prepared IUCN risk assessment, the transsylvanicus form is Vulnerable, the hungaricus form is Endangered while the other 2 forms (syrmiensis and montanosyrmiensis) were regarded as Data Deficient since there was no available data on them for over the past 20 years. A population of the montanosyrmiensis form completely unknown to date was discovered along the Serbian-Hungarian border in 2008. The newly discovered location is fragmented, small in size and endangered due to different agricultural activities. Including the new record this form is only known to occur in 3 areas in Serbia and Hungary. The new habitat is significantly different topographically and edaphically from the previously known 2 other localities, therefore, the theories concerning this form's habitat requirements and factors affecting its distribution are, in all probability, only partially acceptable. Due to the limited distribution area, the very low number of individuals and obvious threatening factors, the suggested IUCN category for this form is "Critically Endangered" and this unique rodent requires immediate conservation measures.

494. PHYSIOLOGICAL AND MORPHOLOGICAL VARIATION AMONG EUCALYPTUS WANDOO BLAKELY PROVENANCES FROM CONTRASTING ENVIRONMENTS

Dalmaris, Eleftheria, University of Western Australia, Greece; **Veneklaas, Erik**, University of Western Australia, Australia; **Poot, Pieter**, University of Western Australia, Australia

E. wandoo Blakely is an endemic tree species of the south-west of Western Australia, a highly biodiverse part of the world. It covers a rainfall gradient ranging from 300 mm to 1200 mm. The region has been massively cleared for agricultural purposes, resulting in numerous environmental problems (e.g. erosion, rising water tables, secondary salinization). Over the past four decades *E. wandoo* has been under the threat of crown decline, which we hypothesize is ultimately due to environmental stress. *E. wandoo* is one of the main tree species of the SW of WA, and is highly significant from a conservation perspective and for the amelioration of the existing environmental problems. Therefore, it is necessary to deepen our knowledge about the tolerance of the species to common environmental stresses. Physiological and morphological measurements were obtained for 25 populations across the species' distribution range using 6-month-old seedlings grown in a glasshouse. We found

very limited evidence of genetically determined physiological and morphological differences between populations from climatically contrasting provenances.

495. SOCIO-ECONOMIC IMPACTS OF THE INVASIVE SPECIES *DREISSENA POLYMORPHA* (ZEBRA MUSSEL) IN THE EBRO RIVER

Dittmer, Kristofer, Universitat Autònoma de Barcelona, Spain; **Rodríguez-Labajos, Beatriz**, Universitat Autònoma de Barcelona, Spain

The invasive freshwater bivalve *Dreissena polymorpha* was detected in the Ebro River in Spain in 2001. This study investigates the socio-economic impacts of the invasion 2001-2008 in the section of the basin where the species has been present the longest. Data are collected mainly through interviews and mail surveys. The analysis clarifies both direct impacts, such as damage to hydraulic infrastructure, and indirect negative consequences of the management response, e.g. navigation restrictions aimed at avoiding further spread of the species. Impacts are categorized according to an elaboration of the ecosystem services framework proposed by the Millennium Ecosystem Assessment. Results are expressed through a series of qualitative and quantitative indicators. The main direct impacts in absolute monetary terms are borne by the energy sector. The agricultural sector is significantly less affected in absolute terms, yet a third of the irrigation societies consider impacts important given tight profit-margins. 30% of population centres with Ebro water supply report at least moderate control costs, generally subsidized by regional authorities. The recreational navigation and angling sector suffers considerable indirect impacts, related to laborious administrative requirements and various restrictions to boat mobility. It is argued that many kinds of impacts cannot be expressed in monetary terms.

496. PREDICTIVE MODELS OF HABITAT AND SPECIES RICHNESS BASED ON CLIMATIC AND LANDSCAPE VARIABLES

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We tested the ability of climatic and landscape variables to predict plant species and habitat richness in 72 wetland ecosystems of the Greek Natura 2000 network. Landscape variables were spatial pattern metrics (e.g. habitat fragmentation and shape indices) and topographic data (longitude, latitude and altitude). Climatic data (e.g. mean annual temperature, annual precipitation) were obtained by WorldClim climate grids. Plant species diversity was analyzed as alpha diversity, i.e. number of plant species recorded in 100 m^2 quadrats. We built models using either landscape or climatic variables, or their combination to predict plant species and habitat richness. Fragmentation and area metrics were better correlated to habitat richness, while no landscape variable was significantly correlated to plant species richness. Among climatic variables, mean annual temperature and precipitation of the driest month stronger correlated to habitat richness, while isothermality was better correlated with plant species richness. Models using both landscape and climatic variables to describe habitat richness were based on fragmentation, area metrics and annual precipitation; those for plant species richness were based on isothermality and altitude. Our results suggested that combining climatic and landscape variables can construct better predictive models for wetland habitat and species richness than when using them independently.

497. HIGH GENETIC DIFFERENTIATION AMONG FRENCH POPULATIONS OF *VIPERA U.URSINII* BASED ON MITOCHONDRIAL AND MICROSATELLITE DATA IMPLICATIONS FOR CONSERVATION

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The meadow viper (*Vipera ursinii*) is currently considered as one of the most threatened snakes in Europe due to high habitat fragmentation, and particularly in France where its alpine steppe habitat is threatened by the ongoing global change and rural land abandonment. A scattered distribution on top of mountains and a specific meadow requirement contribute to its precarious status in France. Mitochondrial sequences (cytochrome b) and 6 microsatellites loci have been used to estimate the impact of fragmentation on the genetic diversity of 157 individuals belonging to 11 French populations. As predicted for fragmented populations, low genetic diversity was found within populations (mean divergence between haplotypes = 0.31%) whereas considerable genetic differentiation (First values are highly significant for most comparisons between pairs of populations) was evidenced among populations. Although a significant Isolation By Distance was detected for both markers, strong differentiation was also observed between some geographically close populations. This result leads to suppose that topographic factors (forest, valley or river) might represent huge barriers preventing gene flow among populations. Despite some discrepancies between the two markers, eight Evolutionarily Significant Units have been identified which should be taken into consideration for future management.

498. INTERACTION BETWEEN PREDATION RISK, DISEASE AND CONDITION IN THE WILD RABBIT

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Rabbits are a keystone species in the Iberian Peninsula and numbers have declined dramatically since 1950. Our goal was to identify the interaction between cover (predation risk) and disease in limiting population recovery. Such understanding is crucial to improving management techniques for a species of such ecological and economical interest. Our experiment took place in southern Spain in 4 breeding nuclei, two of them fenced to exclude terrestrial predators. Each nucleus contained 18 warrens randomly allocated to one of the following treatments: control, added cover, vaccination of susceptible rabbits against Myxomatosis or both cover and vaccination. From April-October 2007 we caught rabbits monthly in each nucleus to quantify: productivity, body condition, presence of Myxomatosis symptoms and ectoparasites, antibody seroprevalence and survival rates, estimated from recapture

rates and radio-tracking. Results suggested that exclusion of terrestrial predators greatly affected survival and vaccination success. Additionally, juveniles from both vaccinated and cover treatment were in better condition and showed higher survival rates. Productivity and ectoparasites were higher in added cover treatment. All rabbits were seropositive to Myxomatosis after the outbreak. We suggest that predation risk affects rabbit condition and productivity which in turn determines the impact of disease and the efficacy of vaccination treatments.

499. FOOD WEB COMPLEXITY AND BIOCONTROL IN LOW VERSUS HIGH DIVERSITY LANDSCAPES

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Landscape simplification due to agricultural intensification has led to the extinction of numerous species. However, only few studies have shown how the diversity of surrounding landscapes effects interactions among trophic levels and how this transfers into ecosystem functioning such as biological pest control. Here, we investigated the effects of high and low diversity landscapes (conventional fields in simple landscapes with <50% of semi-natural habitats versus organic fields in complex landscapes with >50% of semi-natural habitats) on trophic structure in cereal aphid-parasitoid-hyperparasitoid food webs in winter wheat fields in Germany. Aphid counts and mummy samplings were conducted at four dates between wheat flowering and harvesting. Our results show marked changes in food web structure and species dominance between high and low diversity landscapes. In contrast to our expectations, the most abundant parasitoid species was less specialized in complex landscapes, but produced higher parasitism rates. Our results show the importance of the landscape context for species interaction and the role of the identity of particular species for biological control which can be functionally more important than conventional community measures such as the number of species.

500. PHYLOGENETIC AND CONSERVATION OF A NEWLY REDISCOVERED SEABIRD, THE BECK'S PETREL *PSEUDOBULWERIA BECKI*

GANGLOFF, Benoit, National Center for Scientific Research, Chizé Centre of Biological Studies, France; **BRETAGNOLLE, Vincent**, National Center for Scientific Research, Chizé Centre of Biological Studies, France

Estimates of extinction risk and choices of conservation actions priorities are often defined based on the degree of phylogenetic distinctiveness of a taxon compared with its relatives and on its specific or sub-specific status. Identifying proper phylogenetic limits and relationships among taxa is thus essential to evaluate such risks and priorities, hence the importance of phylogenetic studies for conservation science. Petrels, family , present many unresolved phylogenetic relations and a majority of species have an unfavourable conservation status. Within this family, genus comprises four species, three of which are classified as Critically Endangered by the IUCN, including the recently rediscovered Beck's Petrel . Although most often considered a species, its phylogenetic relationship with Near Threatened Tahiti petrel is unclear and requires further examination. Here, using two mitochondrial and one nuclear marker, we investigate the phylogenetic relations in the genus, using all three known preserved specimens. Preliminary results from one mitochondrial gene highlight the need of considering as full species based on its distinctiveness from. It is expected that the two other markers will confirm these results thus reinforcing the call for urgent conservation actions.

501. APPARENT BENEFITS OF GLOBAL CHANGES ON A RAPTOR SPECIES: FROM RAW DATA TO REAL EFFECTS

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A major goal of ecology is to determine how global changes may affect ecosystems in order to predict and contain their consequences on the biodiversity. Until recently, global changes, especially climate warming and agricultural intensification, have always proved to be detrimental to animal species. We investigated the consequences of global changes on a specialist raptor, the Montagu's Harrier, breeding in an agricultural landscape. Data on the species' breeding parameters, on its main prey, the Common Vole and its agricultural habitat have been collected on a 450 km² area in West-France since 1994. Surprisingly, the mean laying date has significantly decreased of one day per year and couples produced on average one chick more than 15 years ago. At the same time, voles' cyclic dynamic was highly perturbed, presenting a flattening, not to say a disappearance of its cycle, affecting voles' abundance. Given the fact that one-year old females 1/ may breed only if resources are sufficient, 2/ lay eggs later in the season and 3/ are less productive than adults, we examine the possibility that changes of females' recruitment may be responsible for the apparent benefits of global change on this species and the potential link between resources availability, climate changes and agricultural intensification.

502. EX SITU CONSERVATION OF *DIANTHUS GIGANTEUS* SUBSP. *BANATICUS* (HEUFF.)

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D. giganteus subsp. *banaticus* is a rare species with a certain distribution in the western part of the south Romanian Carpathians (Caraş-Severin and Mehedinţi District). The researches were performed within the PN II/31-008/2007 (Rumanian Ministry of Education and Research) project, focussed on ex situ conservation. Three populations has been selected, located at different elevations: two from Domogled Cerna Valley National Park (Domogled Mountain and Ţăsna Gorge) and one from Iron Gates Natural Park. For each population has been established three subpopulations, at the same altitudinal range, which has been investigated from the coenological point of view. Biometrical studies have been initiated. These subpopulations occur in *Thymo pannonici-Chrysopogonetum grylli*, *Festucetum xanthinae* and *Achnatheretum calamagrostis* associations. In vitro cultures have been done using nodal explants and seeds from the field collected plant individuals, using three sterilization procedures. The cultures were initiated and maintained on different culture media, focusing on optimal multiplication rate and rhizogenesis. The best results were obtained on MS culture media with 0.1mg/l NAA and 1 mg/l BAP (maximum 35 neoplants/inoculum, of 4 to 8 cm length). The acquired rhizogenesis allow the acclimatization of plants. This ex situ collection allows future exchanges between botanical gardens and possible repopulation.

503. LIMNO-ECOLOGICAL CHANGES OF KOVADA LAKE NATIONAL PARK (*ISPARTA, TURKEY*) AND ITS CONSERVATIONAL PROBLEMS

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Kovada Lake is a graben lake in Lakes region of Turkey with shallow, eutrophic, freshwater character. After 1950s the water of the lake was directed to hydroelectric power station for energy and disconnected from the sea, which resulted in decrease of levels and restraining of european eels from entering the lake. In 1970, declaration of the lake area as a National Park provided official protection and it was rearranged for recreational acitivities. In 1980, to preserve the water level drainage was closed without significant success. After 1990, the lake became subject to sewage from Eğirdir town and non-point flow with intense pesticide load. Today, due to sewage discharge, agricultural surface inflow, food processing factory wastes fish and bird fauna were affected greatly, and it is becoming a dystrophic lake. Kovada lake, despite it legal status, is not seemingly saved from its dark future. In this study, a short history of a not properly conserved national park has been reviewed and confronted conservational problems have been evaluated.

504. IS IT POSSIBLE TO PROTECT ENDANGERED DRAGONFLIES (*ODONATA*) IN SECONDARY BIOTOPES?

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The landscape fragmentation, homogenization and the loss of unique biotopes are the main reason of extinction risk for many habitat specialist species. Dragonflies are a group of water insects, which are very sensitive to their habitat degradation, especially to the loss of vegetation canopy. The distance between the suitable habitat patches is increasing and the dragonfly species are looking for the secondary biotopes. It is very surprising, that the extensively managed fish ponds with the stable hydrological regime and the “extreme” specific industrial water biotopes (irrigated mine subsidence, sludge beds, spoil banks) provide suitable conditions for many endangered dragonfly species. Altogether 50 dragonfly species were found in the Karviná region over the last ten years were found exclusively in anthropogenic aquatic biotopes originating from coal mining activities. Our research is based on the intensive long-term biomonitoring of endangered dragonfly species. We have revealed that these “extreme” secondary biotopes provide very changeable conditions (very fast succession process) and sometimes are becoming a very attractive sinks (the ecological trap principle). The only way how to protect these secondary biotopes with the anthropogenic origin is to maintain the large-scale mosaic of water biotopes in various succession stages (to maintain metapopulation dynamics).

505. STRONG MALE-BIASED DISPERSAL AND HIGH LEVEL OF GENE IN A PECULIAR TERRESTRIAL AMPHIBIAN, THE ALPINE SALAMANDER (*SALAMANDRA ATRA*)

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Dispersal is a fundamental process for the dynamics of genes and individuals. Sex-biased dispersal, stemming from the sex-specific action of evolutionary forces promoting or restraining dispersal, has potentially important consequences for population dynamics, evolution and persistence. Thoroughly investigated in mammals and birds, dispersal patterns remain poorly explored in amphibians, a group that is currently facing a drastic worldwide decline; in this context, studying amphibians’ dispersal patterns becomes of particular interest. In this study we focused on *Salamandra atra*, an endemic alpine species showing a promiscuous mating system and extremely peculiar life-history traits (viviparity, late age at maturity and long gestation time), resulting in a very low female fecundity. Given these particular traits, we predicted a male-biased dispersal and tested this prediction using both field-based (mark-recapture) and genetic approaches. Our results revealed a surprisingly high level of gene flow among populations, which results quite exclusively from male dispersal, a pattern most likely induced by a strong kin competition between males for mating partners. These results indicate that, as recently shown for other amphibian species, alpine salamanders are much more mobile than suggested so far, which helps to understand their impressive ecological success despite a very low population turnover.

506. RELATIONSHIPS BETWEEN SOIL, VEGETATION AND ANIMAL COMMUNITIES ON BROWN-COAL MINING HEAPS IN NORTH BOHEMIA, CZECH REPUBLIC

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Mining activities strongly affects landscape character and ecological structures in mining districts. Reclamations in these areas create specific anthropogenous soils – a substratum for the most frequent biological management when continuous forests have to be established. In our study, man-made forests were compared with spontaneously developed forest formations of a similar age (18 – 45 years). For two spring seasons, we collected data on (1) insects inhabiting soil surface (Carabid beetles) using pitfall traps and vegetation (Heteroptera bugs) by net-sweeping, (2) slug and snails (Gastropoda) by methods of individual collection and sieving of leaf litter, and (3) birds by territory mapping, on 28 study sites in the mining region of Most, Czech Republic. Concurrently, we have studied some habitat characteristics. In contrast with the reclaimed sites, the non-reclaimed sites had higher internal habitat diversification, higher species diversity including more rare species, and also consisted of more individuals and species that represent higher levels of the food chain (bird and invertebrate predators), which we believe to reflect better conditions also on lower levels of the food chain. We conclude that spontaneous succession has to be an important type of landscape management in the post-mining landscapes and should be applied in a more extent than was done up to now.

507. *ACANTHOPHORA SPICIFERA*, AN INVASIVE MARINE MACROALGAE IN THE GULF OF CALIFORNIA, MEXICO. GEOGRAPHICAL DISTRIBUTION AND STATE´S INVASION

Hernandez-Kantun, Jazmin, Autonomous University of Baja California Sur, Mexico; **Riosmena-Rodriguez, Rafael**, Autonomous University of Baja California Sur, Mexico; **Lopez-Vivas, Juan-Manuel**, Autonomous University of Baja California Sur, Mexico; **O´Doherty, Dan**, University of Hawaii, United States; **Sherwood, Alison**, University of Hawaii, United States; **Rioja-Nieto, Rodolfo**, School for Field Stidies, Mexico

Acanthophora spicifera is an invasive species who are recently started to be found in the Gulf of California. We found the species in the summer of 2006 in one locality near the city forming a high density parch (over 300 fronds per square meter) in 500 m2. However, winter conditions affected this population producing thousands of fragments from the species started to spread. By the summer of 2007 the species started to appear in sites aprox. 1 km from the original area and by winter 2007 another spreading happen causing that the species were found widely present along 20 km of the coastline. In summer 2008 the species took over all the space along La Paz Malecon and start to be present in the Islands near La Paz. Biomass and cover has been evaluated with seasonal differences, showing a relationship between the spread and the population density. The spread of this species over protected areas (Isla Espiritu Santo and Isla San Jose) and several touristic beaches. An addition to this, we consider that this species is producing an impact over *Sargassum* communities taking over the space and potentially have effects over the biodiversity and the fisheries of the area.

508. USING HUMAN-IMPRINTED PHEASANT (*PHASIANUS COLCHICUS*) CHICKS TO ASSESS FORAGING SUITABILITY OF FARMLAND HABITAT

Hitchcock, Gwendolen, Imperial College London, United Kingdom; **Leather, Simon**, Imperial College London, United Kingdom; **Sage, Rufus**, Game and Wildlife Conservation Trust, United Kingdom

Pheasant (*Phasianus colchicus*) chicks, like many farmland birds, require a large proportion of insects in their diet for rapid growth and feather development. This study looks at foraging potential of different habitats on farmland in Lower Austria from a birds eye view using pheasant chicks that have been imprinted onto a human handler. By imprinting the chicks, they can be allowed to forage naturally in pre-selected areas giving a uniquely valid insight into foraging behaviour and diet in different crop and set aside areas. Significant differences in dietary composition were found between commercial crop fields and areas of set aside. For example, greater proportions of Hymenoptera were consumed in set aside areas whilst more Aphididae were eaten in the crop fields. Comparisons with the proportions of insects found in the field imply a marked preference for Hymenoptera over Hemiptera. The importance of set aside areas in terms of shelter and food is investigated and implications for the conservation of other species discussed.

509. ENERGY DRIVES THE SPECIES RICHNESS OF BOREAL FOREST BIRDS IN PROTECTED AREAS

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One of the few general laws in ecology is that species richness is a positive function of area. However, area could merely be a proxy for energy or habitat heterogeneity. The relative importance of those relationships is vague, and their mechanisms are unclear. We aimed to dissect which factors drive the species richness, and to identify the most probable mechanisms. Using bird line census data collected in 104 protected areas in Finland, we conducted simultaneous autoregressive models explaining species richness of boreal forest birds. Our results showed that productive energy - not solar energy, area or habitat heterogeneity - was the main driver of species richness. Among the tested hypothetical mechanisms, the sampling hypothesis received strong support. After accounting for sampling, the solar energy based hypothesis had an additional positive effect on species richness. Thus, species richness could be expected to rise in result of climate change. However, the bird species' range shifts may not be fast enough to keep up with climate change. As productive energy drives the species richness, protecting forests in high-energy regions is crucial: reductions of productive energy of the forest may lead first to disappearing of the rarest species due to pure random sampling process.

510. FACTORS RESPONSIBLE FOR SPECIES DIVERSITY AND COMPOSITION IN DRY GRASSLANDS

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In fragmented landscapes, plant species distribution may depend on local habitat conditions, as well as on landscape structure in the present and in the past. The aim of this study was to identify factors responsible for species diversity and composition of dry grasslands patches in forested landscape of Krivoklatsko Biosphere Reserve, Czech Republic. Specifically, I examined the effect of current habitat conditions and landscape structure, past landscape structure and continuity of the habitats for species diversity and composition at study localities. I used aerial photographs from 1938, 1973, 1988, 2000, 2004-6. I assessed the relative importance of all these factors for species diversity and distribution in the landscape. The present distribution of dry grassland species in the study region is significantly affected by current habitat conditions, current landscape structure as well as by past landscape structure. Current landscape structure is not so important for species composition of the patches, whereas it is almost as important as historical structure for species diversity. The highest diversity and specific species composition was found on large, well connected and continuous localities that were never forested since 1938. The changes in landscape structure in the past can thus have strong effects on current species distribution.

511. MITOCHONDRIAL DNA VARIATION IN BOA CONSTRICTOR: RECENT CONTINENT-WIDE INVASION OR CONSERVATION MATTER?

Hynková, Ivana, Charles University, Czech Republic; **Starostová, Zuzana**, Charles University, Czech Republic; **Frynta, Daniel**, Charles University, Czech Republic

We examined the 1114-bp fragment of mitochondrially encoded cytochrome b gene of Boa constrictor. We sequenced 115 samples belonging to six subspecies, and detected 67 haplotypes. Our analyses revealed presence of two distinct clades, one from Central America including neighbouring part of South America West of Andes, and the other one covering the rest of South America. The sequence divergence between CA and SA clades is about 5-7%, and thus roughly corresponds to separation at the time of Panama Isthmus formation before 3.5 Myr and/or the uplift of Colombian Andes. Surprisingly, the sequences divergence within the SA and CA clades are only 2-3%. This suggests fairly recent spread into their current geographic range. Thus, we may not be dealing with taxa with markedly old evolutionary history as one can expect, and it is not necessary to define so many conservation units as may be deduced from conventional taxonomy. Nevertheless, B. c. imperator (= CA clade) may be treated as full species, and also Argentinian B. c. occidentalis is genetically distinct from SA nominotypic subspecies and deserves its current conservation status.

512. BOXES MIMICKING TREE HOLLOWS CAN HELP CONSERVATION OF SAPROXYLIC BEETLES

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Many landscapes with old trees in Europe are fragmented and the long-term survival of the saproxylic beetle fauna is threatened due to habitat decline, isolation and skewed age structure in the tree populations. The aim of this study was to investigate to what extent artificial habitats can be exploited by saproxylic beetles. We constructed wooden boxes filled with different combinations of substrates like oak saw dust, oak leaves, dead hens, chicken dung, lucerne flour or potatoes and placed them on tree trunks. To investigate the importance of distance from dispersal sources, we placed boxes at different distances (0 to 1800 m) from three species-rich sites with high densities of hollow oaks. Over three years, nearly 70% (105 species) of the beetle species naturally living in hollow oaks were caught in 47 boxes and 10 of the species are on the Swedish Red List. The number of species associated with tree hollows in oak decreased with distance from sites with hollow oaks. In conclusion, the prospects for using artificial environments for boosting substrate availability, or to fill spatial and temporal gaps therein (like stepping stones), for saproxylic beetles are good.

513. BIODIVERSITY AND CONSERVATION OF AMPHIBIANS AND REPTILES IN CROATIA

Jelić, Dušan, State Institute for Nature protection in Croatia, Croatia

Among 61 species of Amphibians and Reptiles inhabiting Croatia, all species accept introduced *Trachemys scripta*, are protected by the Nature protection Act of the Republic of Croatia. In the Red book of Amphibians and Reptiles of Croatia there are 19 species and 8 subspecies in categories: CR (3), EN (3), VU (2), NT (11) and DD (8). The most threatened areas with high biodiversity and rates of endemism “hotspots” are Adriatic islands and Dalmatia. In this work we present new data and critical review of IUCN regional category for *Natrix tesselata, Ablepharus kitaibelii* and *Dolichophis caspius* that are currently in the data deficient category. *Salamandra atra* was previously not in Red book of Amphibians and Reptiles of Croatia but due to the new data we suggest it should be given data deficient category. Also for the first time the threatened species richness and areas or occurrence are calculated and presented.

514. THE INFLUENCE OF SEX MATURE OF WILD BOAR (*SUS SCROFA*) TO REPRODUCTION IN THE CZECH REPUBLIC

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Within the frame of our study were morphometric measurements of hunted wild boars in 3 different areas of the Czech Republic provided. Study took place in region of Doupov (NW Bohemia), Sušice (SW Bohemia) and Kostelec nad Černými lesy (Middle Bohemia). There were 654 measurements of wild boar taken in period from 2003 to 2007, which involved body length, height at withers, ear length, length of metatarsus and tail length. Age was determined according to evolution of teeth set. We found regional influence to all morphometric characteristics in each age category. This means that environmental factor affect physical development. To test differences among regions we used one way ANOVA, differences issue was proven on different significance level (F=15,4-3,6; p=0,035-0,000). Growth curves have polynomical courses and sexual dimorphism is perceptible from the age of 18 months. Furthermore we examined fertility of juveniles (up to 12 months) and subadults (from 13 to 24 months). Depending on region 25-60 % juveniles in age 7-10 months and up to 100% subadults in age 18-22 months became pregnant between November and January. The average number of fetuses was from 2,5 to 3,5 at juveniles, and from 4 to 7 at subadults , depending on region.

515. MODELLING METAPOPULATION DYNAMICS OF LICHENS ASSOCIATED WITH ANCIENT OAKS

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Oaks become naturally older than most other European tree species. The characteristic coarse bark structure of old oaks constitutes an important habitat for many specialized epiphyte species. In Sweden, crustose lichens dependent on ancient trees have received much attention as indicator species, and many are also red-listed. For the long-term preservation of these species we need an understanding of their habitat requirements and colonisation and extinction dynamics. We surveyed occurrence of six crustose lichen species on all 2095 big oaks within a 3 km2 area. Tree and environmental characteristics were measured. Our analyses showed that occurrence of all species were positively correlated with tree age. Several species showed a negative relation to increasing macrolichen cover and presence of ant-tracks. Four species had aggregated distribution patterns which may be the result of metapopulation dynamics. We currently work on fitting an incidence function metapopulation model that accounts for the effect of patch age on patch colonization. Preliminary results suggest that metapopulation dynamics are affected by both patch age and location. Recommendations on minimum age and maximum inter-tree distance to allow patch colonization will be given.

516. PUBLIC PERCEPTION OF MARINE CONSERVATION BASED ON SEMANTICS

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In the process of establishing any marine protected area (MPA) one of the biggest challenges is to obtain support of the adjacent local community. Even without miscommunication and misunderstanding this is a difficult task. Despite there being an IUCN definition of an MPA, there are many varied terms that describe a spatially defined area of the sea with specific management guidelines. Each term may perceived by different members of society in a different way. Research was undertaken in Croatia on Lošinj Island, where the establishment of a Special Marine Reserve is in progress, and on the Croatian continent. The term 'Marine Reserve' was analysed to assess the development of a local 'Not in My Back Yard' syndrome. A questionnaire, using a semantic differential, was designed to analyse individual's perception on the need for MPAs generally, and specifically their emotion attached to the phrase 'Marine Reserve'. Results showed that islanders exhibit considerably less enthusiasm for marine conservation than the control group. Although problems with terminology in conservation have been highlighted, little has been done to address this with regards to local communities. Perhaps it is time for policy makers to include sociologists and semantic experts in their projects.

517. GENETIC INDICES OF VULNERABILITY STATUS OF MARBLE TROUT (*SALMO MARMORATUS* CUVIER) POPULATIONS IN RIVER NERETVA, BOSNIA AND HERZEGOVINA

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Marble trout (*Salmo marmoratus* Cuvier 1829) is a freshwater salmonid fish, endemic in the Adriatic drainage. Though its IUCN status is LC (Least concern), on-site data indicate that this species is critically endangered in Neretva Basin. Main factors that led to effective population size reduction are reported to be: fragmentation of habitat, disruption of spawning pathways, excessive fishing during spawning season and hybridization with alochthonous species. The objective of this study was to investigate the level of introgression of alochthonous material in the genofond of the indigenous marble trout from Neretva river system in Bosnia and Herzegovina, using molecular genetic tools. Nuclear genome was genotyped using 8 microsatellite markers, and mitochondrial genome was examined for variation by PCR-RFLP of two coding (ND1 and ND5/6) and one non-coding region. Results of microsatellite analysis exhibited evidence of hybridization between marble trout and brown trout. Investigation of mitochondrial DNA indicated low genetic diversity of studied marble trout populations. Appropriate and comprehensive program for revitalization and conservation of marble trout populations in river Neretva is required.

518. ASSESSING CLUSTERING ALGORITHMS IN UTILIZING ENVIRONMENTAL VARIABLES AS SURROGATES OF COMMUNITY DIVERSITY

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Use of environmental surrogates to represent species or community diversity had been proposed to increase cost-effectiveness of conservation planning. Multivariate clustering techniques can be used to partition the environmental space and to select the most dissimilar sites to represent overall biodiversity. To explore the feasibility of this approach, I used a community map for the Lesser Caucasus Ecoregion in northeastern Turkey. As environmental surrogates, a least correlated set of 11 climate, soil and land use variables were utilized. I used average distance, centroid and Ward's algorithms for clustering at four different scales of 3, 5, 10 and 20 sq.km. Effectiveness was calculated after Trakhtenbrot & Kadmon (2005) and compared against a random null model. Monte Carlo simulations were used to determine significance level of each clustering analysis. Unlike a previous study, Ward's algorithm proved most effective in representing community diversity for all resolutions and was significantly different than random selections. Average distance clustering was no better than the random null model while centroid clustering showed intermediate but significantly different results at all resolutions. Representativeness of vegetation types was highest for 3x3 sq.km. resolution. These results are encouraging for the use of the environmental surrogates to represent the biodiversity.

519. THE IMPACT OF ELECTRICITY TRANSPORT INFRASTRUCTURE ACROSS A HETEROGENEOUS MEDITERRANEAN LANDSCAPE ON GEOPHYTE RICHNESS AND ABUNDANCE

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Many of the most important, in terms of rarity or/and endemism, plant taxa of the Greek flora are geophytes. Therefore, understanding the response of this plant group to disturbance is of key-importance. The present study took place across the north-east facing slopes of a low elevation mountain, near the Athens metropolitan area. Climate was typical Mediterranean and vegetation heterogeneity was high, as a consequence of a long and diverse land use and fire history. Furthermore, across the studied landscape unit there was a gradient from high to low grazing pressure. In winter 2003 a three-meter wide zone of the vegetation was destroyed in order to construct electricity transfer infrastructure. After the infrastructure construction was completed, this bare belt was left undisturbed allowing the establishment and growth of several species. Geophyte richness and abundance was recorded for two consecutive years both within the belt and as a control along the neighbouring undisturbed plant communities. The results showed a very low regeneration or establishment capacity of geophytes in contrary to other life forms, in particular annuals. Different vegetation patches were found to be characterized by different geophyte assemblages, with the most intensively grazed patches presenting the lowest geophyte richness.

520. IMPLICATIONS OF HOME-RANGE ESTIMATION AND HABITAT SELECTION IN THE MANAGEMENT OF THE ENDANGERED ROAN ANTELOPE (*HIPPOTRAGUS EQUINUS LANGHELDI*) IN KENYA

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The roan antelope was formerly widely distributed in Africa but now its distribution range is so drastically reduced that the species is faced with the risk of extinction. In Kenya, only a remnant of 43 roans is left in Ruma National Park (study area). Past research on the species has not fully revealed its habitat requirements and causal decline factors. This study investigates roan habitat selection and home-range dynamics using two groups and two lone males ground-tracked for six months (February to July 2008). Mean ± S.E home-ranges (km2) for 95% levels were 6.01 ± 0.14, 4.64 ± 0.13 and 4.64 ± 0.16 for the groups and 3.14 ± 0.50, 3.35 ± 0.47 and 4.72

± 0.49 for the males using minimum convex polygon (MCP), local convex hulls (LCH) and fixed kernel density (KDEhref), respectively. Wet and dry seasonal home-ranges did not differ significantly. LCH produced more realistic home-ranges that aligned with park fences and omitted inaccessible steep areas. Compositional analysis of second and third order habitat selection indicated that roans select different habitats for different activities depending on water availability and habitat composition. These findings can help formulate a roan recovery conservation strategy with clear guidelines on habitat management.

521. RESEARCH ON CAVITY-NESTING BIRDS AND CONSERVATION OF CAVITY TREES IN THE STATE FORESTS OF THE VYSOČINA REGION OF THE CZECH REPUBLIC

Kodet, Vojtech, Czech University of Life Sciences, Faculty of Environmental Sciences, Czech Republic; **Morawetz, Jiri**, Czech University of Life Sciences, Faculty of Environmental Sciences, Czech Republic

Research on cavity-nesting birds in the Vysočina Region, Czech Republic, conducted together with conservation work, supported results of similar foreign studies. The relationship between the origin of the cavity (bird specie), and the height of the cavity was statistically proved. Also, the data collected supported the results of earlier research works on the relationship between the number of cavities and tree species. The study was conducted together with conservation effort to preserve a part of dead and cavity trees, that are important for biodiversity, in commercial state forests. Czech NGO´s reached an agreement with the state forestry enterprise. The Lesy ČR enterprise agreed to avoid felling of trees that were marked by ČSO volunteers. The state enterprise supplied financial support for the operation. Marked trees will not be logged, and are to remain in the forest stands and clearcuts until the time of their death and decomposition. In total, there were 977 trees marked in the years 2007 and 2008. This number included 848 cavity trees with 1757 cavities that were included in the research study.

522. SEASONAL INFLUENCES ON NON-INVASIVE GENOTYPING OF WILD BOAR (*SUS SCROFA*)

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Non invasive genetic sampling without the need of capture provides a great potential for absolute population size estimation. These methods reduce stress and capture bias and increase the number of observations especially for endangered or elusive animal species. We developed a modified CaptureMarkRecapture-approach for population estimation of wild boar based on individual genotyping of faeces. Faeces proved to be suitable as DNA-source because of easy sampling and almost equal capture probability, however they implicates pitfalls like low DNA quality and quantity and genotyping errors. In this study we wanted to quantify the influence of seasonal weather conditions and food supply on DNA quality and quantity. Therefore, we collected from March 2007 till April 2008 in a monthly interval 119 feaces samples altogether in the Palatinate Forest in Germany. The genotyping was conducted with three microsatellite markers to obtain amplification rates and genotyping success in relation to air temperature, precipitation, humidity and seasonal food supply. The four seasons had an impact on the amplification and genotyping success with best results during the winter season. However, the different microsatellite markers showed specific reactions. In conclusion, time of sampling and choice of microsatellite markers are crucial factors for the reliability of non-invasive genotyping.

523. WHAT WE CAN SAY ABOUT BEAVERS (*CASTOR FIBER*) WITHOUT MEETING THEM

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Nowadays the population of Eurasian beaver is increasing. But detailed and reliable information about abundance are still missing. Population status is recently based on numbers of unique territories, only. But there are not consensus in techniques how to determine territory size (length) if we don't have data from radio tracked animals. We focused on testing of two methods of determining the territory size – radiotracking and noninvasive method based on beavers stand marks. Both of data were collect in floodplain forests in the south of Moravia and on small creeks in Český les Mountains. Also we radio tracked 28 beavers in 18 territories. Spatial telemetry locations obtained from October to January were compared with distribution intensity of cuts, dens, dams and scent marks (same localities and term). We used kernel density estimation methods, autocorrelations, nonlinear mixed models and generalized linear models. We can say that between intensity of stand marks and movement of tracked beavers in territory significant similarity exists. Also spatial distribution of both data sets is closely similar. Thus both methods can provide the comparable and replaceable results. In the future we would like to find an algorithm to assess the size of the territory just from stand marks.

524. EFFECTS OF MOWING ON POPULATIONS OF THE SCARCE LARGE BLUE BUTTERFLY (*MACULINEA TELEIUS*) IN SW HUNGARY

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Maculinea species are widely known of their obligate myrmecophilous lifestyle and they are flagship species in European nature conservation. We started a long-term habitat management experiment in SW Hungary in 2007 to provide a scientific background for the maintenance of the scarce large blue's habitats. We designated four stripes of different mowing types on each of four meadows along a stream. Three management types were mown in different time (May, September, May and September, respectively) and the fourth type was never mown. Abundance of butterflies, food plant (*Sanguisorba officinalis*) and frequency of host ants (*Myrmica* spp.) are surveyed every year in the flight period. Despite the short time-span of the experiment and the differences between the vegetation structure of meadows, we found significant effects of management. Butterfly and food plant abundance were higher in the more intensively mown stripes, while host ant frequency was higher in the less intensively mown areas. The latter may serve as refugee for ant colonies and are likely to be essential for the long-term persistence of *Maculinea* butterflies which need both food plant and host ants for their development. We conclude that

a mosaic-like mowing scheme would be optimal for the survival of *Maculinea* butterflies.

525. IMPACT OF AGROFORESTRY SYSTEMS ON BIODIVERSITY CONSERVATION IN PERUVIAN AMAMZON

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Tropical ecosystem in Peruvian Amazon is endangered by human activities (agriculture), which causes high biodiversity losses. Agroforestry systems are positively affecting biodiversity increase and work as the bioreservoirs. This research is focused on the biodiversity assessment in various agro-ekosystems (degraded soils, monoculture, agroforestry and rainforest for comparison) with the emphasis on agroforetry. As the indicate group class Insecta was chosen, because it's a significant ecosystem component, which allows easy collecting and manipulation. Insects were collected by using standardized methods during proven intervals and morphological species on a family level were determined. Data were evaluated by indexes for biomonitoring. To prevent data distortion by the dry climate, the control collection during rainy season was done for comparison. Our hypotheses H1: Biodiversity and species richness is higher in agroforestry than in other localities. H2: Agroforestry systems are working as the bioreservoirs and are significant for biodiversity conservation, were supported in extenso. On the basis the similarity of species richness in agroforestry to the secondary forest can be told that after the forest disturbation, the agroforestry systems are working as the species reservoirs for several forest insect species, by this are increasing the well-balanced biodiversity and simultaneously support the species conservation.

526. GENETIC VARIATION IN NATURAL AND ARTIFICIAL POPULATIONS OF *JURINEA CYANOIDES*

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Conservation of sufficient genetic diversity is crucial for long term conservation of species. If it is not possible to conserve the species in situ, ex situ conservation may be the solution. In such a case it is important to ensure that the ex situ population will maintain sufficient genetic diversity. *Jurinea cyanoides* is a perennial herb inhabiting dry sandy areas from Turkmenistan, through southern Russia, Ukraine to isolated sites in the Czech Republic and Germany. The species is listed among the most endangered species in Europe. We used isozyme analysis to compare genetic diversity of the last declining population in the field in the Czech Republic with ex situ population in the garden established using seed material from this population and with two large natural populations in Germany. In the future we will compare the diversity also with data from the centre of the distribution range. The artificial population has relatively high genetic variation. This variation is comparable to the only remaining natural population in the Czech Republic and to German populations. This suggests that the artificial cultivation enabled conservation of genetic diversity within this species and that this material can be successfully used for restoring viable natural population.

527. THE IMPORTANCE OF SPRING AREAS FOR THE BIODIVERSITY OF INVERTEBRATES IN OLIGOTROPHIC CATCHMENT

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Spring areas constitute a unique environment for rare species, thanks to their relatively stable physical and chemical conditions. Their mosaic structure creates substrate variability and wide food supply, increasing biodiversity and population density. In 89 selected springs in Blanice and Zlaty potok catchments (Bohemian Forest, Czech Republic) was identified 11 major taxonomical macroinvertebrate groups of permanent and temporal fauna. In the permanent fauna predominated the genera *Pisidium* (21,8%), *Gammarus* (13,0%) and *Crenobia* (6,9%). The significant variables, correlating with their occurrence, were sand as a bottom substrate, helocrenes (spring wetlands) as a spring type, amount of shade, total nitrogen and orthophosphate concentration. The headwaters support also the biodiversity downstream, through the detrital transport. Generally in small intact streams is low primary production, so the most important nutrient source is allochtonous matter. In the investigated catchments, the detrital input from the helocrenes is considered as one of main food source for the filter-feeder assemblages. From the natural conservation point of view, the important element is, in Central-European scale, biggest viable population of critically endangered freshwater pearl mussel (*Margaritifera margaritifera*), detritivorous mollusk. By conservation of spring areas we protect not even the ecosystem own, but contribute also to the conservation of downstream ecosystems.

528. HABITAT ASSOCIATIONS OF *AGATHIDIUM PULCHELLUM*, AN ENDANGERED OLD-GROWTH FOREST BEETLE SPECIES LIVING ON SLIME MOULDS

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Listed in the EU's Habitats Directive, *Agathidium pulchellum* (Coleoptera, *Leiodidae*) is one of the rarest and most poorly known *Agathidium* species in Europe. We studied the biology and habitat associations of *Agathidium* species occurring on slime moulds in 44 sites located in old-growth and mature managed forests in eastern Finland. We found *Agathidium* pulchellum exclusively on the slime-mould species *Trichia decipiens*. The host prefers mid-decayed aspen and spruce logs, and its incidence grows with both increasing log diameter and stand-level log density. We observed that even if its host was present, the beetle was absent from sites with less than 80 aspen and spruce logs per hectare. All sites with *A. pulchellum* were natural forests of high conservation value. Our results show that it is possible to systematically survey the occurrence of *A. pulchellum* in its potential habitats, which may facilitate monitoring the conservation status of the species in the future.

529. THE ROLE OF WOODLAND KEY HABITATS AS PART OF FUNCTIONAL RESERVE NETWORK

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Woodland key habitats (WKHs) represent new means to protect biodiversity in managed forests. The Forest Act of Finland defines seven types of WKHs, which enjoy legal protection. It has been argued that the WKHs are too small-sized and scattered in occurrence to be actually important in the maintenance of forest biodiversity. However, from the species' perspective WKHs form a network together with other reserves. In our research we evaluated the value and role of WKHs as part of the whole reserve network using graph-theoretical approach. Research was conducted in three areas (ca. 500 km2 each) located in Central Finland. The networks were formed separately for different biotopes and dispersal distances (ranging from 200m to 25km). We constructed networks with and without WKHs, and based on comparisons between the two networks we quantified the contribution of WKHs to overall network connectivity. We also examined the role of WKHs in networks based on patch importance indices. Results showed that WKHs make a remarkable contribution in enhancing network connectivity, especially for dispersal-constrained forest specialists. We suggest that the high density of WKHs, not their spatial configuration, makes them valuable.

530. GENETICAL SURVEY AND CONSERVATION OF THE LATEST *LITTORELLA UNIFLORA* L. (ASCHERS.) POPULATION OF THE GENEVA LAKE (SWITZERLAND)

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Littorella uniflora is a typical representative of the *Littorellion*, a vegetal community growing along the natural shores in the eulittoral zone of central European lakes. This community, including other very rare and endangered species, has been drastically reduced in the past century, with the last remaining communities, still almost complete, located around the Bodensee (Germany/Switzerland). In the Western part of Switzerland, the latest known population is situated on the Geneva Lake, near Douvaine in France. Being strongly endangered, a rescue plan has been established in collaboration with several institutes and NGO'S from Switzerland and neighbouring France. A genetical survey using RAPDs has shown that the number of haplotypes is reduced compared to the populations of Bodensee. The hydrological monitoring shows that there is still a potential very narrow niche for the species around this artificially regulated lake. The species has been cultivated ex situ, and measures have been taken since 4 years to manage the station, presently endangered by the growth of *Phragmites autralis* and trees. Eight hundreds plants have been reintroduced in 2004 with a great success, growing to more than 14'000 individuals in 4 year period.

531. BEAVER DAMS IN THE AGRICULTURAL LANDSCAPE

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The European beaver (*Castor fiber*) population in the Herdy area stabilized in 2006-2008 at around six families. During this time the beavers constructed 22 dams along 12 km of water canals. The water levels in the upper part of the watershed were raised to the beaver benefit. But the beavers in the lower territories suffered from a water shortage. The canal and ponds in the Pastviska area dried out and the beavers migrated to new habitats. In order to restore the water flow, five dams were removed from the canal body. However the dam removal was only a short-term method. The beavers returned and rebuilt their dams creating them mighty and higher. In the summer and autumn of 2008 some dams were experimentally perforated by 16 different plastic tubes. The diameter of the pipes was 10 to 30 cm. Water-flow pipes were monitored and checked during the winter. In January 2009 the revitalization channel system and the ponds were full of the water. The use of pipes is a good solution to protect beaver biotopes. Dams are an integral part of beaver territory and an important part in a functional system for distributing water in a fluvial agricultural landscape.

532. RECRUITMENT OF AN AFROMONTANE FOREST TREE IN A THREATENED FRAGMENTED ECOSYSTEM

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Tropical forest fragmentation affects animal and plant populations in different ways. Early plant stages are generally more sensitive than adults, yet shape their future spatial patterns. Therefore, studying how early recruitment varies at different spatiotemporal scales enhances our understanding about plant population spatial structure. We examined if, and to what extent, recruitment at early life-stages of the bird-dispersed tree *Xymalos monospora* differs between and within forest fragments varying in size, surrounding matrix and microhabitats. Three years of field experiments revealed that patterns of seed germination and seedling survival and growth were largely inconsistent, both in space and time. Recruitment did not consistently differ between fragments and showed high between-year variation at microhabitat-level, with decreased germination in gaps only in a dry year. However, performance of seeds and seedlings was consistently better away from than under conspecific fruiting trees. Our results imply that fragmented tree populations of *X. monospora* may become age-structured, or ultimately go extinct, if recruitment fails in subsequent years, especially so in small, disturbed forest fragments that are generally less buffered. Exotic plantations bordering indigenous forest fragments may provide suitable conditions for native tree recruitment; hence, forest expansion through enrichment planting should be considered in future conservation plans.

533. OPTIMAL COMBINATION OF AGES OF FOREST SET-ASIDES FOR THE PRESERVATION OF BIODIVERSITY IN BOREAL FORESTS IN SWEDEN

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Almost all of Sweden's boreal forest is managed in some way, protected areas are therefore important for the preservation of the biodiversity. Current reserves in Sweden are mainly consisting of old forests; my question is if this is the most

cost efficient way to preserve biodiversity? By using an optimization method, the combination of forest ages that gives the highest biodiversity value can be decided at different budget limits. Biodiversity value in this case is described by using a combination of forest variables used by the Swedish National Forest Survey, for example, amount and quality of dead wood and occurrence of deciduous trees. Results indicate that even with no budget constraint a combination of ages gives the highest biodiversity value and when the budget decreases the amount of younger forest increases if the goal is to get as high biodiversity value as possible. Money is often a limiting factor and my results highlight the potential of young forests as a cost efficient complement when establishing new forest reserves.

534. TECHNICAL INSTRUMENTS FOR BIRDS DIVERSITY PROTECTION BY DISTRIBUTION OF ELECTRICAL ENERGY

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The Czech Republic has very dense electric distribution line over 67 000 km outdoor electric line with tension 22 – 35 kV. The line consists of 800 thous. of pylons and transformer substations. For example CEZ Distribuce, a.s. operates with high tension line 2 500 km long. Losses of considerable amounts of birds (primarily birds of prey) come up every year. CEZ Distribuce, a.s. set aside 4 mil. EURO for diversity protection. The aim of diversity-proteciton programme is to cover the most dangerous parts of distribution line with protective systems, which facilitate safety landing and departure of birds. The history and present of use of diversity birds protection methods and evaluation of advantages and disadvantage of systems are desribed in this contribution.

535. BAT COMMUNITIES IN DIFFERENT HABITATS WITHIN A FRAGMENTED LANDSCAPE

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This study was carried out in five different habitats within a fragmented landscape of Central Portugal, namely: Bussaco National Forest (mixed forest), monocultures of pine tree (Pinus pinaster Ait.) and eucalyptus (Eucalyptus globulus Labill.), large agricultural fields and small patches of traditional agriculture. During 2008, bat communities of these habitats were monitored by line transects where bat passes were counted and ultrasound emissions recorded. These recordings were identified to the species, with appropriate software, in order to elaborate a list of occurring bat species and to evaluate the intensity of land use in each habitat. The objective was to compare the communities' structure and bat abundance in relation to habitats' biological richness. More than 1000 bat passes were identified, belonging to a total of 14 species/groups of species. More diverse and richer habitats seem to provide better conditions for bats, which is supported by the results that point mixed forest as the most intensely used habitat and eucalyptus woodland the less one, presenting pine tree plantations the greater bat diversity. Considering bats' importance to ecosystems' equilibrium, this kind of studies should not be disregarded during land use planning and the designing of management policies.

536. EVIDENCE OF ENEMY RELEASE IN THE SUCCESS OF *REYNOUTRIA JAPONICA* IN ITS INTRODUCED RANGE

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Understanding the success of alien plant invaders requires observing them in both native and introduced ranges. *Reynoutria japonica* Houtt. is native to Japan and Eastern Asia and is widely invasive elsewhere, especially in Europe. We conducted a field study in summer 2008 to compare twelve French populations (surroundings of Paris) with twelve Japanese populations (Tokyo and Hiratsuka). We evaluated the herbivory pressure in both direct and indirect ways. First, we harvested invertebrates from *R. japonica* stems and leaves via beating method. Then, we assessed the prevalence and graveness of leaf damage, by estimating the proportion of damaged leaves, and the damaged leaf surface. We also recorded stem density, stem length, and the degree of ramification. Last, we inventoried the flora in- and outside patches to analyse competition relationships. We found many more feeders in Japanese populations, especially beetles such as *Popilia japonica*. We also found higher prevalence and graveness of leaf damages in Japanese populations, with up to 100% damaged leaves. Besides, *R. japonica* patches were less dense, and individuals were smaller in Japanese populations. Our results strongly support the Enemy Release Hypothesis, though this is not mutually exclusive with other hypotheses.

537. NESTING BEHAVIOR OF THE INTRODUCED CHIMPANZEE POPULATION ON RUBONDO ISLAND NP, TANZANIA

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Seventeen chimpanzees were introduced onto Rubondo Island, Tanzania from 1966 to 1969. Although proper nesting behavior was not observed in originally introduced animals, the descendants are now able to built full-featured nests. Nesting behavior could be affected by the presence of elephants and absence of predators or/and other chimpanzee group. In total 1096 night nests were recorded from 2003 to 2008. The most preferred tree species for nest construction were Synsepalum brevipes, Drypetes gerrardii and Pancovia turbinata. Fruit of these species are important food items

in chimpanzee diet, despite chimpanzees usually do not prefer nesting in fruiting trees due to the increased predator attacks. Predation pressure influence also position of the chimpanzees' nests. However, our observations (average height of the nest = 14.2 m) coincide with data from other chimpanzee study sites. The presence of elephants may restrict Rubondo chimpanzees from constructing nests on more accessible lower branches. The absence of predators may have a significant impact on the size of the nesting group, which is notably smaller on Rubondo in comparison to other sites (average number of nests on the sleeping site = 3.55). Frequent re-using of the same nesting sites (more than 50%) indicate reduced fear of predators.

538. RURAL TOURISM IN AMAZONIAN PART OF PERU

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Rural tourism in Amazonian part of Peru The purpose of this paper is to analyse actual stadium of rural tourism in Ucayali region which forms part of state Peru. This region is considered as one of the most various in the world. The analysis is dedicated mainly to agrotourism and also partially to other forms of rural tourism. On the basis of this analyse are proposed treatments for improving economics, environmental and social conditions leading to sustainable development. The method of this research is based on sociological questionnaire. The research links to project „Influence of aesthetics values on tourism in some protected areas" (grant CIGA – č. 20094209).

539. HEDGEROW-DEFINED MEDIEVAL FIELD PATTERNS, THEIR DISAPPEARANCE, CONSERVATION AND SIGNIFICANCE IN THE PLANNING OF SUSTAINABLE AGRICULTURAL LANDSCAPES

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Hedgerow-defined medieval field patterns, pluzinas, are valuable heritage, as well as examples of sustainable agricultural landscapes. Their current fast disappearance brings urgent need for their study and conservation. Using GIS analyses and mixed-effect modelling, we have evaluated the development of pluzina hedgerows in model areas, the factors behind their disappearance and the dynamics of the structural attributes of their networks. Between 1950 and 2005, 341 out of 483 hedgerows disappeared, the total length of the hedgerows decreased by 71%. The most significant factors behind the disappearance of hedgerows are current land use in adjacent areas (also significant in interaction with slope gradient and with historical land use) and natural soil fertility. In the ecological functioning of pluzina hedgerow networks, hedgerow density, mesh size and the number of connections to woodlands are more significant than conectivity and hedgerow area. Dendrological and dendrochronological studies of pluzina hedgerows were also carried out, with a view to the dating of pluzinas before the earliest map sources. This method of dating has, however, proved unreliable in pluzinas. The results are used both in determining priority areas for pluzina conservation and in defining guidelines for this conservation. This study was supported by grants no. QH82162 and ME897.

540. BIODIVERSITY CONSERVATION IN AGRICULTURAL LANDSCAPE – A WIDE GAP BETWEEN SCIENCE AND POLICY OF PUBLIC SUBSIDIES

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A study was conducted to determine conditions and evaluate the impact of the Czech agri-environmental subsidies. The analytical part of the qualitative research consisted of a system of investigative questions that examined the „logic of intervention"; an approach used earlier in some foreign studies. The study found out that there is little evidence on the success (effectiveness or efficiency) of the rural development program in the years 2003 – 2006 (HRDP), as far as support for biodiversity is concerned, even though this was one of its declared goals. Even though the subsidies spent with the aim of environmental protection in the agricultural landscape were substantially higher than ever before, the lack of clear and measurable goals prevents from proper evaluation of real impacts. Small botanical, entomological and ornithological case-studies financed were not sufficient for evaluation of the program. Science did not support policy. Even though the rural program for the years 2007-2013 improved in some aspects, significant issues remain to be solved. One of them is the mechanism of the evaluation process when public authorities administering the program control also the process of evaluation. This raises doubts about objectivity. However, this problem has to be solved at the EU level.

541. QUANTITATIVE EVALUATION OF LANDSCAPE VISUAL QUALITIES

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Research presented here is at the beginning, therefore the papers deal only with methodology of future study. Human society has significant influence on biological diversity because it determines the landscape form, home of every species. Therefore, it is very important to know its preferences of landscape visual qualities. The aim of the research is to find a relationship between the objective attributes of landscape structure and the subjective evaluating attributes of landscape sceneries. For this purpose certain figures of different landscape structure will be chosen and documented. Attributes related to objective landscape structure will be quantified by using the ArcGIS. Subsequently the questionnaire about subjective evaluating attributes applied to chosen photography will be compiled. A list of questions will be evaluated by sufficient number of respondents to reach the good statistical conclusions. Beyond subjective evaluating attributes, short information about respondents will be a part of the question list as well, because the presumption is that different social groups will have very different perceptions of the landscape visual qualities. On the basis of sociological investigation and resulting statistic analysis, correlations between objective attributes of landscape structure and subjective evaluating attributes will be found.

542. ISLATED POPULATION OF THE AESCULAPIAN SNAKE IN EGER RIVER VALLEY, NORTHWEST BOHEMIA

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Isolated populations of the Aesculapian snake are known from Poland, Germany and the Czech Republic. The northernmost population survives above the 50th parallel in the Eger river valley. More than 200 km separates this population from nearest populations from the continuous portion of the range. Many hypotheses of the origin of the population via human introduction have been proposed since its discovery in 1880 but fossil records and recent genetic data supported its origin as a relic of a wider distribution during warmer conditions, now surviving under a sub-optimal climate. Various factors including isolation, a very restricted area, landscape changes and increasing anthropogenic pressure make the population especially vulnerable to extinction. Rapid decline in abundance has been documented since the 1980s. As the situation has deteriorated, an Action Plan in the Czech Republic for this species has been approved recently. The main goal of this Action Plan is to preserve viable population in the Eger valley by managing important existing biotopes such as hibernacula and egg-laying sites. Building new egg-laying sites and restoration of old and shady dry-stone walls can further support the population. Further research and environmental education are essential parts of the Action Plan as well.

543. DOES THE ROAD BRIDGE STRUCTURE AFFECT TRAFFIC MORTALITY OF ANIMALS?

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Roads and traffic have many impacts on animals. One popular way to mitigate the harmful effects is to build wildlife passageways of different kind. We studied how different structure of bridges affects traffic mortality of animals. In Southern Finland, we selected ten bridges with dry paths on both side of a stream, and ten bridges without passage possibilities. We explored control areas with similar landscape and traffic features but without streams for every bridge. Then we measured a 500 meter long road section on every area and identified road-killed terrestrial vertebrates on the verge of the road on ten occasions in the summer of 2008. We found a total of 318 dead vertebrates. Of these, 45 of carcasses were situated on road sections in the vicinity of bridges with dry paths and 123 on their control sections. 96 road-killed animals were situated in the vicinity of bridges without passageways and 54 on their control sections. We assume that the difference in the distribution of carcasses is a consequence of the structure of bridges: when animals could move under bridges without need to climb on the road their risk to get hit by cars were smaller than near bridges without passageways.

544. FISHERY-INDUCED RAPID EVOLUTION AND FISHING-GEAR ADJUSTMENT IN POPULATION MANAGEMENT

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Size-selective fishing, i.e. the systematical removal of larger individuals, may affect life-history traits such as individual growth rate. We used long-term monitoring data to test for such effects in a well-defined population of Alpine whitefish in Lake Joux (Vaud, Switzerland) and found evidence for fishery-induced rapid evolution within only 25 years of gill-net fishing. We then used individual-based modeling and quantitative genetics to study the potential short-term and long-term effects of various mesh-size regulations and hence of catch size and age distribution. We found that management measure, such as maximal mesh size limit, could not only prevent the fishery-induced growth decrease but could even help the population to recover from previous deleterious effects of fishing. We also found that total fishing yield would be higher on the long term (i.e. within the next few decades) if maximal mesh size limits are imposed than if they are not. Our quantitative analyses may help to reconcile short-term and long-term fishery interests with demographic and genetic aspects of fish population.

545. DID GENETICS ULTIMATELY SOLVE THE PROBLEM OF HYBRIDS DETECTION IN EUROPEAN WILDCAT POPULATIONS?

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Introgression of domestic cat genes into European wildcat populations is considered one of the main conservation problems for this endangered feline. In European populations, hybridisation can be either a widespread or sporadic event; hence, the precise mapping of introgression levels is essential to prioritize areas for preservation and to perform efficient conservation strategies. However, previous works clearly showed that developing more powerful tools is still critical to accurately identify parental and hybrid individuals of this species, due to the high similarity in morphology and genomes of wild and domestic forms. Domestication produced obvious changes in domesticates' reproduction, coat pattern, size and behaviour, therefore, we have been focusing our research on identifying polymorphism at candidate loci that may have been specifically selected during domestication and breeds improvement. We selected, so far, 20 new informative SNPs, which we combined with 39 highly polymorphic microsatellites and a small mtDNA fragment, to analyze over 650 cats sampled across all Europe. Using a combination of both slowly and fast evolving loci, we significantly improved the power of admixture analysis achieved so far, an approach that can be used to solve both evolutionary and recent questions on wildcats' hybridisation and, consequently, on its legal protection.

546. EFFECT OF CLIMATE CHANGE AND LAND COVER ON VEGETATION FROM BUCHAREST (ROMANIA)

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Bucharest City lays on 228 square km, with 70% built surface and 15% green spaces. Monitoring higher plant species, climate and land cover in urban-rural gradient, we used PCA and DCA multivariate statistical analysis and surface exchanges parameterization Surfex and Bass schemes coupling meteorological and land cover variables with vegetation changes. Different simulations based on climate change scenarios have been used for establishment the effect of physical parameters on vegetation changes. The natural ecosystems shrunk or disappeared once with the development of the city. The simulations shows that the changes in climate are much faster for plant species to adapt of the new created conditions determine the rapid loss of indigenous biodiversity, increasing the spread of exotic species. Changes in lad cover (prevailing asphalt, bare ground, buildings, etc.) lead to changes in climate. In the last years, extreme temperatures have been met in Bucharest, unusual for the steppe zone in which is situated the city. Changes in plant species diversity and populations distribution have been already registered. Wide population distribution presented the native species from steppe zone and species with large general distribution (ubiquiste) and some exotic species that became invasive. Scenarios and knowledge can be use for urban planning.

547. POST-RELEASE MONITORING OF REINTRODUCED ANATOLIAN MOUFLON (*OVIS GMELINII ANATOLICA*): DEMOGRAPHY, SPATIAL ECOLOGY AND CONSERVATION CHALLENGES

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Anatolian wild sheep (*Ovis gmelinii anatolica*) has single population left in Central Anatolia, Turkey, which recovered from 50 individuals to more than a thousand since 1970s in a 4000 ha. captive breeding station. A recent reintroduction program has formed a new population whose demography, home range and habitat selection is studied to evaluate the success and determine the further conservation strategies. Forty adult individuals were radio-collared and 28 juvenile were ear-tagged and tracked from 2005 to 2009. The survival of the population according to the age groups (females, 0: 0.0873, 1: 0.1398, 2: 1.000, 3: 0.4131, 3+: 0.4442) and the fecundity of adult females (2: 0.3750, 3: 0.2315, 3+: 0.3239) are estimated. A population viability analysis estimated the persistence of the population through restocking the population with at least six adult females/ year. The home ranges of the individuals ranged between 500 – 4700 ha. (mean ± SE.: 2108 ± 432). The habitat selection results showed a preference of southern aspects ($p<0.001$), medium to high slope terrain (slope > 15°, p1 km. away from settlements (p

548. HUNTING PATTERN NORTH OF THE BARDIA NATIONAL PARK: CONSERVATION CHALLENGES IN NON-PROTECTED AREAS

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Wildlife hunting and trade is a serious conservation threat both in Nepal. However, there is no understanding about the nature and trend of hunting and its consequences to the protected areas. We examined the nature and scale of hunting north of the Bardia National Park, using a human dominated forest landscape to assess spatial variations of hunting intensity. Focused Group Discussion with forest user groups and transect surveys were carried out to generate wildlife presence indices and to assess the forest conservation practices. Interviews with hunters, 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 higher close to the national park and in its northern side, which corresponds to the relative abundance of the wildlife. Hunting around the immediate periphery of the national park is increasing with time. The hunting pattern of common species and protected species suggests the presence of subsistence hunting, which could lead to emptiness of forests and consequently affect the protected area. Hence, it is necessary to include community based monitoring in forest users group through modification of law and effective government supervision.

549. STUDY OF SOCIAL BEHAVIOUR AND COMMUNICATION OF THE PHILIPPINE TARSIER USING RADIO-TELEMETRY AND BIOACOUSTIC METHODS AND IMPLICATION FOR CONSERVATION

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Our project focuses on social behaviour and communication of the wild Philippine tarsier (Tarsius syrichta). During the study we focus on 1. home-ranges, 2. communication and 3. maternal behaviour, combining radio tracking, focal observation and bioacoustic methods. We plan to determine mating system of the Philippine tarsier; describe behaviour during social interaction in detail; provide analyses of vocalisation, especially vocal repertoire of the species and the character of loud calls; and also collect preliminary data about maternal behaviour in this species. Beside the research activities we attend to conservation activities especially conservation education and raising awareness about the species in Philippines and the Czech Republic. The study will be conducted during three years in order to detect seasonal changes in home-ranges, behaviour and vocalization. We conduct our project on Bohol Island. Using the different approaches our study provides complex information about sociality and communication in this small nocturnal primate. It will contribute significantly to current knowledge about the Philippine tarsier which is insufficient in comparison with other tarsier species and thus it will be able to contribute significantly to its conservation. First part of the fieldwork is planned for this year with the preliminary results being presented on the conference.

550. DO LOCAL COMMUNITIES IN POLAND NEED EDUCATION ON NATURA 2000 PROGRAM?

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The following presentation discusses social aspects of the European Ecological Network - Natura 2000 (N2000) implementation process in the Polish Carpathians and educational needs on the popularization of N2000 goals among local communities. Study was performed using quantitative

methods (surveys) in two regions of the Carpathians. In total, survey was conducted on random sample of 605 inhabitants of four mountainous boroughs (2 in each region). The results illustrate main factors determining recognition of N2000 program among local communities, most important are socio-environmental conflicts associated with the program that have already appeared, economical activity and educational level among inhabitants. Further statistical analysis focused on locals' attitudes, knowledge and awareness about the nature protection initiatives, N2000 included, recognized that no matter what region, knowledge about N2000 is incomplete and/or often inappropriate or false. What is promising however, majority of respondents (>80%) would like to learn more about the program in the future. The following study was conducted within the EOG Project "Optimization of the use of the resources of the Natura 2000 network for sustainable development in the Carpathians".

551. EFFECTS OF URBANIZATION AND MANAGEMENT ON LAWN DIVERSITY

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Green spaces represent important refuges for wild species in cities, but the mechanisms responsible for the biodiversity distribution in these areas are still unknown. For that purpose, we performed inventories in about 100 Parisian (France) lawns (10 m² quadrats by lawn) and linked their floristic interest to (1) the characteristics of urbanization given by the Land Use Pattern and the distance from Paris centre, (2) environmental factors like luminosity, vegetation height, site area and (3) the type of management as mown frequency, uses of fertilizers and pesticides, public and animal access. A total of 180 species were identified, on which 13% were naturalized. As attempted the highest species richness and rarity were associated with a low management, as poor use of fertilizer, pesticides and limited access to animals and public but surprisingly this high diversity was also found in small lawns, surrounded by collective dwellings. These results permit to give several recommendations to optimize the management of lawns with respect to conservation of urban biodiversity.

552. POPULATION GENETICS AND EMERGING INFECTIOUS DISEASE IN AN ENDANGERED ISLAND ENDEMIC

Raisin, Claire, Durrell Institute of Conservation and Ecology, United Kingdom; **Greenwood, Andrew**, International Zoo Veterinary Group, United Kingdom; **Jones, Carl**, Mauritian Wildlife Foundation, United Kingdom; **Groombridge, Jim**, Durrell Institute of Conservation and Ecology, United Kingdom

The Mauritius parakeet (*Psittacula eques*) is documented to have recovered from < 20 individuals to over 350 in just 20 years, resulting in its recent downgrading by the IUCN to Endangered. The emergence of Psittacine Beak and Feather Disease (PBFD), a highly contagious viral disease, again brings the population under threat and has influenced the way in which its recovery can be managed. Genotyping of ~500 individuals at over 15 microsatellite loci has confirmed that a severe population bottleneck has occurred and has allowed examination of population structure. Levels of heterozygosity remain reassuringly high, possibly as a result of the populations' rapid recovery. Cases of extra-pair paternity have been genetically detected and this information has supplemented the social pedigree compiled from field reports. The number of supplementary fed birds that have tested positive for PBFD is significantly higher than those that do not receive supplemental food and the majority of birds that have tested positive have had direct or indirect contact with the captive breeding facility used during the intensive management of the population. A greater understanding of these infection parameters and of the role of inbreeding in disease susceptibility will aid the continued recovery of this endangered island endemic.

553. VISITOR OR INVADER? RECENT OCURRENCES OF STRIPED DOLPHINS (*STENELLA COERULEOALBA*) IN THE CROATIAN PART OF THE ADRIATIC SEA

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Although the striped dolphin (*Stenella coeruleoalba*) represents the most abundant cetacean species in the Mediterranean, it has never been considered part of the Croatian fauna. A review of the historical data together with inspection of the natural history museum collections in Croatia, scientific literature and unpublished data shows a recent progressive increase in the occurrence of this species along the Croatian coastline. In the past decade (1998 – 2008), striped dolphins were sighted on 9 occasions with a total of 12 individuals in the Northern Adriatic Sea. In the Central Adriatic Sea striped dolphins were sighted on 3 occasions with approximately 26 individuals. Analyses of the stranded dolphin reports also reveal a slight increase in their occurrence for this time span. More frequent reports suggest an expansion of this species home range and raises questions on the possible reasons behind it. Could it be due to a recovery of their preferred pelagic prey stocks? Is it in any way related to a progressive and almost complete disappearance of the generally sympatric short-beaked common dolphin (*Delphinus delphis*) from the Adriatic Sea (Holcer, 2006; Bearzi et al. 2004), or does it simply reflect a better familiarity with sighting reporting procedures and species recognition?

554. DENSITY AND HABITAT SELECTION BY MALE LITTLE BUSTARD *TETRAX TETRAX* IN CONTRASTING LANDSCAPES WITHIN SARDINIA (ITALY)

Santangeli, Andrea, University of East Anglia, United Kingdom; **Dolman, Paul**, University of East Anglia, United Kingdom

The little bustard *Tetrax tetrax* (IUCN: Globally near-threatened) has undergone severe range contraction, with extinction of national populations from 11 European and north African countries during the 20th century. Although habitat requirements and ecology are well studied in Iberia and France, the status and habitat associations of the Sardinian population are poorly known. This study investigated habitat preference and abundance of male little bustards in three Natura 2000 sites designated for the species in Sardinia. Good densities (2.7-3.4 displaying males/km^2) were found at Abbasanta, but numbers were significantly lower at both Campeda and Campidano (0.1-0.2 and 0.3-0.4 males/km^2 respectively). Logistic regression analysis of habitat selection by displaying males showed strong preference for pastures and new fallows, and within pastures, males selected areas with greater cover of legumes and herbs. Roads were avoided, while shorter vegetation was preferred. Vegetation height was negatively related to grazing pressure within pastures and recent fallows, highlighting the importance of livestock to providing suitable habitat for breeding male bustards. Overall, preferences show the importance of display, but also feeding habitats. Conservation efforts at the three sites should focus on maintaining extensively grazed pasture and fallow lands, and control building of new roads.

555. PROCESSES DRIVING TEMPORAL DYNAMICS IN THE NESTED PATTERN OF WATERBIRD COMMUNITIES IN ARTIFICIAL WETLANDS

Sebastián-González, Esther, Miguel Hernández University-Doñana Biological Station CSIC, Spain; **Paracuellos, Mariano**, University of Almeria, Spain; **Sánchez-Zapata, José Antonio**, Miguel Hernández University, Spain; **Botella, Francisco**, Miguel Hernández University, Spain

Nestedness is a common pattern in bird communities which use patched habitats where species-poor sites are subsets of species-rich sites. Several studies have focused on determining the processes that drive nestedness, but few have considered the changes in time of these processes. We used data from 6 years in two seasons (wintering and breeding) to explore the temporal changes in the causes producing the nested pattern of a waterbird community in man-made irrigation ponds. Nestedness was significant in all seasons and years, and this seems to indicate that the pattern was stable over time. The proportion of idiosyncratic species was higher than in other studies and some waterbirds among the idiosyncratic species were endangered. Selective extinction and colonisation were the most important factors producing the nested pattern, but the nested structure of the microhabitats at the ponds also caused the pattern. Moreover, the causes of the pattern changed temporally even if there were not disturbance events. In general, breeding communities seemed to be more stable than wintering communities, and the seasonal differences in the causes of the nestedness were larger than the inter-annual differences. Consequently, studies on nestedness concerning only one temporal moment should be considered with caution.

556. AN ECOLOGIC ISLAND: BIOTIC AND EDAPHIC FACTORS LIMITING THE DISTRIBUTION OF A RARE *PLANTAGO* SPECIES

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Plantago almogravensis is a Portuguese endemic, extremely localised, threatened by habitat reduction and small population size. This species is found mainly colonising bare ground soils not invaded by the surrounding dominant shrubland vegetation, in many decades. The objectives of our work where to determine biotic and edaphic limitations to the expansion of *P. almogravensis* populations beyond those ecologic island boundaries, in order to optimize conservation efforts. Two study plots (islands) were analysed by vectorizing the adult plants detected on overlaid high-resolution georeferenced RGB imagery. All *P. almogravensis* individuals and other vegetation were quantified in relation to microscale vegetation environments (shrubland, interface, nude soil and water-runoff) and a stratified soil sampling scheme was applied accordingly. Soil samples were analysed for abiotic (soil chemical properties, depth, water logging) and biotic properties (competition, soil microorganisms). The results show that competition and a chemical balance between aluminium and calcium in the soil are the most limiting factors for the species. This rare plant Al-hyperaccumulation capabilities only give it some advantage at the ecologic islands.

557. MULTIPLE HABITAT CHARACTERISTIC CUES LINKED TO NEST PREDATION RISK IMPROVE BREEDING HABITAT CHOICE IN NORTHERN WHEATEARS

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Breeding habitat selection is an important factor for individual fitness and population dynamics of species. It is, however, poorly known if individuals use single or multiple cues during habitat selection. Previously we have shown that Northern Wheatears breeding in the Swedish farmland prefer territory characteristics poorly linked to reproductive success, thus indicating non-ideal habitat selection. In a new approach we investigated information about nest predation risk and its links to habitat characteristics to see whether individuals may use cues linked to predation risk to improve their breeding habitat choice. We analysed nest predation risk over a period of 16 years (N=923 breeding attempts) in relation to habitat characteristics in the close surroundings of the nest using GIS-techniques. Results suggest that nest predation risk increases at the proximity of habitat interfaces (probably reflecting higher activity of the main predators, i.e. small mustelids and snakes). This relationship was tightly linked to vegetation height within the nest surroundings. It is therefore possible that individual wheatears use these simple landscape features to improve their breeding habitat choice and that the use of multiple cues during habitat selection trumps the use of single cues based on conspecific attraction or single environmental characteristics.

558. SPATIAL USE AND HABITAT SELECTION BY WHITE-TAILED EAGLES (*HALIAEETUS ALBICILLA*) IN NORTHERN GERMANY

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Information on spatial use and habitat requirements are essential for conservation and management of a threatened species. Nevertheless, detailed telemetry studies regarding these topics have been lacking for adult and territorial white-tailed eagles (*Haliaeetus albicilla*). Between July 2003 and January 2009 we equipped eight adult eagles with backpack transmitters combining GPS and VHF technology. We analysed location data using a Geographic Information System (GIS). The eight eagles under investigation used home ranges of 6 km2 up to 36 km2 (95% Minimum Convex Polygons) and 2 km2 up to 41 km2 size, respectively (95% Fixed Kernel estimates). Habitat composition within home ranges was different from the composition of the study area, with a smaller proportion of agricultural areas and settlements within home ranges. Concerning GPS locations, distinct preference of riparian vegetation and avoidance of agricultural areas and settlements was found using log-likelihood chi-squared statistics. The eagles were detected considerably closer to habitat edges than would have been expected from a random distribution, suggesting the importance of edge structures as perches. By the protection of habitat structures identified as crucial for white-tailed eagles by these and prospective results, the ongoing recovery of the German population can be directly supported.

559. THE DECLINE OF FINNISH CAPERCAILLIE POPULATIONS IN RELATION TO THE MASSIVE EXPANSION OF FORESTRY

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In Finland, Capercaillie (*Tetrao urogallus*) populations have a history of serious decrease starting from the mid-20th century. The decline is temporally in line with massive expansion of the modern forestry practices that have led to major changes in the landscape. We used tetraonid route-censuses from 19 forestry board regions and Finnish forest inventories (data on forest stand structure) to model the decline during 1964–1989. We used a log-linear second order autoregressive model to investigate the dynamics and trends in Capercaillie population densities. To enhance the accuracy of the density-dependent model, observation error in the density estimates and spatial autocorrelation of the residuals were taken into account. According to the model predictions, the average rate of decline was 1.2% per year (half-life 60 years). The decline was surprisingly uniform throughout the country, and hence most parsimoniously explained by an arbitrary log-linear trend. In terms of forest age structure the population decline could be linked to areas with low overall forest cover, e.g. southern and western Finland. Forestry and other human land use are evidently threats to Capercaillie populations. However, some recent examples of forestry actions show that practical forest management and Capercaillie conservation can be done in concert.

560. FACTORS INFLUENCING POPULATION DYNAMICS OF A CRITICALLY ENDANGERED PLANT SPECIES, *LIGULARIA SIBIRICA*

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Good knowledge of population biology, genetic diversity and environmental factors is necessary for efficient conservation of rare species. Our study species is *Ligularia sibirica*, critically endangered plant species protected by EU Habitats Directive (Annex II.). The centre of distribution is in Siberia. In Europe there are only isolated populations. We estimated genetic diversity of all populations in the Czech Republic and Slovakia, main environmental factors of the localities and assessed their importance for population dynamics. Genetic diversity was estimated using allozyme electrophoresis. Genetic variability within populations is 80.86%, between populations 12.59% and between studied regions 6.55%. Populations are significantly genetically differentiated. Population dynamics was studied using population transition matrices. Population growth rates are above 1 except for one strongly degraded population. Analyses of elasticity showed that transitions that most contribute to population growth rate vary with habitat condition and management type. The results suggest that the populations posses sufficient genetic diversity and have high production of viable seeds. This indicates that inbreeding is not a major problem and conservation of the species should focus on restoring habitat conditions of the localities.

561. MORPHOLOGICAL AND MOLECULAR DIVERSITY OF THE PROTECTED SPECIES OF *DIANTHUS* SECT. *PLUMARIA* FROM CENTRAL EUROPE

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In Central Europe, the protected carnation species of sect. *Plumaria* are characterized by strong habitat specificity and pronounced ecological differentiation. As substantial difficulties are encountered in delimitating species and subspecies, our research focuses on the investigation of this plant group through a combination of molecular genetic methods and a morphometric analysis. Twenty-five morphological characters, already used by researchers in the past, were selected and tested on 14 taxa (number of taxa depending on the interpretation of authors), using herbarium specimens as well as living collections originating from 60 localities. Epicalyx bract scales and petal morphology proved to be the most valuable characters for delimiting three species groups: *Plumaria*, *Petraeus*, *Superbus* agg. These characters were least variable in the *Plumaria* group (incl. *Dianthus serotinus*), suggesting the close relationship and recent evolution of the taxa of this group. The AFLP analysis supported the three major species groups and showed their vicariant distribution in East-Central Europe. The reconstruction of phylogenetic relationships among the members of sect. *Plumaria* has consequences for conservation and should contribute to the development of a better protection strategy.

562. PRELIMINARY RESULTS OF A LONG TERM CAMERA TRAPPING SURVEY IN A GLOBALLY IMPORTANT INTACT LARGE MAMMAL REGION IN NORTHERN TURKEY

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The limited information on large mammals presents an obstacle for planning of conservation strategies in Turkey. The study was conducted in Bartın and Karabük provinces in part of an important large mammal region in Northern Turkey between November 2007 and February 2009. In order to reveal the presence and distribution of large mammals, 81 camera-trap stations were established uniformly with 2x2 km grid system in homogenous forest habitat in the study area (~3800 km2). Additional camera-trap stations were placed at selected locations where mammal activity was observed during the ground survey. A total of 1500 photographs were obtained in 9461 active-camera-nights and presence of eight carnivore and four herbivore species (e.g. brown bear, wolf, wild cat, golden jackal, red deer, roe deer, wild boar) were documented. Camera-trap capture rates indicate that wild boar is the most abundant, golden jackal and brown bear are common, wolf and red deer are rare in the study area. The study also revealed the temporal and spatial activities of target species. The study results provide a scientific basis for improving wildlife protection and for developing a conservation strategy for the large mammals and their habitats in a globally important intact large mammal region.

563. SPIDER DIVERSITY AND AGRICULTURAL INTENSIFICATION IN CACAO AGROFORESTRY IN SULAWESI, INDONESIA

Stenchly, Kathrin, University of Göttingen, Agroecology, Germany; **Clough, Yann**, University of Göttingen, Germany; **Tscharntke, Teja**, University of Göttingen, Germany

The knowledge of spider response to agricultural intensification and possible effects on ecological processes in tropical ecosystems is still rudimental. There are but a few published studies on spider diversity in Southeast Asian, and none of these included agroforests. We investigated the spider fauna in 43 cacao plots along the margin of Lore Lindu National Park in Central Sulawesi. Our aim was to assess the effect of management and landscape context on spider abundance, diversity and distribution patterns between different strata. We caught canopy dwelling spiders by using branch eclectors, while the strata herb layer and litter were investigated by sweep netting, pitfall traps as well as litter sifting. In addition we recorded all spider webs detected visually from ground-level to 4 m height on 420 cacao trees. We identified 20 families. *Tetragnathidae*, *Clubionidae* and *Salticidae* each with 15% of individuals were dominant families in cacao agroforestry if spiders from all strata are pooled. Half of the families were caught only in one of three investigated strata, thus most of the spiders in cacao agroecosystem showed a clear preference for certain microhabitats with specific responses to environmental changes. We discuss these effects in terms of the consequences for spider communities and consequences for agroforestry functioning.

564. BIRD DENSITY AND SPECIES RICHNESS IN NATIVE AND PLANTATION WOODLANDS IN IRELAND: WHAT DIFFERENCES EXIST AND WHY?

Sweeney, Oisín, University College Cork, Ireland; **Wilson, Mark**, University College Cork, Ireland; **Kelly, Thomas**, University College Cork, Ireland; **Irwin, Sandra**, University College Cork, Ireland; **O'Halloran, John**, University College Cork, Ireland

Planting of non-native conifers is ongoing in Europe and such plantations must be investigated in terms of their contribution to biodiversity conservation. Native woodlands offer a reference point against which the biodiversity of plantations can be evaluated. Point counts were used to survey the bird communities in 20 native woodlands and 20 plantation woodlands in different stages of the forest cycle. Bird communities were investigated in terms of species richness and population densities using ordination and rank-abundance curves. Distance software was used to calculate bird densities. In plantations, community evenness decreased with age to the point where, in plantations over 30 years old, just three species accounted for almost 75% of overall bird density. Younger plantations (5-15 years) and native woodlands had a more even community structure, although species composition differed between them. Native woodlands had marginally higher species richness. This study suggests that the value of plantations to bird conservation may decrease as they mature, and that mature plantation woodlands should be regarded as a separate habitat type to native woodlands. Differences in forest structure likely accounts for the differences in bird communities, and management should target increasing structural diversity in plantations for the benefit of bird communities.

565. MOVEMENT OF HEAVY METALS AMONG ENVIRONMENT, MUCOID EGG CAPSULES AND TADPOLES OF THE AGILE FROG, *RANA DALMATINA*

Šebková, Kamila, Czech University of Life Sciences, Czech Republic; **Vojar, Jiří**, Czech University of Life Sciences, Czech Republic; **Kotíková, Zora**, Czech University of Life Sciences, Czech Republic; **Miholová, Daniela**, Czech University of Life Sciences, Czech Republic

We investigated heavy metals (HM) transmissions in environment (sediment, water, mucoid egg capsules and tadpoles) and their influence on hatching success of the agile frog (Rana dalamatina) in the Hornojiřetínská spoil heap (Most mining districts, North-west Bohemia, Czech Republic). In March and April 2007, 33 clutches were selected to analyse concentration of nine heavy metals (As, Cd, Cr, Cu, Fe, Mn, Ni, Pb, Zn) using Atomic Absorption Spectrometry. The overall clutch size was assessed as the number of well-developed embryos (tadpoles) and unhatched eggs. We expressed the hatching success as the ratio of living tadpoles to overall clutch size. The number of eggs in clutches and the hatching success weakly fluctuated among localities without significant effect of majority of HM on the hatching success. We found that significant relation only between the concentration of lead (Pb) in sediment and tadpoles. It seems that relatively high concentrations of HM monitored in environment do not affect the survival of frog eggs.

566. EFFECT OF AGRICULTURAL FIELDS MANAGEMENT ON DIVERSITY OF PLANT AND BIRD COMMUNITIES

Štefanová, Martina, Czech University of Life Sciences Prague, Czech Republic

Fertilizers and pesticides in farming perform to increase of profit in crop fields. Their negative influence on agroecosystems was recorded during the 20th Century. Preliminary results of my PhD study from Mezná, supported the hypothesis of positive effect of provident field management on plant and bird communities inhabiting agricultural landscapes. The aim of this broadening project was to extend the study areas, improve the design of monitoring plots to reduce dependence of study sites among themselves and enhance general validity of the results obtained in 2006. The core topic was to compare the differences in the structure of weed and bird communities in dependence on agricultural practices, i.e. fertilization by industrial fertilizers vs. moderate application of homestead fertilizers (dung) within two habitat types, fields and meadows. The study was conducted in two localities, at Mezná Village and at Zruč nad Sázavou, in 2008. Birds were recorded using standard point method three times a zdar. Vegetation samples (plots 5x5 m) and habitat description were carried out in the surroundings of all points (128) in July 2008. In total, we recorded 33 bird species and 148 plants species in Mezná and 30 birds species and 115 plants species in Zruč. Preliminary results are consistent with the results obtained in 2006.

567. WOODLAND KEY HABITATS (WHKS) IN THE FENNOSCANDIAN AND BALTIC COUNTRIES

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The Woodland Key Habitat (WKH, presumed biodiversity hotspots of small size) concept has become an essential component of biodiversity-oriented forest management in Fennoscandian and Baltic countries. The philosophy behind the concept is relatively similar in each of the country. However, there are noteworthy differences between

the countries in definitions, criteria for delimitation, and legal status of WKHs. We analyzed the national WKH systems to reveal the differences and their ecological consequences. We noted that depending on the country the definitions emphasized either habitat's primary factors, such as soil and bedrock properties, or secondary factors, such as occurrence of species. The median size of the delineated habitats varied considerably among countries (0.36-2.10 ha). There was also much variation in the degree of protection of the key habitats. The implementation of this concept was regionally and nationally very inconsistent, and susceptible to personal and communal subjectivity. These results suggest that the WKH concept and its implementation are not uniform. Hence the variation in national definitions of the concept results in rather different set of habitat types that become included in the WKH network.

568. IMPACT OF HABITAT FRAGMENTATION ON STRUCTURE OF FOREST PLANT COMMUNITIES

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Land use change is known to affect biodiversity, notably via the fragmentation of natural habitats. Impacts of fragmentation on population dynamics and species persistence are now well-documented, but few studies address its effects on composition and functioning of communities. Such effects are expected because sensitivity of species to fragmentation is known to vary according to their traits. Here, we aimed to assess the impact of fragmentation on the structure of forest plant communities in Île-de-France, a densely populated French region. We examined the effects of fragmentation on the probability of species presence, in relation with some of their traits (habitat specialization and dispersal type), but also on community characteristics: species richness and average community specialization. Our study showed that fragmentation is associated with higher species richness but lower plant community specialization. This lower community specialization is due to the fact that sensitivity of species to fragmentation depends on their degree of habitat specialization (specialist species are more sensitive to fragmentation, while generalist species are more frequent in highly fragmented landscapes), but not on their dispersal type. These results suggest that fragmentation is associated with biotic homogenization of plant communities, with possible consequences for community functions and ecosystem services.

569. AVIAN DISPERSAL IN A MOUNTAIN ENVIRONMENT: LANDSCAPE GENETICS IN CAPERCAILLIE

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Landscape genetic methods combine the high resolution of genetic markers with spatial data, to infere the impact of landscape configuration on gene flow and genetic structure among populations. In this study, we examined the effects of mountain landscapes on genetic structure and connectivity of a regional population of the capercaillie *Tetrao urogallus*, in the northeastern Swiss Alps. In spring 2003 and 2008, we systematically collected non-invasive samples of this endangered forest bird species in five lekking areas, recovering 88 unique genotypes over both sampling periods. Based on eleven nuclear microsatellites, we determined population sizes, dispersal rates and genetic structure. Two source populations had experienced a population increase since 2003, whereas the three sink populations have declined. Results indicate that reproduction was dominated by few individuals, therefore reducing effective population size. Presence of population differentiation, the absence of isolation by distance but concurrent evidence of recent, asymmetrical dispersal, let us conclude that the landscape configuration notably affects gene flow among populations. We further asses the relative impact of topography and landuse types on population connectivitiy under a GIS-derived landscape genetical model based on electrical circuit theory and partial Mantel tests.

570. SHOULD WE BE AFRAID OF BEAVER'S (*CASTOR FIBER*) FOOD BEHAVIOUR?

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Eurasian beavers have successfully settled large areas in the continental Europe. Thanks to their strong abilities to modify their environment (food activity, damming, digging ...) the political pressure for reduction has increased in many countries and somewhere reduction has already started. We tried to assume if beaver's food selection depends on vegetation structure or if it depends on any common trees (although they are opportunistic herbivores). The availability and use of woody vegetation was determined in four different habitats (river, mountains, agriculture landscape, flood plain forest) most often settled by beavers in the Czech Republic. The obtained preferences showed common food behaviour across all areas. Although we observed very different frequencies of tree genus in studied riparian vegetation, the food preferences revealed commonly used trees. We found out that willows and poplars were mostly positively preferred in all areas. Although other trees were used, beavers didn't reflect their rates in vegetation. Hence beavers can settle many different areas with dissimilar vegetation structure, but they still forage common trees. Our data originated from relatively saturated population. In the case of large increase of the population density (which is very improbable), beavers can switch to different tree genus (documented in literature).

571. ACTIONS TOWARDS THE CONSERVATION AND KNOWLEDGE OF THE ENDANGERED-ENDEMIC RIVER TURTLE *PODOCNEMIS LEWYANA* IN COLOMBIA

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7. Several actions to search for strategies towards the conservation and increase the knowledge base of *P. lewyana* and its habitat have been performed. In a first initiative we identified several threatening factors which are affecting the survival of the populations throughout its distribution range. Awareness-raising presentations provided relevant experiences which informed the creation of a further educational program and provided information regarding the threats the turtle and its habitat are facing. In a second initiative, we accomplished the setting up of an educational program. We evidenced the positive impact of the educational program as having immediate and effective consequences for the species' and its habitat conservation. We also collected crucial information regarding values, attitudes and utilization of the species and its habitat by local communities. In a third

initiative, the educational program and awareness-raising methodologies were complemented and strengthened. Based on a preliminary evaluation there is initial evidence that such methods are effective and indications that we are achieving the project educational goals. A participative scenario for dialogue among stakeholders was opened. We started to exchange ideas towards the definition of future productive initiatives which may secure the conservation of the turtle, the environment and improvement of the local communities.

572. RESULTS OF A STUDY OF THE POPULATION OF AESCULAPEAN SNAKE (*ZAMENIS LONGISSIMUS*) IN PODYJI NATIONAL PARK

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Research in to the population of the Aesculapean Snake on the territory of NP Podyji was carried out between the years 2000 – 2008. Caught individuals were individually marked, in order to track their migration in a certain territory. Overall 638 individuals were marked. Seasonal migration, length of migration and habitat preferences of the marked individuals where observed. The time between each catching, expressed in number of days, was assessed and the migration of snakes, expressed in metres, was assessed through repeated catching. Both sexes migrate. The longest distance of migration was 3 750 m. Migration further than 1 km was observed in 11% of males, but only in 0,75% females. On the basis of repeated catching (altogether 1819) it was ascertained that the snakes have a relatively regular yearly schedule (hibernaculum, reproduction stand, summer stand). The influence of possible barriers (roads, cycle tracks, the river Dyje) throughout the country was assessed. According to our results the river Dyje isn't a barrier. The results were used to propose a management plan for this species, concerns above all in enumeration of risk factors, habitat arrangement and the preservation of reproduction sites. The management type suggestions vary from preservative measures to active intervention.

573. CONSERVATION EDUCATION IN FORREST KINDERGARTENS

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Conservation Education in Forest Kindergartens: Forest Kindergarten is an alternative form of pre-school education. The basic idea is to let children develop themselves in the forest in all seasons. There are no buildings and artificial toys. Forest supplies everything the children need. The first Forest Kindergarten was founded in Denmark in 1952 as a common idea of parents wanting their children to grow up outdoors close to the nature. Since that time Forest Kindergartens have spread in many other countries e.g. all Scandinavia, Germany, Canada. The potential of this concept lies in the connection of children´s development and the nature processes and principles. Children growing up in Forest Kindergarten understand the value of all parts of nature because they can experience them in relations. Conservation Education is a natural component of the concept. A survey (Haefner, 2002) of children in the first grade in grammar school shows that children attending Forest Kindergatnen develop better in all spectra of skills than the ones who attended a regular kindergarten.

574. AN UNCERTAIN FUTURE FOR URBAN WOODLOTS

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Urban vegetation makes a positive contribution to climate change mitigation and to quality of life. However, there are some less desirable associations with, for example, increased antisocial behaviour and fear of crime. Such tensions present city managers with often conflicting end goals for urban green space. In the town of Runcorn, northwest England a series of woodlots and other green spaces were planted during the 1960s to 1980s to form a vegetative framework within which residential and commercial development subsequently took place. Having reached maturity questions are being asked by the town managers about the future of these intra-city woodlots. In this paper the authors discuss the motivation behind the landscaping of Runcorn, the current floral composition, distribution, and ownership and management of these woodlots. Initial findings on the floral composition and diversity within woodlots are described. The preliminary results of botanical surveys undertaken of the woodlots are presented. Species lists and abundance readings taken from selected sites demonstrate the variations within the planting. The paper concludes with a discussion of the need for future work that combines these data with climate change predictions and with perceptions of local residents to develop scenarios for the development of these woodlots to circa 2060.

575. THE IMPACT OF THE DECLINE OF AN ICONIC WEST AUSTRALIAN EUCALYPTUS TREE SPECIES, THE TUART, ON BIRDS

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Tree declines are a global phenomenon, yet little research has been conducted into the impact of tree decline on fauna. In Western Australia, clearing has reduced the tuart (*Eucalyptus gomphocephala*) to less than a third of its former range and remaining trees are heavily impacted by decline of unknown cause. The disappearance of this iconic tree and subsequent impact on fauna, is a source of grave concern. We investigated the effect of tuart decline on birds by conducting species counts for 24 woodland sites dominated by tuart in various stages of decline. The presence of bird species was compared against habitat parameters: vegetation composition and structure, litter characteristics, and indices of tuart health including the extent of branch dieback, epicormic development and crown condition. Some bird nesting and feeding guilds, particularly hollow-nesters and understorey insect gleaners appear to benefit from tuart decline, possibly due to the greater diversification of resources in declining sites. Several species apparently benefiting from tuart decline are common generalists or open country species; however, increased avian diversity associated with declining sites should not be interpreted as a conservation gain, as specialist species may be detrimentally affected with major ecological consequences.

576. EFFECTS OF ORGANIC FARMING AND LANDSCAPE COMPLEXITY ON SPECIES RICHNESS OF BIRDS, CARABIDS AND PLANTS ACROSS EUROPE

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Organic farming has been proposed to reduce negative effects of agricultural intensification and to enhance biodiversity in agricultural landscapes. Effects of organic farming on biodiversity are often studied on single organism groups in single countries and without considering effects of the surrounding landscape. In the Europe-wide AGRIPOPES project we study effects of agricultural intensification on biodiversity and ecosystem services in contrasting landscapes. To study the effects of organic farming on biodiversity, we measured species richness of birds, plants and carabids on organic and conventional farms in simple and complex landscapes. Our results show that organic farming only enhances parts of the overall biodiversity. Organic farming positively affects species richness of birds and plants but not species richness of carabids. Birds and plants are negatively affected by homogenous landscapes, whereas no effect of landscape was found for carabids. For plants and birds it is important to promote organic farming in homogenous landscapes to increase their species richness. For organic farming to better promote biodiversity, the landscape context and target organism group need to be considered.

577. OPTIMISING SURVEY EFFORT FOR AMPHIBIANS IN LUXEMBOURG: MORE MONITORING OR MORE METHODS?

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Fundamental to the assessment of the conservation status of a species is the ability to distinguish between true absence and non-detection in habitat patches. Occupancy modelling offers statistical confidence in assigning species as present or absent at a site. Models were developed using Program PRESENCE to (1) assess the status of amphibians in ponds in Luxembourg, and (2) determine how much survey effort is needed to be confident of true absence at a site. Data were collected using three survey methods repeated on up to seven survey visits in both breeding seasons over two years. Dip-netting was not an effective method for detecting *Triturus cristatus*. In contrast, aquatic funnel traps were very efficient in detecting the same species. Indeed, surveys for *Triturus cristatus* without traps were found to be highly ineffective, failing to detect the species in 41% ponds that were occupied. The best predictors of *T. cristatus* pond occupancy were pond size and the extent of external shade. *T. cristatus* detection was most influenced by water turbidity at the time of the pond survey and pond size. Occupancy modelling is a powerful tool in designing survey protocol and achieving confidence in the accuracy of results.

578. MEASURING INVASIVE SPEED OF ALIEN PLANT SPECIES USING DATA FORM A GENERAL MAPPING PROGRAM IN THE NORTH OF BELGIUM

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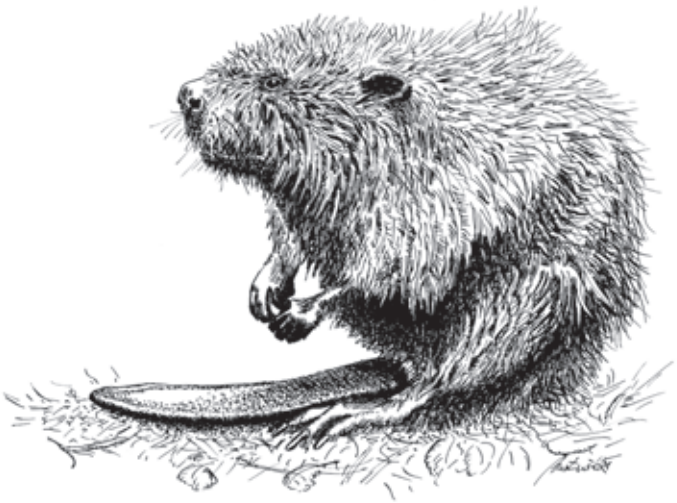
The start and spread of alien plant species in most countries is not well documented. Often alien plant species are not detected in the early start of their introduction. Once the presence of a certain alien plant species is detected they get a lot of attention resulting in numerous new records which rather reflect the recording effort rather than a real expansion of the species. To cope with this problem we used a dataset which was set up for mapping the flora of Flanders with a time scope from 1972 until 2008. Each year on average 200 grid cells of 1 km² are prospected and the field surveyors record all plant species they find in the grid cell without having special attention for certain species. By calculation the proportion of the prospected grid cell where a certain alien species was present for each year we could calculate the spread of alien species in a more objective way so we could compare the expansion of alien species with each other. This method is useful for species which are easy to recognize and are not limited to rare habitats. It also requires a wide spread of the prospected grid cells over the country or region.

ABSTRACTS OF POSTER PRESENTATIONS



Castor fiber
Graphics by Václav Bartuška

579. EFFECTS OF HABITAT DEGRADATION ON GRAY BROCKET DEER POPULATIONS IN THE ARID CHACO OF ARGENTINA

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The Chaco biome of Córdoba province has been undergoing severe environmental degradation due to a long history of deforestation and overgrazing. This process has resulted in the almost complete loss of the herbaceous layer of the original forest, affecting the status of many vertebrate populations, including the gray brocket deer (*Mazama gouazoubira*). To assess the degree of impact on gray brocket populations, we measured the presence of fecal pellets groups in two different environments: undisturbed forest inside Chancaní Reserve and degraded areas outside the Reserve. The Generalized Linear Models fitted showed a negative effect of grazing on the presence of fecal pellet groups of gray brocket deer. The effect was more evident in areas with a higher degree of degradation (qualitative grades). Although we used presence of fecal pellet groups as a proxy for the population presence, there is evidence that the loss in habitat quality is affecting negatively on the presence of gray brocket populations in the region. As for Chancaní Forest Reserve, it seems to fulfil its role in conserving gray brocket deer populations in the region.

580. EFFECTS OF HUMAN INDUCED LANDSCAPE CHANGES ON THE VEGETATION OF A DANUBE ISLAND IN HUNGARY

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19th century regulation works on the River Danube played significant role in the formation of the present shapes of its islands. Since then, river branches have become slow-flowing caused by their separation from main stream and are affected by continuous silting. This process has been speeding up successional changes and giving ways to invasive alien species. This had happened also to the Island of Koppánymonostor, situated near Komarom town. Military maps of the 1780's represent one big and three small islands, all of them covered by forest. Forests on two islands were cut down later and meadows appeared with some smaller swamp patches. Most significant changes of the island occurred in the second half of the 19th century, when its bank has been stoned, its branch was separated by dams and the smaller islands were connected to the bigger one. During that time, vegetation of the island was dominated by natural alluvial forests, except for its central part where mowed meadows and two orchards were situated. Nowadays eight protected species live there and the main vegetation units are riverine willow-poplar woodlands (*Salicion albae*) the survivals of which are threatened by dryness due to deepening underground water-level and invasive alien species.

581. THE INFLUENCE OF EDAPHIC FACTOR AND ENDEMIC SPECIES PRESENCE ON STRUCTURE AND BIOMASS PRODUCTION OF SERPENTINE COMMUNITIES

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Serpentine substrates are stressful environment for plant growth due to relatively large concentrations of magnesium and heavy metals and low concentrations of macronutrients and calcium. Poor plant productivity, high rates of endemism and distinct vegetation types from those of non-serpentine areas, are the collective traits of serpentine soils that settle them as a global diversity priority and constitute them as an ideal model for studying the role of the edaphic factor in plant diversification and evolution. In this study we focused on differentiation in species diversity and richness, dominantspecies numbers, and biomass production between serpentine and non-serpentine communities around Lesvos island (Greece) and we investigated whether these differentiations are explained through soil chemistry. Serpentine communities presented significantly lower species diversity, richness and number of dominant species relative to non-serpentine ones. Soil concentrations of magnesium, calcium and several metals significantly affected diversity, richness and dominant species numbers when included as covariates, eliminating the significant soil-type effects in the initial ANOVA. No significant effects of soil-type on biomass production were observed, due to the high biomass of the serpentine endemic speciesAlyssum lesbiacum which is a Ni-hyperaccumulator. Our results demonstrate the important role of the edaphic factor in shaping serpentine communities.

582. NEST SITE SELECTION BY ASIATIC HOUBARA BUSTARD (*CHLAMYDOTIS MACQUEENII*) IN GHARATAPPEH HERAT, YAZD PROVINCE, IRAN

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Small populations of threatened Asiatic houbara bustard breed in steppes of central Iran. Many factors threat breeding of houbara bustards throughout its range. However, little information is available about nest site selection by this species. The aim of this study was to determine habitat variables influencing nest site selection by houbara in one of its breeding habitats in central Iran. The study was performed in an 8000 ha area in Gharratappeh Herat and adjacent steppes from early March to late April over three successive years (2005-2007). Habitat features of the detected nests were compared with randomly selected control sites by quantifying a number of habitat variables in 10 × 10 quadrats. The difference in habitat features between nest and control sites revealed that breeding houbaras select sites with low vegetation density and higher density of insects, but where are far from densely vegetated patches. The 80% destruction of pseudo nests by predators in *Zygophyllum atriplicoides* community is a reason for unsuitable this community compare to *Artemisia sieberi* and *Seidlitzia rosmarinus* communities.

583. BOTANICAL AND ENTOMOLOGICAL ASPECTS OF AN ISOLATED PEAT BOG IN CENTRAL CROATIA (SE EUROPE)

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Although Đon močvar (situated in central Croatia, 170 m a.s.l., in Quercus petrea-Carpinus betulus vegetation zone) represents the oldest (preboreal origin) and, with area of 11 ha, one of the biggest peat bog in Croatia, it was poorly investigated since its first description (1925). This isolated island habitat is a mosaic of different vegetation types – from transitional peat bog vegetation (Drosero-Caricetum stellulate) and some elements of raised bog communities (Sph. capillifolium-Polytrichum longisetum), to well preserved association Rhinchosporetum albae, thought to be extinct in Croatia. With the richest Sphagnum flora (8 species) it represents the center of diversity of these mosses in Croatia. Vascular flora consists of many rare and Red listed (27%) species (e.g. Drosera rotundifolia,Betula pubescens, Rhynchospora alba). The carabid beetle fauna was studied simultaneously on two sites – in the forest community Epimedio-Carpinetum betuli and in the peat bog community Drosero-Caricetum stellulatae. A total of 57 specimens of carabid beetles representing 11 species were recorded. Only one species (Notiophilus germinyi) can be considered as tyrphophilous species. The remaining carabids recorded on two sites were mesophilous and hygrophilous species without a clear preference for bogs. This by succession threatened hot spot demands measures of active protection.

584. COIMBRA COLLECTION OF ALGAE (ACOI): CHALLENGES AND CONSTRAINTS OF A LARGE BIORESOURCE HOLDER

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Culture collections are biodiversity resources seen as crucial for scientific development. It must be assured that the organisms are preserved in optimal high standard conditions. *Algae* are the basis of the food chains in aquatic systems and vital for humanity, contributing to about 50% of global photosynthesis. ACOI is the largest freshwater microalgae collection in the world, a biodiversity repository of about 4000 in vitro strains isolated from a wide range of Portuguese habitats (http://acoi.ci.uc.pt/). The cultures are maintained by sub-culturing, a technique that demands substantial human and material resources and does not guarantee long-term genetic stability. Cryopreservation methods were developed and applied to 600 ACOI strains but financial constraints do not allow keeping the collection in a frozen state. Financial support is an essential matter to allow large collections to flourish instead of declining. Important applied projects are in development at ACOI, such as biodiesel production, based in the premise that all strains in culture are a potential source of valuable products for technology and industrial purposes. At a time when most natural resources are over exploited or at risk, microalgae may become the key raw-material to solve many of the problems that mankind is starting to face.

585. CONSERVATION PRIORITY OF PARNITHA NATIONAL PARK PLANTS

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Species-oriented approaches are useful in order to prioritize conservation actions. Yet, available data on species conservation status are often incomplete, especially for plants and for countries with high plant diversity. Involuntarily, management decisions at the local level are often based upon red data books and legislation annexes. To access how effective is such an approach in the view of the responsibility of a national park to protect species diversity, plant conservation priority has been accessed for Mt Parnitha National Park (Attica, Greece). Scientific literature has been reviewed and a species checklist with >1100 plant taxa has been created. Species relative endemism (contribution of presence inside the Park to the global occurrence of the species) and taxonomic distinctiveness (a taxon is more distinct as less taxa of the same genus-family-class are present in the Park) were estimated and the Index of Local Conservation Priority (ILCP) was calculated. Species were ranked according to their ILCP score and it was revealed that 2/3 of the high priority species were protected neither by National nor by European legislation. Conservation priority tools are able to assist management decisions in order not to neglect significant components of species diversity at the local level.

586. FINE SCALE FISH AND OTTER (*LUTRA LUTRA*) MONITORING IN THE OFANTO RIVER (SOUTH ITALY). INTEGRATING MARKING FREQUENCIES, DIET AND RESOURCES AVAILABILITY

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The otter *Lutra lutra* is one of the most endangered mammals in Italy. One of the priorities for its conservation is the identification of factors influencing its occurrence, densities and distribution. A fine scale otter and fish monitoring was run along 36 km of the river Ofanto (southern Italy) from January 2007 to March 2008. Eight stations at four km intervals were monthly searched for otter signs (spraints, jelly, footprints) along 600 m of riverbanks. The number and location of marking sites were recorded at each session. The fish community was investigated by means of seasonal electrofishing at the same stations. A total 209 spraints were collected and analyzed for prey composition. Mean marking frequency was highest in June and lowest in February-March, while mean fish biomass was highest in spring (April, X = 6,49 gr/m2) and decreased from summer to winter (December X = 2,06 gr/m2). Mean marking frequency was highest in the upper course and decreased toward the mouth, and was not related to fish biomass. The most frequent fish species in the study area were *Cyprinius carpio, Carassius auratus Anguilla anguilla* and *Leuciscus cephalus*, while the cat fish *Ictalurus melas* was the most frequent prey of otters.

587. LANDSCAPE HISTORY AS A TOOL FOR PLANNING THE MANAGEMENT OF PROTECTED AREAS – A CASE STUDY FROM A HUNGARIAN PROTECTED GRASSLAND

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In this paper the authors aim to introduce the methods and results of landscape history examinations at an Eastern Hungarian protected grassland. In the Lesser Mole Rat (*Spalax leucodon*) Reservation of Hajdúbagos Nature Conservation Area the sand steppe meadow (*Pulsatillo hungaricae-Festucetum rupicolae*) plant association is endangered by the partly natural succession. To stop or at least to slow down this process the conservation of the protected species is not enough; the rehabilitation of the area could be necessary. The target of the restoration ecology actions is to restore the previously existing, more favourable natural status of a certain area. However the lack of knowledge according to the conditions that refer to the original circumstances often complicates this activity. To define these reference conditions the exploration of the history of a certain landscape is very important as restoration is only successful if the restored ecosystem is similar to the original. We examined the land use changes of the research area in the last 250 years according to historical and present geographical databases using GIS technology and complete this work with the study of archival data. By our results we stated that these examinations are crucial in the proper management of protected areas.

588. SITTING ON THE FENCE? POLICIES AND PRACTICES IN CONTROLLING DAMAGE-CAUSING ANIMALS IN LIMPOPO PROVINCE, SOUTH AFRICA

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Human-wildlife conflicts are the product of socio-economic and political landscapes and are contentious because the resources concerned have economic value and species are often high profile and legally protected. We detail policies and practices of controlling damage-causing animals (DCAs) by Kruger National Park (KNP) and Limpopo Province (DFED/EA) along KNP's western border. Most DCAs originate from KNP, significantly affecting its long-term legitimacy among local communities. Over 12% of households experienced DCA damage within the past two years, with damage positively and significantly correlated with living closer to KNP and greater numbers of mammalian livestock. According to 482 DCA incident records from 1998-2004, the most problematic species are buffalo, lion, elephant, hippo and crocodile. DFED/EA utilised professional hunters in DCA control, however, widespread abuses including the direct luring of lion led to a national moratorium on specific hunting practices. Current DCA procedures are highly flawed due to ambiguity concerning type, origin and movement of DCAs; poor reporting; inadequate response times; overlapping responsibilities; and corruption. Further, the controversial issue of undelivered compensation is determining negative attitudes by communities towards institutions who have historically promised it. We offer recommendations on alleviating DCA conflicts, and guidelines for developing a robust compensation scheme.

589. RESTORING PRACTICES IN A NATURAL PARK: CHANGES IN FRESHWATER FISH FAUNA AFTER BRINGING LARGE WOOD BACK TO THE STREAMS

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Heavy channel modifications have detrimental effects on stream ecosystem biodiversity and functioning but the effects of more subtle activities like snagging, that have been widespread for centuries in Europe, is less known. A LIFE-Nature project is being developed in a Natural Park in Guipuscoa (Aiako Harria, Basque Country, Spain): following a BACI design, large wood has been added to reach natural abundance (40-80 m3/ha) in 4 stream reaches (width from 3 to 15 m), which are compared to 4 upstream controls, in order to evaluate changes concerning in-channel retention, litter inputs and stream habitat complexity. All reaches, control and experimental, have been monitored for one year prior to wood addition, and are being followed for two years after. Brown trout (*Salmo trutta*) and minnow (*Phoxinus phoxinus*) inhabit these streams. Wood addition shows quick environmental benefits, as increasing refuges for fishes. In that sense, an increment in fish density has been observed (electrofishing, catch removal method). But the most amazing changes are those related with age structure and fish biomass which has increased even up to five times. Nevertheless, other effects are expected as channel is gradually changing, with more suitable spawning gravels that will lead into a better fish recruitment

590. FORAGING HABITAT SELECTION AND HOME RANGE OF MONTAGU'S HARRIERS BREEDING IN SPAS IN NE SPAIN

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The Montagu's harrier (*Circus pygargus*) is a ground-nesting bird of prey typical of agricultural habitats. There are many current conservation programmes for this species, usually biased towards protecting nests or breeding habitats (e.g. through the definition of Special Protection Areas, SPAs). Effective conservation plans should also include protection of foraging areas and habitats. In a study in two SPAs in north-east Spain, based on 14 radio-tracked individuals, we evaluate where Montagu´s harriers hunt in relation to nests and the limits of the SPAs, and assess foraging habitat selection. Mean observed distance between nests and trapping attempts was 5.6 □ 4.2 km (n = 638). Average home range size, estimated from either MCP or Kernel 90%, was larger than 100 km^2. Only 18 □ 11 % of the home ranges were within the limits of the SPAs. Trapping attempts occurred significantly more frequently than expected in alfalfa, habitat where the highest small mammal diversity and density was found, and where the highest trapping success occurred. Cereal (the main habitat used for nesting) was negatively selected for foraging. This study confirms the importance of considering foraging needs when developing conservation plans, and of habitat diversity within agricultural areas to fulfil those needs.

591. SOIL MODIFICATION BY DESERT SHRUB *HALOXYLON SALICORNICUM* IN DEGRADED RANGELANDS OF SAUDI ARABIA

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Haloxylon salicornicum has been recommended for restoration and maintaining plant diversity in degraded and oil-polluted lands of the Arabian deserts. However, little knowledge exists about the influence of this shrub patches on soil properties. In order to understand the capability of this species in modifying attributes of soil to facilitate the establishment and growth of other species, soil samples (at depths: 0-15 cm, 15-30 cm and 30-60 cm) were collected under, at the edge and outside the canopy on sandy soil in degraded rangelands of Saudi Arabia. Soil under the canopy had the highest organic matter and extractable nutrients (Na, K, Mg, Ca, Zn, Cu, Fe and Mn). The enrichment ratios of most soil nutrients decreased with depth. Furthermore, soil nutrient concentrations were similar at the three depths outside the canopy, implying that shrub litter seems to be the major supply of nutrients in the canopy zone. The results suggest that *H. salicornicum* has a positive influence on accumulation of nutrients and maintenance of soil fertility within the degraded rangelands.

592. EFFECT OF CLIMATE CHANGE ON TREE SPECIES DISTRIBUTION ASSESSED BY CELLULAR AUTOMATA MODEL

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Biological changes due to global warming are already noticeable. The effects of climate change can negatively influence the survival capacity of a species. This led to the development of species-climate envelope models to predict potential effects on tree species distribution under climate change scenarios at European scale. Limitations associated with predicting the future distribution of species are linked to the use of coarse resolution and to the presence-absence data. In order to produce more reliable forecasts, for elaboration of adaptive management strategies in the network of the Italian Protected Areas, a specific project has been carried out. This project has a high spatial resolution of current and future climatic data (1 km^2), a National Forest Inventory with 6461 forest plots used to calculate a measure abundance for three tree species and the use of Cellular Automata algorithms to incorporate the effects of time and landscape fragmentation on the potential migration of tree species. The performances of new spatial distribution models such as Support Vector Regression, Multivariate Adaptive Regression Splines and Random Forest in forecasting the effects of climate change on species distribution is discussed. Moreover, the effect of the increasing aridity and higher probability of drought is evaluate.

593. MARGINALITY OF REMNANT POPULATIONS AND IMPLICATIONS FOR CONSERVATION: EXAMPLE OF THE NEW ZEALAND SEA LION

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The New Zealand (NZ) sea lion is a threatened species with only three remaining breeding colonies in the NZ sub-Antarctic islands (500 to 700 km South of NZ). Because of their ecological characteristics and location, these islands were hypothesised to be a marginal habitat. The NZ sea lion has started recolonising part of its original breeding range (mainland NZ), now allowing us to test this hypothesis. The foraging behaviour of breeding females has been investigated in details at the Auckland Islands since 1998. Our study presents the results of the first investigation of the foraging behaviour of breeding females on the mainland in 2008 and the comparison of the results with breeding females of the Auckland Islands. We used satellite-linked location and time-depth recorders fitted to four females for up to six weeks. We found support for the hypothesis of the marginal habitat as the distances to foraging grounds were about 80% closer to the coast and periods at sea and depths reached on average 60% less than those recorded in the sub-Antarctic islands. Our findings have implications for the appropriate management actions and provide a valuable example of the difficulties faced by spatial ecology studies based on remnant populations.

594. THE SPATIAL EXTENT OF FOREST ROAD EFFECT ON UNDERSTORY PLANT DIVERSITY IN FRENCH OAK STANDS

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Forest roads are important landscape features to consider in species conservation and management issue. We aimed to analyse the effect of distance to forest road on plant understory diversity in young and adult lowland oak stands. At twenty sites, we established 2x50 m plots at five distances from road verge to 100 m into adjacent forest stand and recorded the presence of all vascular and bryophytes species. We analysed species response, ecological group response and mean indictor values in relation to road distance and stand age. Plant composition strongly differed between road verge and forest interior habitats. Road edge effect extended less than 5 m into forest stand: added to the particular edge topography, it created a third habitat at the forest-road edge. Plant patterns were determined by change in light, nutrient and disturbance levels along the road distance and forest successional gradients. No strong biodiversity threat was detected, except for some bryophytes and other species that kept away from road. However, the expected intensification of silviculture in response to global changes will emphasize the role of forest roads on biodiversity. Consequently, managers should better take into account the species conservation challenges in forest planning and new forest road building.

595. REASONS FOR SYSTEMATIC REVIEWS IN CONSERVATION: THE EXAMPLE OF ANIMAL REINTRODUCTION LITERATURE

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The amount of literature in most scientific disciplines is showing a dramatic increase. As a result, the task of accessing, reading, interpreting and synthesising the information has become unrealistic for individual conservation practitioners. As an example, we examined the area of animal reintroductions.

We undertook an extensive search in eight electronic literature databases, using seven different keyword combinations, and added the content of four bibliographies on reintroductions. We found 3 825 potentially relevant publications, with a total of at least 29 290 pages. The cumulative growth of the literature was exponential until 1995 and subsequently linear. Almost 40% of the items were scientific journal articles, scattered across 335 journals. A taxonomic bias appeared: mammals and birds were overrepresented compared to their weight in biodiversity numbers. In the context of huge information accrual, reviewing and synthesising work is of increasing importance. Literature reviews have traditionally been used but suffer from problems of transparency and bias. The regular production of systematic reviews is a potential solution to this problem and has been adopted in other applied sciences. The key strengths of this method are its transparency, stakeholder engagement and repeatability. Language and outcome bias can affect the synthesising work on conservation programs.

596. LONG-TERM LARGE-SCALE STUDIES OF POPULATION DYNAMICS OF BARN SWALLOW IN NORTHERN ITALY

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Modern ecological studies aiming at assessing determinants of population trends should rely on monitoring programs that are both long in time and wide in space. Here we present the results of two long-term monitoring programs that assessed independently population dynamics of the barn swallow (*Hirundo rustica*) at two wide spatial scales: regional (about 24.000 kmq, in 1992-2008) and sub-regional (about 240 kmq, in 2000-2008). Both studies consistently showed a decline in breeding swallow population estimated in -6.7% and -4.4% each year, respectively. Investigation of ecological determinants of population trends and variation in breeding performances revealed a positive influence of vegetation "condition" in the wintering grounds (as indicated by the Normalized Difference Vegetation Index) on population indices while atmospheric circulation in the north Atlantic Ocean (North Atlantic Oscillation index) and ecological condition in the breeding grounds (April temperature) significantly influenced mean clutch size and mean hatching date respectively. Finally, mean brood size was negatively related to number of breeding pairs. These studies highlight the importance of long-term large-scale monitoring programs to assess the relative importance of conditions in different geographical areas in determining observed population trends and are among the few wide scale ornithological studies conducted in Southern Europe.

597. HOW DO OPEN SAND STEPPES RESPOND TO THE ABANDONMENT OF GRAZING AND TO THE INCREASING FREQUENCY OF DROUGHTS?

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Natural stands of open sand steppes (*Festucetum vaginatae*) were monitored between 1996 and 2008 in two protected areas in the Kiskunság, Hungary. Before protection, both sites were used as grazing land and after that abandoned. Repeated vegetation mapping (within 40 x 100 m areas with 5 x 5 m resolution) and line-intercept sampling (by recording the presence of plant species along 52 m long circular belt transects of 5 cm x 5 cm contiguous microquadrats) were used for detecting patterns at multiple scales in a sensitive, precise and non-destructive way. In wet years grazing abandonment resulted in litter accumulation and diversity collapse in some stands. Diversity decreased during repeated slight droughts when *Festuca vaginata* was gradually replaced by *Stipa borysthenica*. Serious droughts caused temporal diversity collapse and local mass extinction of dominant grasses. However, there was a remarkable diversity peak two years after drought due to micro-successions and patch dynamics. Gaps were colonized first by annuals and mosses then were occupied by valuable perennial habitat specialists. Diversity is maintained by multiple factors in this system. Therefore the negative effects of land use change (i.e. grazing abandonment) can partly be compensated by the increasing frequency of droughts due to changing climate.

598. CHANGES IN THE HABITAT NETWORK OF *PHOLIDOPTERA TRANSSYLVANICA* (FISCHER WALDHEIM, 1853) IN THE AGGTELEK KARST, HUNGARY

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Population of the endangered, endemic bush-cricket, *Pholidoptera transsylvanica* in the Aggtelek Karst, northeast Hungary lives in 39 habitat patches connected with several corridors. Here, key element in the long-term survival is the maintenance of gene flow (hence the connectivity of habitat network). Recently we have re-examined all the landscape elements and results were compared to the ones from a previous study. We applied indices developed for network analysis to characterize the relative importance of elements, which decreased due to the expansion of the habitat network. "Nagy Nyilas", one of the largest hayfields in the centre and the related corridor seemed to be the most important in maintaining connectivity. We would like to draw attention to the changes in the vegetation structure occurred during the years between the two studies, which pose serious threat for the connectivity of habitat network and consequently the survival. A potential solution for preventing the fragmentation of subpopulations is establishing new corridors or improving the existing ones, therefore we estimated the possible effects of these changes. New corridors (of which establishment would cause some additional disturbance)

did not have major effect on the system; precluding active corridors from being destroyed appeared to be much more effective.

599. BIODIVERSITY OF SMALL MAMMALS UNDER THE INFLUENCE OF DIFFERENT LAND USE PRACTICES

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In arid and semiarid regions of Southern Africa the principle of sustainable use of natural resources has become of indispensable importance to provide coexistence of livelihood for local people on the one hand and nature conservation on the other. Therefore, it is required to evaluate essential parameters for determining current states of ecosystems and assessing anthropogenic disturbances. In this study we give data on diversity and distribution of vegetation and small mammals in a semi arid ecosystem in northern Namibia to reveal the impact given by large herbivores on flora and small mammal fauna. We concentrated on two different forms of land use (game/cattle) by habitat mapping and live trapping by using capture-mark-recapture. As a result of reduced food supply and loss of specific vegetation structures for burrowing and hiding, the diversity and abundance of small mammals on the agricultural area declined. Furthermore our results show that *Tatera leucogaster* might be apropriate as a bioindicator for assessing anthropogenic influences and disturbances in semi arid savannah regions of southern Africa. This kind of research are necessary to assist with farm management and planning as well as with conservation education and, finally, to assess and reduce the human-wildlife conflicts.

600. *CRYOPHILOUS BRYOPHYTES* VANISH FROM LOWER ALTITUDES — AN EFFECT OF CLIMATE WARMING?

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Altitudinal range expansions due to recent climate warming has been shown for a number of organisms. However, the study of altitudinal range shifts in bryophytes has so far been neglected. We used here a dataset of 2735 historical (collected 1880-1920) and 5785 recent (collected 1980-2005) herbarium specimens of 61 *bryopyhte* species. In order to account for the different sampling efforts in the two study periodes a resampling procedure has been applied. We found that *cryophilous* species showed a highly significant mean increase of 200 ± 51m ($p < 0.001$), but there were no changes for intermediate and *thermophilous* species. While lower range limits of *cryophilous* species increased by 209 ± 65m ($p < 0.01$), upper range limits did not change. There was also no change in range limits of intermediate and *thermophilous* species. Moreover, the proportion of records of *thermophilous* to cryophilous species increased considerably at lower altitudes only. We conclude that for *cryophilous* bryophyte species an extinction process is going on at lower altitudes and that this process seems at least partly driven by climate warming. Historical records of specimens stored in herbaria have proved to provide valuable data for detecting ongoing changes on a time-scale otherwise not accessible.

601. RESEARCH AND PROTECTION OF THE MOST ENDANGERED FORMICA SPECIES (HYMENOPTERA: *FORMICIDAE*) IN THE CZECH REPUBLIC

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All species of the genus *Formica Linnaeus*, 1758 are protected by law in the Czech Republic. However, the active protection is in fact exclusively focused on the complexes of economically important but not immediately endangered species of wood ants (*Formica rufa* group). Species that are much more endangered are neglected in respect of both theoretical research and practical treatment. We studied distribution and ecology of such species – *Formica picea Leach*, 1825 and the members of subgenus *Coptoformica Müller, 1923* (*F. exsecta Nylander, 1846 and F. foreli Bondroit, 1918*) in the Czech Republic. Until today we have explored 300 localities of potential occurrence of these species. *F. picea* occurred in 75 localities, *Coptoformica* species in twelve localities all together. We recorded sexuals in August and September in *F. picea* and in July and August in *Coptoformica*. Predation and trophobiosis were the main recorded food strategies in all the species. Conductivity, pH and concentration of the most important ions in the soil water did not significantly affect occurrence of *F. picea*. Rapid plant succession, destruction of nests-sites (including incorrect management), habitat destroying and fragmentation seem to be the main factors directly limiting prosperity of studied populations. Project is supported by SP/2d4/23/07.

602. POSSIBILITIES OF HEAVY METALS INFLUENCE ON *MARGARITIFERA MARGARITIFERA* POPULATION IN BOHEMIAN- GERMAN BORDER STREAMS

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Lužní Stream (Bohemian - German frontier) represents a locality where a *Margaritifera margaritifera* population decreased rapidly during last decades. An influence of heavy metals represents one of possible stressors in this locality. Muscles from together 10 freshly dead *M. margaritifera* individuals from Lužní Stream and from close situated Bystřina Stream were analyzed for selected metals. 4 individuals of *M. Margaritifera* from Blanice River and together 21 individuals of Unio sp. and *Anodonta anatina* from different localities were used as comparative material. The highest mercury level (1.33 mg/kg of dry weight) was found in the body of *M. Margaritifera* from Blanice River, while the highest cadmium level (23 mg/kg) was found in the body of *M. Margaritifera* from Lužní Stream. Results show that the accumulation of cadmium and other metals in the body of *M. margaritifera* can be very high compared to other mollusks. The reasons could be as follows: high age of this species, and type of locality where *M. margaritifera* occurs. Since high cadmium levels are generally associated with the acidification, a hypothesis emerges that cadmium has been increasingly washed out in the Lužní Stream basin due to the acidity of water in the spring area.

603. IDENTFYING ECOSYSTEMS SERVICES OF TRADITIONAL RURAL BIOTOPES IN SW COASTAL FINLAND USING SOCIAL-ECOLOGICAL MAPPING

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Traditional rural biotopes (TRBs) in Finland are highly endangered agricultural landscapes rich in biodiversity. The quantity of these grazed woodlands and meadows in Finland has declined to only 1% of what existed prior to 1950. Concurrently, the quality of existing TRBs has declined. The need for a new approach to conservation of traditional rural biotopes (TRBs) is evident in the continued decline in traditional rural biotopes, despite ongoing conservation measures. The importance of emphasizing the link between human wellbeing and ecosystem health for conservation has gained momentum since the Millennium Ecosystem Assessment and its pioneering use of the ecosystems services conceptual framework. Successful ecosystem management requires thorough knowledge of both ecosystem processes, as well as the social actors and structures that make these processes viable (Schultz et al. 2007). I present a methodology for identifying and valuing the ecosystems service of traditional rural biotopes of SW Finland. Using the social-ecological inventory method and data from agri-environmental subsidy applications, a map of how stewards interact with TRBs was created and the primary drivers of change in TRBs in SW coastal Finland identified.

604. REINTRODUCTION MANAGEMENT FOR TYPICAL AND ENDANGERED SPECIES OF MOUNTAIN MEADOWS IN THE EASTERN ORE MOUNTAINS (GERMANY)

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Advancing regeneration of species rich grassland in a mountain region with formerly intensive agriculture we observed a side-limitation for regenerative establishment for a lot of target species in types of regeneration sites as well as in nature reserves. Searching for treatments to overcome this since 2004 we conducted sowing experiments with general types of disturbance intensity for 23 species: creating gaps with bare soil, scarifying and no disturbance combined with a mowing regime specific to the vegetation type. Creating gaps significantly increased the number of resulting plants or their fitness of approximately the half of the species while scarifying was effective with only one species. Although gaps caused highest germination rates in the most cases after two years the number of established plants converged to those of the other disturbance levels. The sowing year significantly influenced germination and mortality of some species. In general gap creation, as the most expensive management, improved generative reestablishment best. For some endangered species disturbance has to be combined with additional treatments. Furthermore planting was tested as an alternative for species with general low germination rates and was very successful. It is also suggested for a quick fructification and higher competitiveness of plants.

605. ESTIMATION OF EFFECTIVE POPULATION SIZES IN ATLANTIC SALMON (*SALMO SALAR*, L.) POPULATIONS FROM ASTURIAS (NORTHERN SPAIN) USING MICROSATELLITES

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Asturias rivers (northern Spain) constitute the southern limit of the distribution of Atlantic salmon (*Salmo salar L.*) in Europe, a biological resource facing one of the more serious challenges for conservation today. We used eight microsatellite loci to analyse samples collected in 1993 and 1999 from four rivers (Esva, Narcea, Sella, and Cares), obtaining information about temporal and spatial genetic variation and estimations of their effective population sizes. The temporal analysis revealed a general decrease of genetic variability when 1993 samples from 1993 (mean A(1993) = 6.47, mean HO(1993) = 0.472,) and 1999 samples (mean A(1999) = 6.16, mean HO(1999) = 0.460),were compared, particularly notable for Esva river. Our results pointed to a pattern of spatial genetic differentiation inside the Asturian region (FST (1993) = 0.016 P.01; FST (1999) = 0.023 P.01). Estimates of Ne using 3 different methods (Temporal, Waples 1989, Pseudo Maximum Likelyhood , Wang and Whitlock,2003, and Maximum Likelyhood using bayesian approach, Berthier et al.2002) suggested the presence of larger populations for Sella and Narcea rivers (Ne ranging from 150 to 200 individuals) while Esva and Cares populations (Ne around 60–70 individuals) could be close to the conservation genetic borderline for avoiding inbreeding depression .

606. DISTRIBUTION, ENCOUNTER RATE AND SPATIAL BEHAVIOUR OF SMALL CETACEANS IN THE AEOLIAN ARCHIPELAGO (SICILY, ITALY)

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Data on distribution, encounter rate and habitat utilization of cetacean species were collected from June to September (2005-2008) in Filicudi Island (Italy). Boat-based surveys were conducted using focal group instantaneous data sampling and photo-identification techniques. 3242,275 km were surveyed and 132 encounters of 4 identified species, including delphinids, fin whale and sperm whale were recorded. Encounter rates (sightings/kilometres spent on effort) of the two most common species, striped dolphin (*Stenella coeruleoalba*) and bottlenose dolphin (*Tursiops truncatus*) were related, using multivariate statistics, to both environmental (depth, slope, bottom variability and distance to shore) and fishing (trammel nets, fishing boats) covariates with a cell resolution of 1 km^2 each. Striped dolphin was observed to higher distances from coast (2-3 km). Bottom variability clearly played a significant role in the habitat partitioning of the two species. For Bottlenose dolphin an opportunistic feeding was evidenced and a positive selection for the exceeding amount of trammel nets in the optimal submarine north-west shallows (distance=1-2 km) found out. In addition, bottlenose dolphin group sizes increased according to distance from the coast. These results suggest a food-safety trade off for bottlenose dolphin. They will be beneficial for the management plan of the future Aeolian Archipelago marine protected area.

607. SPATIO-TEMPORAL DYNAMICS OF MALACOFAUNA ALONG A SECOND ORDER STREAM – LARGE RIVER CONTINUUM

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The malacofauna was investigated along a second order (Hosszúvölgyi-stream) and third order stream (Börzsönyi-stream) – medium-sized river (Ipoly) – large river (Danube) continuum in 2007. A total 22 mussel and 22 snail species were recorded. Among them 7 (*Borysthenia naticina, Esperiana acicularis, E. esperi, Pseudoanodonta complanata, Theodoxus danubialis, T. transversalis, Unio crassus*) are protected, 5 (*Acroloxus lacustris, Physa fontinalis, Pisidium amnicum, Sphaerium rivicola, S. solidum*) are rare and 8 (*Corbicula fluminea, C. fluminalis, Dreissena bugensis, D. polymorpha, Physella acuta, Potamopyrgus antipodarum, Sinanodonta woodiana, Theodoxus fluviatilis*)

species are invasive in Hungary. Considering the spatial pattern the number of species and individuals increased from the hypocrenon-epirhitron zones to the epipotamon as a result of environmental specialization of the animals. However a decrease can be identified on the lowland regions of the large river. This phenomenon can be explained with the mosaic pattern of habitats and antropogenic factors affecting the large rivers. The highest diversity of snails was observed in April, the greatest richness of mussel species occured in October, while the density was the highest in June regarding both mussels and snails.

608. WHERE AND WHEN: ACTIVITIES OF THE BROWN BEAR IN RELATION TO SEASON AND HABITAT

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We examined activities of brown bears *Ursus arctos* in the Bieszczady Mountains (SE Poland) in relation to habitat characteristics and time of day and year. Activities were identified for field-visited GPS radiotelemetry locations obtained every half an hour from the collared individuals at the beginning of each month. We distinguished the following activities: bedding, walking, frugivory, insect foraging and hard mast feeding. Activity patterns changed considerably, both over the 24-h period and the year. Bedding occurred mostly during the daylight, while foraging was the main activity during the nocturnal period. Among feeding activities, insectivory was most commonly identified in spring and early summer, frugivory in late summer and early autumn, and hard mast feeding in autumn. Supplementary feeding of ungulates was also an important food resource for bears. The type of activity was related to habitat features. Young forest stands were selected as bedding areas, meadows for ants foraging, whereas frugivory and hard mast feeding were associated with mature forests. Abandoned orchards, common in the study area, were used intensively. We discuss the relative importance of habitat types and food items in different seasons and highlight the need to consider this complexity in management and conservation plans of the species.

609. NESTING ECOLOGY OF THE COMMON KINGFISHER AT THE CHOSEN WATERCOURSES IN PLZEŇ REGION

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The aim of the thesis was the monitoring of the Common Kingfisher (*Alcedo atthis*) done during the breeding season 2008 at the chosen watercourses in Plzeň region (West Bohemia, Czech Republic). Every single nesting (60 in total, 7 abortive included) and the number of young ones were recorded regularly from March to the middle of September. Sequentially there was done the analysis of the nesting density and the appraisal of the effect of the character of the watercourse on the nesting successfulness and the effect of the size of the nesting bank on the degree of predation. Furthermore, there was evaluated the preference of the choice of the nesting bank depending on surroundings of the locality. The assumption that kingfisher prefers bank ripping and bare banks for building the burrows to tree uprootings was confirmed. Kingfisher also positively prefers natural watercourses to the regulated ones. Finally the priorities for the protection of the species at the chosen watercourses were determined. At the same time there were selected localities suitable for adaptation of the banks to enable nesting in the following years.

610. POPULATION DENSITY AND STRESS LOAD IN EUROPEAN GROUND SQUIRRELS (*SPERMOPHILUS CITELLUS*)

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In Austria, the European ground squirrel (IUCN vulnerable) inhabits the pontic-pannonic zone in the eastern-most part of the country. Aggregations occur in nearly natural as well as in strongly altered environments. In this study we compared population density and stress levels between a natural steppe area (TD) and a highly altered, isolated Alfalfa meadow (FB). Ground squirrels were life-trapped, individually marked and faecal samples were collected. Population density at FB was about twice as high as at TD. In adult males at FB, faecal cortisol metabolites (FCM) were higher than at TD, whereas in females no significant difference was found. In juveniles at FB, FCM levels peaked during the first month after natal emergence. Furthermore, we compared FCM levels in adult ground squirrels before and after juvenile emergence. In FB, male stress levels appeared to be higher after juveniles had emerged. We assume that increased predation pressure due to juvenile emergence was more pronounced at FB, leading to higher stress load both in adult males and juveniles. Our results indicate that although populations in isolated areas can get exceptionally dense, increased predator attraction and social conflict may cause high stress load negatively affecting immune function and survival.

611. SITUATIONAL ANALYSIS OF FIVE URBAN PARKS IN BRASILIA: STRATEGIC AREAS FOR PRESERVATION OF CERRADO IN URBAN AREAS

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The Federal District is entirely located within cerrado, in Central Brazil. This biome is the second largest in the country and is considered one of the 25 world hotspots for conservation. The way the economic and demographic growth in the region is being managed has not taken account of the conservation of natural resources, creating a permanent process of environmental degradation. Therefore, choosing strategic areas to preserve the ecosystems and planning urban occupation are essential steps for biological conservation. In this basis, the creation of urban parks is an interesting measure and, further, it is seen as an alternative to improve population life quality. This study evaluated the status of different parks by delivering questionnaires to park users, employees, directors and to the own conductors of this study. It was noted that, although the establishment of urban parks has been intensively used by local politicians for political visibility, their maintenance has not been of prior concern. Finally, it was noted the existence of a large amount of potential conservative areas prevented from invasions. However, the choice of these areas for parks has been occurred without a proper study, causing an increase in total cost for maintaining of these areas.

612. THE STUDY OF GENETIC STRUCTURE OF EUROPEAN POPULATION OF WOODPIGEON *COLUMBA PALUMBUS* AS THE TOOL FOR CONSERVATION AND WISE MANAGEMENT OF THE SPECIES

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The genetic analysis of mtDNA D-loop sequences of more than 200 samples of breeding, migratory and wintering Woodpigeons *Columba palumbus* was performed. The samples were collected in Lithuania, Russia, Belarus, France, Spain and Portugal in 2005 – 2008. Among overall 53 different haplotypes detected during this study the highest number of unique haplotypes (19) has been found among breeding population inhabiting Kaliningrad region of Western Russia. Southern Portugal was characteristic as second exclusive region with 8 unique haplotypes detected. The results of the study have confirmed that the Iberian Peninsula is the key wintering area of Woodpigeons of Eastern Europe origin and that the Baltic Sea – North Sea Flyway is the most important for breeders from the Baltic region. The genetic analysis indicates that part of Woodpigeons breeding in the Baltic region are only short distance migrants, wintering in the neighbouring countries, while some birds breeding in this region also use the Mediterranean Flyway and migrate to the wintering areas located along the coast of Mediterranean Sea. A distinct genetic structure with certain unique haplotypes is characteristic of sedentary Woodpigeons breeding in Balearic islands. For conservation and wise management of European population of Woodpigeons flyway concept should be taken into account.

613. DOES COMMUNITY FOREST MANAGEMENT DELIVER BIODIVERSITY AND LOCAL WELFARE BENEFITS IN DEVELOPING COUNTRIES?

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The past three decades have seen a global shift from the state-centred control of the management and conservation of natural forests towards decentralised approaches, recognising the value of local knowledge and the participation of local people in decision-making. Such approaches are known by a multitude of terms and, whilst they may be highly variable in both context and application, all are based on the same fundamental objective of achieving ecosystem conservation that is simultaneously compatible with the improvement of local welfare and livelihoods: here, the term community forest management (CFM) is used collectively. Although there has been a large investment in CFM over recent years, individual reports of project outcomes are highly variable and fundamental questions regarding programme effectiveness, and the possible causes of variation in effectiveness, still remain. Our systematic review seeks to evaluate effectiveness through the identification, appraisal and synthesis of the best available evidence. This study thus provides a characterisation of the evidence for CFM as a mechanism for a) the generation of local, regional and global biodiversity benefits b) poverty alleviation and livelihood improvement in developing countries. Recommendations for policy and practice are presented in the context of the limitations of the existing evidence base.

614. POPULATION BIOLOGY RARE SPECIES OF PLANTS ON URAL (RUSSIA)

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Urals - an industrial developed mountain region with intensive anthropogenous load on natural ecosystems is situated on border between of the Europe and Asia, where some endemic species were generated. Rare endemic species are particularly vulnerable. It is necessary to study them for development of the most efficient strategy their protection. We research spreading, genetic and spatial structure of the some rare Ural species natural population. On Ural is confirmed existence of *Pulsatilla patens* (L.) Mill and *P. uralensis* (Zamels) Tzvel. On the abutment their area is situated bar of transitional populations. Each species are disintegrate on groups, differing on morphological signs and having different geographical location. The study of genetic variability and population structures of two junipers (*Juniperus communis* L. var *communis* L. and *J. communis* var s*axatilis* Pall.) has shown that differences in allelic composition of populations concern mainly rare alleles, on share of interpopulational forming variability happens to only 4%. In zones of the contact of areals of the licorice species (*Glycyrrhiza korshinskyi* Grig., *G. uralensis* Fisch., *G glabra* L.) enough high level of allozyme polymorphism was observed and has allowed to reveal at these species specific alternative alleles in ferment systems. Support: RFBR (07-04-96102-r_ural_a).

615. FORAGING BEHAVIOUR IN EURASIAN STONE-CURLEW (*BURHINUS OEDICNEMUS*) IN THE PRODUCTION AREA OF "PARMIGIANO-REGGIANO" CHEESE

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This study aimed at characterizing the foraging behaviour of Stone-curlews breeding along the gravel river-bed of the Taro River Regional Park (Parma, Italy). As recorded through radio-telemetry, during the night birds regularly commute from breeding sites to feeding areas (mostly farmlands) which are a few kilometres far. To overcome the low precision of radio-tracking locations, we analyzed Stone-curlews habitat choice by means of nocturnal counts of foraging birds in potential feeding areas and associated vegetation measurements. Our results show that Stone-curlews forage in recently mown crops (mainly forage and wheat) and in piles of manure, where they can find a high density of invertebrates (chiefly *Coleoptera*). This habitat use is closely tied to the agricultural landscape of the study area which is characterized by high density of farms for the production of "Parmigiano-Reggiano". According to the production standard of this cheese, the feed rationing of dairy cows has to be based on the use of local forage. Both the presence of forage crops regularly mown in Spring-Summer and the use of manure as fertilizer make up for the lack of pastures and probably favour the high density of breeding pairs recorded for the area.

616. GENETICS OF THE IBERIAN LYNX, THE MOST ENDANGERED FELID

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Iberian lynx is the most endangered felid in the world, and considered critically endangered by the World Conservation Unit. There are only two remnant populations, both located in south Spain, Doñana and Sierra Morena, with less than 50 and 160 individuals respectively. Using mitochondrial and microsatellites markers we explored the current genetic status of the species. Results show an extremely low mitochondrial diversity, with only two haplotypes, and only one present in Doñana population. Reduced diversity levels are also observed for microsatellites, and a high differentiation between populations is put in evidence. Using museum specimens as a DNA source we also investigated temporal patterns of genetic diversity. All suggest a recent demographic bottleneck and the predominance of genetic drift in recent times, affecting both populations, but more intensely Doñana, where population viability could be compromised. These results are important for conservation plans and the genetic management of the species, both in the wild and in the captive-breeding program. Some recommendations have already been put in practice, such as male translocations from Sierra Morena to Doñana population in order to diminish inbreeding risks.

617. BIOLOGICAL DIVERSITY OF *INGA EDULIS* MART. (*MIMOSACEAE*) IN PERUVIAN AMAZON

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Inga edulis Mart. is recognized to be a multipurpose tree and has large use in agroforestry systems thanks to its valuable fruit which is produced throughout the year, rapid growth, shade potential for productive plantations and soil-improving ability due to N-fixing root nodules, high amount of protecting leafy biomass and weed and erosion control. *Inga edulis* shows growth variability on different natural sites. The objective of the study was to indicate whether the diversity is only the consequence of various environmental conditions or the species forms smaller taxonomical units such as subspecies and/or varieties. The research was conducted from June 2008 to October 2008 in Ucayali department near Pucallpa city. Three trees per plot on five different sites (cultivated and wild ones) were randomly selected and metric and descriptive evaluation was executed according to a suitable descriptor. The statistical analysis was done with Basic Statistics and Principal Component Analysis (Statistica 7.0 CZ). The results detect the cross-correlations among particular growth characters and show the diversification among each study sites, which is indicative of forming genetic varieties within the species. The study promotes the subsequent DNA research which could display more details on this matter.

618. IMPACT OF POLLINATORS AND HERBIVORES ON POPULATION DYNAMICS OF SCORZONERA HISPANICA

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The objective of this study is to describe selection pressures of pollinators and herbivores on flowering phenology and morphology of reproductive organs of the perennial herb *Scorzonera hispanica*. We presume that certain plant properties (i.e., plant height, size and number of flower heads, and flowering period) can function as criteria for choice by pollinators and herbivores. Different effects of interacting animals can thus lead to opposing selection pressures on the same characters. The results show a significant relationship between plant traits and herbivory and significant impact of herbivory on flower number and seed mass. The intensity of herbivory and its effect on plant fitness change during the flowering season. Specifically, two main periods of herbivory were identified. The first one was at the time of flower bud development. In this period, the plants were often completely grazed and did not resprout during that field season. The second was during flowering and usually concerned just single flower heads. We also found a significant effect of seed mass on seed germination and plant growth. We will further combine information on the relationship between intensity of herbivory and plant traits with data on the full life cycle of the species.

619. CAN THE EURASIAN OTTER HAVE A SUSTAINABLE RECOVERING IN THE EUROPEAN LANDSCAPE?

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In the last five decades the Eurasian otter *Lutra lutra*, has declined dramatically in all Europe. Nowadays the otter seems to be thriving in some European countries, but the population is fragmented and the central part of Europe is almost free of otters. The promotion of population expansion and reconnection is crucial to assure the genetic diversity for a long-term persistence of the species. In this regard, habitat suitability models (HSM) represent powerful tools to evaluate habitat quality and produce maps of potential distribution and natural dispersion of the specie. This study aimed at determining the factors that influence the otter distribution and predicting the potential distribution of the species at European scale. We developed a HSM using the occurrence of the otter and the predictors related to water availability, food supply, resting site and human disturbance. At this scale the otter is mostly influenced by water availability predictors, the distance to the big cities and natural features such as percentage of forest. We also identified large gaps of unsuitable habitats for otter reconnection. The knowledge carried out by this study is an important tool to efficiently define conservation actions to promote the otter expansion and reconnection in Europe.

620. INVOLVING STAKEHOLDERS IN IMPLEMENTION OF ECOLOGICAL NETWORKS

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Involving stakeholders in implementation of ecological networks It is now widely accepted that the concept of ecological networks makes a major contribution to the overall effort to protect, maintain and enhance biodiversity; and it has gained significant political support across Europe. However, the current position, of widespread acceptance within policy frameworks but limited practical implementation, has created a need and an opportunity to explore the knowledge about the implementation of ecological networks, including the necessary involvement and support from relevant stakeholder groups and sectors; in particular agriculture, spatial planning, transport and infrastructure development and water management. Many of these issues are taken up in recently completed projects. This paper provides the results of the project on the practical implementation of ecological networks in Europe, which was funded by

the Dutch government. The project stimulates practical partnerships and consensus-building within and between the stakeholders involved in the implementation of ecological networks, including organizations and sectors. Through the participation of national stakeholders, the project has revealed an extensive knowledge on the ideas and opinions of individuals who are directly involved in implementation processes. Several conclusions have been drawn in this paper, including the challenges, opportunities and unexplored areas of ecological networks.

621. STRATEGIES FOR CONSERVING THE BIODIVERSITY IN THE MOLHASURILE PEATBOG, ROMANIA

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"Molhaşurile Căpăţânei" is a 13 ha active raised bog, recently designated as Site of Community Interest within the Natura 2000 network. The peat bog is located in the heart of the Western Romanian Carpathians (Apuseni Mountains), at an altitude of ca. 1.600 m a.s.l. It shelters relict plant species with high biogeographical value, typical for tundra, preserved here since the ice ages, which need better protection and monitoring in order to assess their syndinamics. Six strategies are proposed in order to protect the local biodiversity, as follows: (i) control on respecting general rules set in order to protect the area, (ii) preserving tree-communities in the lagg area, (iii) monitoring rare and vulnerable species every 5 years, (iv) implementing relevant action plans for rare and vulnerable species present here, (v) developing and promoting training on its conservation at the level of relevant (N)GOs and (vi) participating in EU Biodiversity and Forestry strategies, in order to develop and strengthen measures for habitat conservation.

622. CHYTRIDIOMYCOSIS

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Chytridiomycosis is a serious fungal disease of amphibians caused by the chytrid fungus *Batrachochytrium dendrobatidis*. The fungal zoosporangia attack the uppermost skin layer and affect its normal functioning. The infection leads to behavioral changes, decreased hydration, cutaneous respiration and to disrupted osmo- and thermoregulation. Its recent emergence, spreading rate and lethal activity have made chytridiomycosis a global threat, probably promoted by recent climate changes. Nowadays the fungus can be found on all 5 continents. It affects more than 100 amphibian species, at least 34 of which are thought to have become extinct due to chytrid infection. The disease was first recorded in the Czech Republic in 2008. It spreads primarily by close contact among specimens. Human action supports introduction of the disease to new areas by transporting animals for research purposes, pet trade, or for exchange between zoological gardens. Rescue transfers can be dangerous, because a bucket trap full of amphibians is ideal for transmitting zoospores. Awareness of the disease is very low in our country, but professional and volunteer conservationists, above all, need to know about the possible risks. We are not able to assess how chytridiomycosis can affect our amphibian populations. It is therefore necessary to take preventive measures.

623. CONNECTIVITY IN BROWN BEAR POPULATIONS: AN ASSESSMENT OF GENE FLOW IN COASTAL BRITISH COLUMBIA

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Brown bear (*Ursus arctos*) populations have experienced declines in both number and range due to changes in land use and persecution. Identifying and protecting areas with adequate gene flow between populations is now of fundamental importance to the survival of some populations. This study assessed genetic variance and relatedness between individuals from two coastal regions of British Columbia. Samples were analysed at 8 microsatellite loci to determine individual genotypes for statistical analysis. The mean expected heterozygosity (He) of all individuals was 0.69. A difference in He was highlighted between genders, with females displaying homozygosity for 2 out of 8 loci. Genetic differentiation was low (FST = 0.06) between coastal individuals. Dispersal distances of bears in the area would suggest the possibility of gene flow between the two regions. Genetic distance estimates, through kinship coefficients and the proportion of shared alleles, further reiterated a link between the two densely populated areas. Data from this study indicates dispersal via gene flow between the brown bears of southwest coastal British Columbia. Comparisons can now be made with European populations, regarding relatedness and assessment of the connectivity of landscapes. Implications for the conservation of this species in Europe's fragmented landscape will be discussed.

624. WOODPECKERS FROM BUCEGI NATURAL PARK, ROMANIA, AS A FLAG SPECIES FOR THE CONSERVATION OF NATURAL FORESTS

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Primeval forests from Bucegi Natural Park represents more than 20% of the Bucegi Mountain forests, reaching more than 4100 ha. They shelter seven species of woodpeckers, five of them being listed in annex 1 of the Birds Directive. We conducted a study in different type of forest (spruce, mixed and beech), both in natural and managed forest to establish what influence most woodpeckers density. We obtain both qualitative and quantitative description of the species, found differences in species composition between the main habitat types in primeval and managed forest, analyzed the diversity and the distribution of the species. We found that forest management and human presence are the main factors of species disturbance.

625. NATURAL HISTORY DATA FOR SPECIES DISTRIBUTION MODELLING: EFFECTS OF GEOREFERENCING ERROR ON MODEL PERFORMANCE

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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 can be identified

as having insignificant effects on model performance, then the appropriate records can be included in future modelling. To investigate their effects on model success, three levels of error (50, 100, 200m) were artificially added to existing, precisely located systematic presence-absence data. Geographic region (Alps; Mittelands), species group (bryophyte; lichen; fungi; herb; tree), and modelling technique (boosted regression tree; general additive model; generalized linear model; maximum entropy) were included as additional factors. All levels of error were found to have significantly ($p<0.001$) negative impacts on model success. Among the additional factors, bryophyte models and models generated with maximum entropy were most successful. There was no difference in the effect of error between geographic regions. In conclusion, when considering the use of natural history data for SDM, records with georeferencing error as small as 50m should be excluded as they can significantly reduce model success.

626. WINTER HABITAT SELECTION OF WOLVES ALONG TRACKS AND HUMAN-ACTIVITIES EFFECTS IN THE WOLF MOVEMENTS IN THE WESTERN ALPS

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The natural recolonization of wolves of the Western Alps, a high human density region, began in the late 1990's. The conservation of this species relies on the understanding of how and if human activities, such us winter tourism, influence wolves habitat selection. We investigated the landscape variables naturally selected by wolves along 933.5 km of snow-tracking data of 6 wolf packs during 2 winter seasons (2003-2005) in the Western Alps. Wolf tracks recorded with snow-tracking techniques were attributed to packs using genetics analysis on scats collected along the track. We elaborated the data with GIS software (ArcGIS 9.1) and tested statistical hypothesis using compositional analysis. We investigated how topographic variables (vegetation type, slope, aspect, topographic position, altitude) and human-activity variables (ski resorts areas, human settlements, roads) were selected by wolves. Wolves avoided rocky-areas ($\Lambda=0.177$, $\chi2=41.0$, $P<0.001$), human settlements, ski resorts areas ($\Lambda=0.087$, $\chi2=304.1$, P

627. DOES THE PHOTOBIONT AVAILABILITY LIMIT THE SPREAD OF THE CRITICALLY ENDANGERED LICHEN *ERIODERMA PEDICELLATUM*?

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Erioderma pedicellatum (Hue) P.M.Jørg. is a globally critically endangered lichen of boreal regions in Europe and North America. His photobiont is a cyanobacterium of the genus *Scytonema*, a rarely reported photobiont in lichens. In this context, we hypothesize that the limited photobiont availability may limit the distribution and local abundance of the lichen phenotype. We investigated the photobionts of *E. pedicellatum* and of other associated lichen species to (1) molecularly characterize them and (2) monitor their availability in the microhabitat. Parts of the SSU rRNA and RuBisCo genes were used to screen for compatible *Scytonema* strain epiphytic on the liverwort *Frullania tamarisci*, which lives in the same habitats as *E. pedicellatum*, and monitor the availability in primary forests and in afforestations in Newfoundland, Canada. The photobionts of *E. pedicellatum* and of some associated lichens were identified in the free-living state on *F. tamarisci*. The free-living strain, compatible with the *E. pedicellatum* photobiont, was detected on mature trees in primary forests with and without *E. pedicellatum* and on young trees in afforestations without *E. pedicellatum*. The hypothesized «photobiont limitation» can therefore be rejected as a possible explanation for the limited distribution of this rare and endangered lichen species.

628. GENETIC DIVERSITY AND POPULATION STRUCTURE OF EUROPEAN GROUND SQUIRREL IN VOJVODINA, SERBIA

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The European ground squirrel (*Spermophilus citellus*) in Serbia, as in other parts of its historical distribution, is under strong antropogenic influence. Disappearance and fragmentation of habitat have led to dramatic decline of population numbers and sizes and reduced range of this species in whole Serbia. In order to investigate genetic diversity, population structure and degree of fragmentation in Serbian populations 157 samples, from 9 populations, from the northern part of Serbia-Vojvodina, were collected and genotyped for 12 microsatellite loci. We have found quite high genetic variability based on heterozygosity (mean value of He=0.507) and allelic richness (mean value of AR=3.92). Inbreeding coefficient was quite low. The mean value of Fst=0.219 showed strong genetic differentiation among populations. Existence and spatial position of clusters indicated that Danube River is the main barrier among populations, but that distance is very important factor too. Despite to higher values of Fst and evidence of barriers, the genetic variability is quite high (based on He and compare with results from the Czech Republic) probably because of existence of gene flow between populations and size of populations.

629. THE CONSERVATION VALUE NORTHERN PERIPHERAL *SAPONARIA BELLIDIFOLIA* POPULATIONS ON ISOLATED OUTCROPS FROM SOUTHEASTERN CARPATHIANS

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Recognition of anthropogenic range contractions patterns constituted a breakthrough in admitting the high conservation value of peripheral populations. Subsisting in isolated, less disturbed places like mountain ranges, range-edge populations have presumably higher chances to survive. Nevertheless, conservation biologists ought to conduct complex studies on populations' biology, ecology and genetics, in order to support the assumptions of their viability. Our study assessed the conservation value of the rare submediterranean *Saponaria bellidifolia* on seven limestone outcrops from the species' northern range-edge. The plant is a long-lived, rhizomatous, outcrossing chamaephyt. Populations were investigated for abundance, dynamic and genetic structure. Genetic isolation from southern populations was also tested. The results showed that heterogeneity of outcrops exerted a constraining effect on abundance of individuals, whereas microclimate had only secondary importance. Plants preferred mostly the screes, suggesting the species' low competitive abilities. Low variability of neutral molecular markers was evidenced, as a response to both natural habitat fragmentation and geographic isolation. Deterministic growth rate oscillated closely around unity, inferring stable population dynamic. Constant habitat conditions, maintained in state of edaphic climax and the absence of negative anthropogenic impact confer high stability and conservation value to the populations of Southeastern Carpathians, despite the low genetic variability detected.

630. EFFECTS OF LANDSCAPE CHANGES ON AMPHIBIAN BREEDING PONDS IN PAS-DE-CALAIS, NW FRANCE OVER A 30-YEAR PERIOD

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Ponds and other small and stagnant man-made water bodies are the primary breeding habitat for amphibians, and pond management is essential for conservation. We investigated for 200 ponds in the department Pas-de-Calais, NW France if their persistence (n=87, 43%) or disappearance (n=113, 57%) was related to landscape change over the period 1975 - 2006. Land use around the ponds was described over concentric circles with five different radii of 100m - 1000m. Analysis with logistic regression and Mann-Whitney U tests indicated that pond disappearance was associated with a decrease in grassland and an increase in arable field use around the ponds. The ponds most likely to disappear could successfully be predicted, but the results varied with the size around the ponds considered. Areas at risk of further pond loss were identified through temporal and spatial extrapolation. From these predictions and from the distribution of remaining ponds and their amphibian biodiversity, we recommend that local conservation efforts should focus on grasslands, marshes and dune areas.

631. IMPACT OF WATER LEVEL CHANGES ON SMALL MAMMAL COMMUNITIES

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Wetlands' reconstructions are often associated with flooding of the territories. These processes cause enormous changes for small mammals living there. We studied the impact of water level changes on the dynamic of small mammal communities in Small-Balaton wetland area (Hungary) between 2005-2008. In this period water level changed max. 50 cm. At high water level the study area was flooded totally. Dry places were founded at lower levels. Remarkable changes were recorded in the structure of the communities when water level increased and dry places disappeared. The *Sorex* species (*S. araneus, S. minutus*) and other small mammal species (*Apodemus flavicollis, A. agrarius, Micromys minutus, Microtus agrestis, Myodes glareolus*) emigrated, however the *Neomys anomalus* stayed, *N. fodiens* and *Arvicola amphibius* appeared. When dry places turned up again, *S. araneus* and the small rodents recolonized in one month, *N. fodiens* and *A. amphibius* disappeared. We suggest that after flooding, the species composition and the abundance of the communities change quickly and seriously. *N. fodiens* and A. *amphibius* live in area with deep water only, *Sorex* species and the small rodents need dry places. *N. anomalus* lives in both area types.

632. HISTORICAL AND CURRENT DISTRIBUTION OF ENDANGERED SPECIES - WHAT ARE THE DISTRIBUTION MAPS SAYING?

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This study is a part of the project „Prioritisation of Vascular Plants for Species Conservation". The aim of the study is to identify changes in distribution of critically endangered species in the Czech Republic and distinguish between species that are rare and that are really declining. In this part of the project, we study historical and current distribution of the endangered species using data gained e.g. from basic literature (Red List of Vascular Plants of the Czech Republic, Key to the Flora of the Czech Republic etc.), herbal materials of Czech Museums, floral and fytocenological databases. The next important source of high quality data are materials from Administrations of Protected Landscape Areas and from Regional Offices of Agency for Nature Conservation and Landscape Protection of the Czech Republic. This poster presentation shows first results of distribution changes over time of several chosen endangered species through distribution maps of quadrate. The results indicate that among the critically endangered species we can really see species that used to be relatively common in the past as well as species that have a stable low number of populations and that these species differ in selected traits.

633. THE COMPARATIVE ANALYSIS OF AVIFAUNA IN FOUR URBAN PARKS IN ZAGREB (CROATIA) – IMPLEMENTATION FOR CONSERVATION

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Due to current urbanization trends wildlife conservation in urban habitats is becoming increasingly important and urban parks are often considered as important biodiversity hotspots in cities. Bird communities were investigated in four urban parks during 2007. The study intends to asses the influence of park characteristics on avifauna composition and diversity. The mapping method was used for bird recording and for assessing territories. 17 park variables (15 vegetation and two disturbance variables) were calculated. A total of 45 bird species (27 breeding and 24 wintering) were observed. Omnivorous species were dominant during the breeding season as well as during the winter. Among the breeding species the canopy nesting species and species nesting on artificial structures were dominant. Omnivorous birds correlated positively with the proportion of the built up area and human disturbance. These variables correlated negatively with other bird groups. Vegetation variables correlated positively with the species richness and diversity of all bird groups except omnivorous. The results should help asses the importance of parks in the conservation and promotion of bird populations and to address guidelines for park management (e.g. more vegetation cover, coniferous vegetation, vegetation diversity, old trees...)

634. CONSERVATION VALUE OF FIELD MARGINS IN AGRICULTURAL LANDSCAPE OF SOUTH-WESTERN POLAND

Dajdok, Zygmunt, University of Wrocław, Institute of Plant Biology, Poland; **Grzesiak, Wojciech**, Institute of Nature Conservation, Polish Academy of Sciences, Poland

Linear semi-natural habitats are key elements which hold the loss of biodiversity in agricultural landscapes, however their role as refuges of endangered species remains ambiguous. In 2004-2008 we checked it for breeding birds, insects, vascular plants, and bryophytes which were recorded in 70 field margins typical for Polish farmland. The amount of alien species and the role of habitat characteristics was also tested. High numbers and diversity was revealed in all studied organisms. Endangered species amounted to 3.4% in vascular plant communities, 5.5% in bryophytes, and 24.5% of species and 16.4% of pairs in birds. Significant amount of the guild of predators was noted in insects (18.2% of 148 families). Field margins appeared to be an important reservoir of native plants (77,5% of species composition), and the most invasive plants were occasional. The amount of trees and

shrubs was the most important factor for the richness of flora and fauna. Overall, the results indicate that field margins are inhabited mainly by common species, although the admixture of threatened forms is significant. We argue, that in the face of rapid decline, the field margins deserve special protection, but it should be targeted at wider biodiversity enhancement rather than rarer species.

635. THE RAMSAR WETLANDS OF UKRAINE AS IMPORTANT PLACES FOR BIRDS CONSERVATION

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After the disintegration of the Soviet Union in 1991 only 4 wetlands of international importance were located on the territory of Ukraine, in 1995 – 22 Ramsar sites, in 2005 – 33 one (676251 ha of total area) and 23 were on shadow list. Considerable parts of them were included in the nature-reserve fund of Ukraine, some of them are the transboundary territories also. These wetlands have a very important significance for animals and plants, especially for birds. Many bird species of the Red Data Book of Ukraine, IUCN Red List, Afro-Eurasian Waterbird Agreement bird as well as of the list and Supplement II to Bern Convention were recorded here. The most rare and vulnerable of them are: Dalmatian Pelican (*Pelecanus crispus*), Pygmy Cormorant (*Phalacrocorax pygmaeus*), Red-breasted Goose (*Rufibrenta ruficollis*), Lesser White-fronted Goose (*Anser erythropus*), Ferruginous Duck (*Aythya nyroca*), White-headed Duck (*Oxyura leucocephala*), White-tailed Eagle (*Haliaeetus albicilla*), Corncrake (*Crex crex*), Great Snipe (*Gallinago media*), Slender-billed Curlew (*Numenius tenuirostris*), Black-winged Pratincole (*Glareola nordmanni*) and Aquatic Warbler (*Acrocephalus paludicola*). Thus, further monitoring and protection of these unique biological systems are necessary.

636. COMBINING STANDARD METHODS FOR OTTER AND RIVER SURVEYS. A TEST IN THE RIVER OFANTO (SOUTHERN ITALY)

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Several standard methods have been proposed to assess the quality of river ecosystems, as well to define the distribution and status of otter populations in Europe. The otter standard survey recommended by the IUCN-OSG provides information on both otter occurrence and habitat structure and quality, including the water and riparian habitat. The standard river survey CARAVAGGIO (Core Assessment of River hAbitat VAlue and hydro-morpholoGIcal cOndition) is based on 18 hydromorphological characteristics of water course and riverbanks. These are combined in three synthetic indexes of river quality (HMS- Habitat Modification Score; HQA- Habitat Quality Assessment; LRD- Lentic-lotic River Descriptor). As both methods are based on random point sampling sites, they can easily be integrated to produce an accurate description of water and riparian habitat to be used in otter standard surveys. We tested this combined approach during a year-long otter monitoring of the Ofanto river in southern Italy. Both standard methods were used to seasonally monitor three stations along the low course of the river. Results showed a positive correlation between otter marking frequencies and HQA index, and an inverse relation with LRD, while no correlations were found with HMS.

637. STATUS, HABITAT CHARACTERISTICS AND PROSPECTS OF *LEUCORRHINIA PECTORALIS* IN BELGIUM AND THE NETHERLANDS

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The Yellow-spotted Whiteface (*Leucorrhinia pectoralis*) is a rare species in Western Europe and is declining in many countries. Therefore it is mentioned on the Annexes of the Habitat Directive and is listed on the Red lists of Belgium and the Netherlands. Populations occur mainly in two large lowland peat marshes in the north of the Netherlands. Besides these, it is found in several smaller peat marshes and in fens on sandy soils in the south of the Netherlands and in Flanders. The habitat is characterised by well-structured aquatic and riparian vegetation. This is important for the larvae which are day active and are visual foragers. Sufficient coverage and structure, formed by roots and leaves is needed to hide for predation by fish. Since 2000 the species has been found on several new localities, often with only one or a few individuals and not yearly. On sandy grounds, the number of adults has dropped significantly comparing with the eighties. Our data suppose that it doesn't reproduce annually on the same site, but switches to nearby ponds (meta-population model). This reproduction system is probably wide-spread in other European countries and can therefore be seen as an important "species-own" strategy.

638. HABITAT AND LANDSCAPE DIVERSITY OF THE GREAT HUNGARIAN PLAIN IN CSONGRÁD COUNTY

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I mapped 70% (3000 km2) of Csongrád county for the Hungarian Habitat Map Database using 35 ha-sized hexagonal grids and 61 Natura 2000 sites there on 1:400 scale. I ordered the habitats into microregionally specific, successionally and dynamically connective habitat-complexes and more comprehensive vegetational landscape-types and main-types to specify the border of geographical microregions and flora districts of *Praematricum* and *Crisicum*. In sand landscapes the habitat-complexes of the mosaics of deflation hollows with fen-head – alkali foot pattern, steppe grasslands and forests and the fields of blow-out dunes covered with open sand grasslands and forests – were separated. The "pusztas" of the loess-landscapes are covered by mosaics of loess steppe grasslands and oak loess-steppe forests, wet alkali habitats and the salt-berm alkali steppes. In the floodplains the vegetational landscape-types of active floodplains (with 5 habitat-complexes), saved-side non-alkali floodplains (with 3 habitat-complexes), secondary alkali landscapes (with 2 habitat-complexes), lag-surfaces (with 2 habitat-complexes) and floodplain moor-landscapes (with 2 habitat-complexes) were determined. The habitat-diversity hot spots are at the borders of geographical microregions, in the mid-third of the Dorozsma-Majsaian Sandlands (groundwater-upwelling zone with deflation hollows covered by fens and alkali vegetation), on the salt-berm alkali steppes and in the floodplains (especially in the active floodplain).

639. INVASIVE PLANT SPECIES MANAGEMENT TESTS IN SOUTHERN BELGIUM

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In respect to the CBD (Rio, 2002) aims and managers request, regional authorities of Southern Belgium have financed from 2006 research projects aiming at testing management techniques of several invasive species because management methods mentioned in the literature often lack scientific assessment and follow up. Target species are Impatiens glandulifera, *Heracleum mantegazzianum* and *Fallopia* spp. along rivers, plant species from the top 20 environmental weeds in Western Europe and *Cotoneaster horizontalis*, *Acer rufinerve* and *Spiraea* spp., less known but emergent invasive species recorded in Southern Belgium. Mechanical and chemical management techniques are tested on the field to assess their efficiency, cost and feasibility. Results and concrete implications for managers will be presented in the oral presentation.

640. ATTEMPTS TO ESTABLISH NATIVE LAWN SPECIES IN A MEDITERRANEAN URBAN CONTEXT

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In 2008 a study started in Genoa, a Mediterranean town in Northern Italy, to verify whether it is possible to spread native lawn species in urban green areas and, in the meantime, to deprive undesirable weeds of some of their ecological space. The aim is to increase floristic biodiversity in Genoa urban lawns and to produce attractive, low maintenance meadows of native species. Six entities common in Genoa have been selected for the first experiments: *Piptatherum miliaceum* (L.) Coss., *Brachypodium rupestre* (Host) Roem. &t;Schult., *Bituminaria bituminosa* (L.) C.H. Stirt., *Trifolium pratense* L. *Prunella vulgaris* L. *Viola reichenbachiana* Jord. ex Boreau. This list of species was drawn up from researches on urban city flora carried out between 1992 and 2000. In late September 2008 an equal number of seeds of the selected species was sown as individuals in twelve 1x0,75 m experimental plots. Six plots were pegged out in shady areas, while the other six were set in sunny places. Grasses seem to spread and establish faster than forbs: after four months they covered over 75% of their plots, while only *Bituminaria bituminosa* covers 25% of its plot area. All the other species are in an emerging phase as seedlings.

641. FLORA OF THE VEPSSKY FOREST NATURE PARK (LENINGRAD REGION, RUSSIA)

Doronina, Anna, Saint-Petersburg State University, Russia

Nature Park Vepssky Forest (1891 km²) is disposed on the extreme east of the Leningrad Region on the Vepsovskaya Upland. A section of the watershed between the Baltic and Caspian seas passes along Vepsovskaya Upland. It is a part of the Leningrad Region with the most continental climate. The richness of the flora is determined by the presence of the parts with outcrops of the carbonate rocks, large number of the lakes, rivers and bogs. In the present time 30 species of vascular plants from Red Data Book of Nature of the Leningrad Region (including 6 species from Red Data Book of the Russian Federation are found: *Isoëtes echinospora*, *I. lacustris*, *Cypripedium calceolus*, *Dactylorhiza traunsteineri*, *Epipogium aphyllum*, *Lobelia dortmanna*). *Lycopodiella inundata*, *Equisetum variegatum*, *Carex tenuiflora*, *Trichophorum cespitosum*, *Trisetum sibiricum*, *Coeloglossum viride*, *Neottia nidus-avis*, *Viola selkirkii*, *Crepis sibirica*, *Ligularia sibirica* are deserved of refer. Many species are found on the boundaries of areas for example *Nymphaea tetragona*, *Nardosmia frigida* on the south-western, *Actaea erythrocarpa* on the western, *Jovibarba globifera* on the northern, *Carex bohemica* near the northern boundary. The location of the *Lathyrus laevigatus* (grows on the north-eastern boundary of area) in the Vepssky forest possibly is the largest in Russia.

642. ECOLOGY OF *HEMIPARASITE THESIUM* SPECIES

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Our aim was to explore ecology of *Thesium* species using comparative study of common *Thesium linophyllon* and rare *T. bavarum, T. ebracteatum* and *T. rostratum*. We wanted to obtain general information about performance of these species, which could be used for practical conservation. To identify potential hosts of *Thesium*, we studied relationship between occurrence of *Thesium* and species composition in plots arranged in transects across the populations for all studied species. To prove that the species are really physically connected to the species with which they are associated aboveground we did also sowing experiment and excavating experiment, where we tried to find with which species *T. linophyllon* is really connected with haustoria. Plants with physical connection were compared with plants identified as potential hosts in vegetation plots. There was no significant correlation between potential and real hosts of *T. linophyllon* and we also did not find any evidence that *T. linophyllon* selects its hosts (but more data will be analyzed). There was significantly more light, less moisture and more species in plots with *Thesium* compared to neighbouring plots without *Thesium*. More haustoria occurred on species with higher amount of roots.

643. WATER QUALITY CRITERIA FOR PROTECTION OF ENDANGERED UNIONID BIVALVES FROM NITRATE NITROGEN POLLUTION

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The identification of water quality parameters responsible for deterioration of species conservation status and setting of protective water quality limits is a general theme in freshwater conservation biology. In Central Europe, several studies showed that water pollution and particularly increased nitrates concentration is related to the impairment of freshwater mussel populations. I tried to generate values of nitrate nitrogen protective for Central European unionids from the data on species distribution. Results implied considerable sensitivity of studied species to nitrates. Only the watercourses with mean values of nitrate nitrogen concentration below 2.6 to 4.8 mg/l (*Unio crassus* and *Anodonta anatina* respectively) were inhabited by five studied species. Consequently, acute toxicity tests for artificially reared juvenile mussels of the two above mentioned species were conducted with aim to find a possible causal effect. Surprisingly, results showed remarkable tolerance to nitrates (lethal concentrations were two orders of magnitude higher than the limits derived from distributional data). Environmental realistic values of nitrates have probable no direct harmful effects to unionids, however nitrates apparently indicate presence of some stressors responsible for population impairment. Study demonstrates the need of integration of different methods in setting water quality criteria protective for freshwater species.

644. DIVERSITY INDICES – MAGICAL NUMBERS IN CONSERVATION BIOLOGY

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Diversity indices are very popular statistics used for characterization of ecosystems biodiversity. Our work critically summarizes the knowledge on the diversity indices with respect on Shannon-Wiener index. We try to explain the main problems of the species diversity measurement and its importance for conservation biology based on both terrain data and simulation. We suggest that wrong interpretation of the indices results from the lack of understanding species diversity and biodiversity frameworks. This study was supported by the grant No. 206/07/0811 from the Grant Agency of the Czech Republic.

645. BIRDS AND CARABID BEETLES IN BEECH FORESTS OF DIFFERENT AGE IN PAPUK NATURE PARK, CROATIA

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Birds and carabid species diversity in beech forests of different age (50, 80-100 and 150 year old), placed in Papuk Nature Park, were investigated. Point-count bird census technique was carried out on 15 sites and pitfall traps for carabid beetles sampling were exposed on 9 of them. Mean individual biomass (MIB values) of carabid beetles were calculated as indicators of forest succession and stability. Circular plot method was used for estimation of habitat parameters. Species diversity, birds' density and beetles biomass increased with the age of the stands, with the highest values recorded in unmanaged 150 year old forests. Certain bird species (hole-nesters and dead wood specialist) as White-backed Woodpecker were found only in unmanaged forest. Large bodied carabid species (over 30 mm length) were dominant in structurally complex habitats in the unmanaged 150 year old forests. Tree-felling and removal of dead wood were found as the main threats to birds. Based on the results we suggest 1) MIB as a useful tool for evaluation of forest management ecological impact, 2) the selective cutting or group harvesting to become forest management practice in managed beech forests, adjoined with assuring at least 30 m3/ha of dead wood in all forest stands.

646. DO FEEDING STATIONS HAVE AN AGE-SPECIFIC IMPACT ON GRIFFON VULTURE BEHAVIOUR?

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Griffon vultures *Gyps fulvus* evolved in Europe as commensals of extensive pastoralism. In the 20th century, vulture populations declined in parallel of modifications of pastoral practices and persecutions. Since 1980 in France, vultures were reintroduced in the Grands Causses area. Feeding stations (FS), provisioned with carrions collected in nearby farms, were established, but vultures can also find carrions not deposited on FS. Studies on a large FS close to the main colony found a strong dominance of adult vultures over younger individuals. Young birds arrive late at the FS, when only low-quality food remains. It was suggested that these young birds should rely in FS farther from the colony, where food is deposited less regularly. We hypothesize that 1) the use of peripheral FS should result in larger home-ranges in young birds compared to adults; and 2) young birds should arrive earlier in peripheral FS, have a better access to high-quality food and suffer less competition. We present here the first results of a GPS tracking study of young and adult vultures in the Grands Causses area, combined with behavioural observations of dominance at FS at different distances from the main colony.

647. RESTORATION FIRE AS A CONSERVATION TOOL IN BOREAL FORESTS- EFFECTS ON DEAD WOOD HETEROGENEITY AND AVAILABILITY

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To recreate fire characterized forest and to benefit fire dependent species, restoration fire are increasingly used as a management method in Sweden. Fire can result in a large input of fresh dead wood, but there is also a risk of losing a part of the existing dead wood community. We studied the dead wood heterogeneity and availability before and after restoration fire. Specifically, the change in overall dead wood volume and fire consumption rates of logs in different decay classes. The study includes three areas were data on coarse dead pine wood and fire killed trees were collected before and after fire. The results showed that fire decreased the total volume of existing dead wood. Further, logs in late decay stages were most consumed. However, the input of fresh dead wood exceeded the total loss of existing dead wood. Saproxylic species adapted to dead wood in late decay stages will suffer most from a fire and those species that inhabit earlier decay stages will be favored. Implications for management suggest burning of stands preferably without rare wood substrates in order to create dead wood values for the future. Alternatively, management should include protection of rare substrates during restoration fires.

648. HABITAT AND POPULATION FEATURES OF *VERBASCUM RUPICOLA* (HAYEK & SIEHE) HUB.-MOR. (*SCROPHULARIACEAE*)

Eroğlu, Volkan, Ege University Botanical Garden & Herbarium Research and Application Center, Turkey; **Şenol, Serdar Gökhan**, Ege University Botanical Garden & Herbarium Research and Application Center, Turkey; **Seçmen, Özcan**, Ege University Botanical Garden & Herbarium Research and Application Center, Turkey

Verbascum rupicola was only known from the type gathering collected in June 1912 and considered to be a local endemic of Konya, Turkey (Huber-Morath in Davis 1978: 486). All recent attempts to recollect this little known species at its type locality (the label on the type "Clician Taurus biem Übergange nach Korash") have failed. As a result its IUCN threat category suggested by Ekim & al. (2000) is DD. During field studies around İzmir- Turkey, *V. rupicola* was collected from Gümüldür on metamorphic rocks at an altitude of 180-200 m. The reproductive biology, demographic and phenologic studies conducted on this newly discovered population showed that

the distribution area is narrow (352518 m2) and the number of individuals is low (approximately 1250 individuals). This is due to unsuitable substrate, low competitive strength and habitat destruction due to anthropogenic effects like rubbish dumping, fires, construction of a dam and roads etc.. We propose that the threat category of this species is changed to CR (Critically Endangered) and that its distribution area be protected. Keywords: *Verbascum rupicola*, population, threat category, conservation

649. A GIS BASED GRAY WOLF HABITAT SUITABILITY MODELLING IN WESTERN BLACK SEA REGION, TURKEY

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Being one of the most widespread and adaptive carnivore species in Anatolia, gray wolf creates intense conflict in the regions where wolf-human coexistence occurs. In this study we built a multivariate habitat suitability model in order to evaluate the relationship between wolf presence and its habitat structure in the Western Black Sea region, Turkey. The region is characterized mainly by the coniferous and broadleaf forests but also includes arable lands and orchards which settled next to the forest lands. The study area covers 7350 km^2 and divided into 4 km^2 UTM grid squares to measure the impact of habitat features on wolf presence. Predictor variables were grouped into four main classes namely land cover, human impact, prey density and topographic features were used in the model to determine favorable wolf habitats in the region. Wolf presence data were collected by signs and tracks observed in field surveys, direct observations, camera-trap data, inventory results of Ministry of Environment and Forestry, and predation records obtained from livestock owners. The model revealed possible corridors being used by the wolf packs in the study area and it presents the relationship between wolf occupancy and habitat features in the Northern Anatolia.

650. IS ARGENTINE ANT INVASION HAMPERING REPRODUCTIVE FOLIAGE-GLEANING RESOURCES?

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Reproductive success of insectivorous birds is greatly constrained by food availability during breeding season. Trough multiple mechanisms from predation to competition, the Argentine ant (*Linepithema humile*) impinges negative effects in a large array of taxa, from ants and other arthropods to vertebrates. The effects of the invasive ant on the foliage arthropods assemblages, and how these disturbances are transmitted through the trophic web of Mediterranean sclerophyllous forest, have been assessed during three consecutive reproductive seasons. Argentine ants interact with arboreal foliage arthropods in a different manner than the native ants they displace do. The invasive ant is responsible for the local extinction of native ant populations in the cork oaks forests studied. It also impacted native arthropod assemblages by reducing their diversity. Arthropod availability for foliage gleaners' nestlings diminished in invaded cork oaks, mainly responding to the abundance and biomass depletion of caterpillars. Results suggest that the Argentine ant invasion could be compromising the reproduction of canopy-foraging foliage-gleaning species that mostly rely on caterpillars to feed their young. Thus, the Argentine ant would be promoting bottom-up effects in the trophic web through its effects on the availability of arthropod preys for insectivorous birds.

651. AGRICULTURAL LAND AS A VALUE GENETIC RESOURCES IN POLAND

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Poland is one of the most abundant countries in Europe in terms of biological diversity. According to the State Strategy for Protection and Moderate Use of Biological Diversity Poland is not only the refuge of these live resources but may also constitute a good source for their restitution. More than a half of the area of Poland is agricultural land. Therefore, we may assume how important maintenance of diversity in the case of arable land. The importance of plant genetic resources and the threats to them has led to the creation of conservation programs. Plant collecting systematically performed is the most important way for expansion of the collections. Systematic collecting missions are carried out every year in Poland. Every year number of old orchards, landraces and weeds associated with old agricultural communities is decreasing. The expeditions show us that the Southern and Southeaster part of Poland are still rich in local races of agricultural and horticultural crops, as well in plants that accompanying the cultivations. However the North-East of Poland is richer in orchards. The samples gathered in the collections are recognised as a part of the national heritage.

652. FROM THE DESK TO THE FIELD

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In the last 30 years the practice of environmental conservation has evolved towards an interdisciplinary approach embracing biological, socio-cultural and economical aspects Stakeholders have now to be included in environmental research and its application to management. This is particularly true for conservation in countries in central Africa that are characterised by hierarchical administrative systems and centralized power. In such a context it requires special efforts to distinguish and meet with the all parties concerned and assess the specific context of the project. In this situation a pilot study is a precious tool and takes on a special significance as a gateway to the problematic processes of achieving stakeholder representation and integration. My project focusing on human/wildlife conflicts in protected areas in Gabon aims to provide tools and knowledge towards effective conservation. During my pilot study I located the stakeholders at all societal levels to encourage them to participate in an integrative interdisciplinary project. Several issues and questions have emerged from this first experience of the research process, particularly on how to retain a balanced perspective when participants demonstrate opposite expectations? Such questions arise out of new integrative approaches towards conservation that will, to some extent, be determined by the answers.

653. EFFECTS OF LOCAL CONDITIONS ON THE CONSERVATION OF ENDANGERED NARROW ENDEMIC PLANTS: THE CASE STUDY OF *CENTAUREA HORRIDA* BADARO (*ASTERACEAE*)

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It is not only historical reasons that influence the spatial distribution and performance of endemic species but also the local ecological conditions. We estimated the spatial

variability of life-history traits of the narrow endemic Mediterranean species *Centaurea horrida* Badarò (*Asteraceae*), endemic of Northern Sardinia (Italy). The current conservation status of *C. horrida* is EN (EOO = 172.43 km^2, AOO = 108 km^2, population size = 11,719 adults, extinction rate = 18% in 50 years, Pisanu et al. 2009). A considerable amount of genetic variation (He = 0.603–0.854) together with a medium-high differentiation among populations (FST = 0.123; RST = 0.158) was detected. Bayesian analysis and AMOVA suggested that the origins of the current populations lie in two gene pools (Mameli et al. 2008). *C. horrida* experiments dramatic contraction of its range when secondary succession proceeds. The spatial distribution of *C. horrida* is not random but concentrated in open microhabitats (Farris et al. 2009). Three factors are determinants of the estimated variability in population structure and reproductive traits of *C. horrida*: 1) genetics; 2) site management; and 3) local adaptation. Despite its restricted range, three management units could be deemed viable for the conservation of *C. horrida*.

654. GROWTH OF THE PRUSSIAN CARP (*CARASSIUS GIBELIO*, BLOCH) IN FOUR HABITATS OF THE BALATON CATCHMENT (HUNGARY), IN COMPARISON TO THE FAUNA COMPOSITION

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The aggressively expanding Prussian carp (*Carassius gibelio*) is known as one of the most dangerous species for the native fish communities. This species causes problem also in the cathment of the biggest lake in Central Europe. In this occasion we examined the dynamical parameters of the populations and growth speed (Bertalanffy model) of the Prussian carp and in parallel the fauna composition of four habitats: the I. and II. phase of the „Little Balaton" Water Protection Reservoir, the „Nagyberek", and the littoral zone of the Balaton's western basin. The samples were collected by electrofishing, and after registration every individual were released except the Prussian carps, which were taken into the laboratory, where the necessary measurements, the scale collection and the sex determination were done. We found that the examined populations are gonochoristic, showing faster growth than in most of Europaean water bodies. The fauna composition indicated that proportion of predators might influence the population dynamical parameters. The big population of wels (*Silurus glanis*) in two habitats most possibly correlates with high abundance of Prussian carp. The abundance of the native cyprinids (e.g. *Abramis bjoerkna, Rutilus rutilus*) is higher than expected at these ratios of Prussian carp.

655. CONTRIBUTION TO THE CHARACTERIZATION OF THE DISTRIBUTION OF *TUBERARIA MAJOR* – AN ENDANGERED *CISTACEAE* SPECIES ENDEMIC OF ALGARVE

Fernandes, Maria Jacinta, Universidade do Algarve, Portugal; **David, Maria Manuela**, CDCTPV, Universidade do Algarve, Portugal; **Brás, Luís**, CDCTPV, Universidade do Algarve, Portugal; **Rosa-Pinto, José**, Universidade do Algarve, Portugal; **Correia, Maria João**, CDCTPV, Universidade do Algarve, Portugal

Tuberaria major (Willk) Pinto da Silva & Rozeira is an endangered Cistaceae species, whose conservation should deserve top priority according to Habitats Directive (92/43/CEE). This hemycriptophyte with a woody stem base and rosette-like basal leaves is endemic of Algarve where it grows in a sandy xerophytic scrubland the endemic association *Tuberario majoris-Stauracanthetum boivinii* Br.-Bl., P. Silva & Rozeira. *T. major* plants are rare under closed canopies but its populations have been found to regenerate after disturbances such as fire or clearings. The objective of this study was to conduct a survey of the spatial distribution of the species, to follow the evolution of its populations and to characterize the plant community where it occurs. The evolution of the population and the community description was done in stratified random permanent plots (4 quadrats/site, each quadrat with 4 m^2) located in sites with different recent fire history. On those plots we have recorded (in 2006 and 2008) plant densities, rosette sizes and reproductive effort, as well as the abundance-dominance Braun-Blanquet values for all species present. The results obtained suggest that differences in fire history are not sufficient to explain the observed differences in the evolution of the populations.

656. LANUSE AND CONSERVATION EFFECTS ON ECOSYSTEM FUNCTIONING: THE CASE OF THE DONANA REGION, SW SPAIN

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An important goal of conservation biology is understanding and preserving the capacity of ecosystems to regulate functional processes related to matter and energy fluxes (i.e. nutrient and water balance and carbon gains). We produced a functional characterization of ecosystems in Doñana, one of the most charismatic conservation areas in Europe, to evaluate the influence of protection, land use and weather on two descriptors of ecosystem functioning: the photosynthetically active radiation intercepted by vegetation (the main control of carbon gains) and evapotranspiration. For this, long-term series of satellite images were analysed. The Doñana ecosystems displayed great functional variability, showing pronounced gradients in light interception and evapotranspiration. Land covers differed not only in the total amount of radiation intercepted but also in their seasonal dynamics. Though the environmental heterogeneity accounted for an important part of functional variability, the largest differences were associated to land use. Additionally, land use intensification reduced the "memory" of the system, decoupling its seasonal behaviour from previous states and making it more dependent on variability in precipitation. The important control that local factors play on water and carbon fluxes reveals the need for monitoring ecosystem functioning in the evaluation of regional conservation policies.

657. ENVIRONMENTAL FACTORS AND SPATIAL STRUCTURE THAT DETERMINE AQUATIC VEGETATION ASSEMBLAGES IN AN OUTSTANDING EUROPEAN PROTECTED AREA

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Doñana National Park (SW Spain) presents one of the scarce natural systems of temporary wetlands that remain in Europe nowadays, with more than 3000 water bodies during wet years. They are found in depressions formed by stabilized Aeolian sands from the Holocene period. These systems show a broad range of habitats taking in consideration water persistence. The permanence of water is due to a combination of groundwater feed and rainfall, which may persist up to late spring or summer depending on pond location and depth. A vegetation survey, on 100 ponds analysed, has been done in order to find out what are the best set of predictor variables (related to habitat structure, physical environment and disturbance) that explain species richness and species composition (total, helophyte and macrophyte). GLM and ordination techniques have been used. Also we have been

measured the influence of the spatial component on species data and how the selected predictor variables influence on it. Preliminary results evidence the existence of a significant spatial component for species composition but not for species richness. The results will provide useful information for be applied on the conservation policy of this outstanding European protected area.

658. STRUCTURE AND SEASONAL DYNAMICS OF COLLEMBOLA COMMUNITIES INHABITING SOIL AND ROCKY "FLORAS" FROM PRAHOVA AND DOFTANA VALLEYS (ROMANIA)

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Flora developed on rocks and stones represent a large range of habitats isolated from surrounding soil and differ in environmental conditions have their own humus horizon. Our research was conducted from May to October 2008 in three rocky habitats from hill areas of the Romanian Subcarpathians: Brebu Gorges (N45°12'31.1''lat.; E 25°44'23.5''lat.) and Breaza Gorges (N 45°10'38.5''; E 25°41'14.2''), situated on Doftana Valley are represented by shrublands with *Hippophäe rhamnoides*; the third area- a mixed beech forest on Posada Gorges (45°17'43.5''lat.; E 25°35'40.9'' lat.) from Prahova Valley contains species which are adapted to live on stones. The aims of the present study were: a) to study the structure and b) seasonal abundance dynamics of *Collembola* communities and c) to establish if there are some differences between springtails from true saxicolous mosses, which colonize exposed rock habitats and group of soil *Collembola* inhabits vegetation developed primarily on the soil surface, which also colonize mineral and organic deposits on rocks. Seasonal abundance dynamics of springtails fauna seemed to be regulated by moisture, the highest values of numerical abundance was noted on October in Breaza Gorges (35 600 ind./m^2). The results showed that springtails communities structure differed distinctly between the above mentioned two groups.

659. RAINFALL-ADAPTED WATER PROVISIONING FOR ELEPHANTS CAN REDUCE THE DESTRUCTION OF WOODY VEGETATION

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The provisioning of artificial water sources is an important tool for the management of African elephants and other herbivores in arid and semi-arid regions. However, excessive water provision can lead to over-grazing, which can cause vegetation degradation and biodiversity loss. Although it is known that rainfall patterns determine vegetation dynamics and herbivore behavior, the understanding of how different rainfall regimes interact with the provisioning of artificial water sources is still rudimentary. To address this problem, we developed a deterministic simulation model that describes the interplay of rainfall, elephants and woody vegetation in the vicinity of waterholes. The model is based on elephant telemetry data and the ecological conditions in Etosha National Park, Namibia. We show that decreasing amounts of rainfall increase the destructive effects of elephants on woody vegetation. While, in general, woody biomass increases with distance from water, decreasing rainfall causes a shift of this vegetation gradient away from water. Using long-term rainfall data from Etosha, we also demonstrate that adapting the number of water sources to current rainfall conditions can mitigate the destructive impact of elephants. Including flexible, rainfall-adapted water provisioning in the management of elephants and other herbivores, thus, could crucially support conservation efforts in dry regions.

660. GENETIC DIVERSITY OF THE EUROPEAN MOUFLON (*OVIS MUSIMON*) POPULATION IN POLAND

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The European mouflon (*Ovis musimon*) was introduced in Poland over 100 years ago in few places. In last years the malformation of horns is being observed in the largest population in Góry Sowie (south-west of the country). The frequency of this defect is increasing in time probably as a consequence of isolation and inbreeding so the import of new animals is organized. The new animals are coming mainly from Czech and Slovakian commercial farms. The main goal of mouflon import is to improve the genetic diversity of the population separated for over 60 years. The main aim of our study is to find the relations between existence of the horns malformation and the genotype using molecular analysis of three microsatellite loci (OarHH41, OarVH58 and AGLA226).. All chosen loci are described as QTL responsible for a shape of the horns in primitive sheep breeds. Material for analysis was collected from three Polish separated populations (2 free-living and captive) and from few herds in other countries. Those four groups were compared for each examined loci. The alleles and genotypes frequencies as well as observed and estimated heterozygosity were calculated. Also there was checked the relationship between genotype and horn malformation.

661. IMPORTANCE OF SEED DISPERSAL VIA SHEEP AND GOAT FOR THE RESTORATION OF SPECIES RICH GRASSLAND

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Due to reduction of number of freely grazing animals in the 20th century, many localities of dry grasslands overgrew with shrubs and mesophilous grasses. Many recent projects thus attempt to reintroduce grazing management at these sites. The success of the restoration is often limited by availability of seeds of new species. The aim is to describe changes in vegetation of a dry grassland locality after clearing bushes and *Robinia pseudacacia* and introduction of grazing sheep and goats and identify the potential sources of new species at the site. To do this we set up permanent plots at the locality in 2006 and follow vegetation composition over time. Moreover, we studied composition of the soil seed bank and seeds found in sheep wool and goat and sheep dung on our locality and after moving the animals from a neighbouring species rich locality. The results show strong changes in species composition of the plots. Seed bank, sheep wool as well as dung contain large number of species, some of which were not found in the vegetation of our permanent plots at the beginning of the survey. This suggests that all these three sources can potentially contribute to the restoration.

662. TRAITS CHARACTERIZED CRITICALLY ENDANGERED VASCULAR PLANT SPECIES OF THE CZECH REPUBLIC

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Understanding factors responsible for species rarity is crucial for their effective conservation. One possible approach to describe rare species is to identify which traits characterize rare species and differentiate them from species that are common. This work is a part of the project "Prioritization of vascular plants for species conservation". The project focuses on critically endangered plant species of the Czech Republic (483 species) and tries to identify which types of species are most vulnerable. In this part, we explore basic biological and ecological characteristics, which could be typical for critically endangered plants. To assess the traits that are correlated with species rarity, we compare rare species with their more common close relatives (due to phylogenetic correction). Information about species traits was mainly obtained from literature and databases. The results show that the critically endangered species are smaller, flower for shorter period and have higher terminal velocities. They are more often wind or self pollinated than their common close relatives and have lower requirement for nitrogen and greater requirement for light measured as Ellenberg indicator values. The results suggest that critically endangered species are small species, with badly dispersed seed, that are sensitive to habitat eutrophication and overgrowth by larger species.

663. PATTERNS OF SPACE USE OF GRIFFON VULTURES IN WIND FARMS

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The use of wind as a renewable energy experiences a remarkable expansion worldwide. Unfortunately, habitat displacement, mortality, and other negative side effects of turbine operation on birds have been reported. The same air currents that make particular locations along mountain ridges attractive to soaring birds are chosen to place wind farms, generating a conservation conflict. We studied frequency, location, and height of griffon vulture flights in ten wind farms of eastern Spain. Data obtained before construction allowed us to recommend relocation of turbines placed in sites intensively used by vultures. During the first two years of turbine operation vulture flow over wind farms decreased and the height of crossing flights increased. Flights were more frequent across turbines placed on top of slopes most suitable for lifts. Collisions were positively related with the number of vulture flights at the rotor height. Vulture flights and risk situations posed by turbines were dynamic, as a result of their interaction with changes in the regional distribution of carcass aggregation in feeding stations. The distribution of slope lifts and feeding stations may help to predict flight intensity of vultures, to avoid risky places during wind farm design, and to reduce vulture collisions with turbines.

664. NATIVE FRESHWATER CRAYFISH (*AUSTROPOTAMOBIUS ITALICUS*) LIVE OR HOW TO SURVIVE BEING AN INCONVENIENT AND NOT MUCH APPRECIATED THREATENED SPECIES

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Three species of freshwater crayfish inhabit in Basque Country (North Iberian Peninsula). Native species, the white-clawed crayfish *Austropotamobius italicus* is included as vulnerable in the Spanish Redlist. We studied the distribution patterns of the crayfish species in Biscay (2220 km^2 and > 560 $inhab/km^2$). More than 600 localities were visited from 1994 to 2007: 111 streams were inhabited by *A. italicus* and 145 by the introduced species (*Pacifastacus leniusculus* or/and *Procambarus clarkii*). Differences in abiotic water conditions between reaches inhabited by signal and native crayfish have been found and used as a management tool in restocking experiences. Alien species spread is not the unique threat for the native crayfish, which survival is closed related to the management of our catchments: alterations due to an important forestry activity and water extraction for urban and industry water supply. Plans of conservation and restoration of the indigenous crayfish have been implemented in other regions in Spain, as the species is classified as in risk of extinction by their local governments, but not in the Basque Country where native crayfish could be an inconvenient species for some economic sectors and is also gradually losing his cultural value. As synthesis, a SWOT analysis is performed.

665. COMMUNITY STRUCTURE OF LONG-TIME BURNED FOREST SOIL MICOINVERTEBRATES DISTURBED BY HURRICANE HUGO IN SOUTH CAROLINA

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Frequent (1-3 years) prescribed burning for 40 years was applied on long-leaf pine forest in South Carolina. In 1989, Hugo hurricane destroyed all tress, afterward the plots were planted again in 1994. From this moment, simultaneous grow of the forest, without any human activity was going on all stands. Soil samples in the system (3 treatments X 3 plots X 10 samples) were identified to morphospecies level. Density of invertebrates and functional groups in three treatments was insignificant. Rarefaction curves of the first-order jackknife estimator indicated significant increase in total invertebrate diversity as well as carnivore and herbivore diversity on long term annually burned plots. Only the diversity of detritivores was significantly higher on both annually and periodically plots than on control. Ordination diagram of detrended correspondence analysis, describing 30% of total variance, confirm high variety of animals living on annually burned sites. Significantly more checkerboard pairs of species than expected by chance were estimated only on annually burned plots, suggesting more competitively structured communities than less intensively managed and controls. Long term burning treatment is able to create competitive soil communities over long period of time resilient to catastrophic disturbance such as hurricane.

666. MEDICINAL PLANTS USED BY BHILS TRIBES OF RATLAM DISTRICT, MADHYA PRADESH, INDIA

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This paper documents the traditional knowledge of medicinal plants that are in use by the indigenous Bhil tribes residing in Ratlam district of Madhya Pradesh, INDIA. The present study was done through structured questionnaires in consultations with the tribal practitioners and has resulted in the documentation of 34 medicinal plant species belonging to 17 families for curing diverse form of ailments. The study shows the need for the documentation of traditional ethno botanical knowledge pertaining to the medicinal plant utilization for the greater benefit of mankind.

667. ECOLOGICAL CHARACTRISTICS AFFECTING ON *MEDICAGO GENUS* IN IRAN

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Iran is one of the most important centers of diversity for *Medicago* sp. Annual Medics were collected from different states, evaluated and the relationship between geographical diversity and ecological factors was analysed. Results showed Annual Medics were distributed mostly in the North-West, West and South of Iran. Meanwhile longitude and precipitation are the two important factors in this diversity. Most of them had been distributed from 0-2750m longitudinally, in areas with 100-400mm annual rainfall and Mediteranian climates. Also, they had normal growth in pH=7.0-8.0. Soil texture analysis showed, the proper soil for Annual Medics was Loam or Clay soil. Never the less some species could grow in ecologically different areas. Among these species *M. rigidula* and *M. rigiduloides* had been adapted to cold zones, while *M. laciniata* and *M. sauvagei* were found in Southern parts of Iran with 20.C temperature. *M. littoralis* is a littoral plant and it was growing near the Caspian Sea and the Persian Gulf. Also, *M. noeana* was seen just in Northwest and West of Iran.

668. POND NETWORKS IN AN URBAN CONTEXT

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In 2008, ponds were designated as habitats of national importance within the UK. The northwest of England has one of the densest pond landscapes in Europe. Continued urban expansion in this area has seen many former rural ponds incorporated into urban developments. Ecological data was collected from 37 urban ponds in the Borough of Halton (northwest England) over a period of 2 years (2005–2006). These ponds were placed into a national and regional context with data from the national lowland pond survey and the adjacent rural county of Cheshire. The median species richness of ponds in the Halton sample were 27 species of aquatic invertebrates and 10 species of aquatic macrophyte per pond, compared to 42 and 20 species of invertebrates and macrophytes in rural Cheshire. Although factors such as water chemistry, shade and vegetation cover impact on the composition of invertebrate communities the major determinant of species richness was the proximity of other ponds and the nature of the surrounding landscape. The results show many aquatic species operating at the landscape scale rather than within individual ponds and the need for the creation of pond networks in order to maximise their impact for biodiversity conservation.

669. RECOVER A CORK OAK FOREST – BIRDS AS MANAGEMENT INDICATORS

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The original Portuguese forest was dominated by Oaks with Cork Oak *Quercus suber* as dominant specie in the south. Along the last century's these forests were transformed in the actual landscape know as Montado – a complex system with several valences (e.g. agricultural, forestry and cattle exploration). Although Montado is considerate a priority for conservation and is habitat of a high biological diversity, is threat by abandonment and inaccurate management. We study an area of 775ha of fragmented Montado in the Southwest of Portugal chosen for recover actions in order to forest densification. We use a point count methods for bird census (10 minutes) with distance limit (3 bandwidths) in 38 sampling stations along a grid of squares 500x500m. In 2008 we characterized the context in, and compared the results with well establish patches in the same area. Results shows that recover area is dominated by woodland and insectivorous species (e.g. Tits and Creepers) presenting lower species richness and community composition than control areas.

670. PLAN OF MEASUREMENTS FOR AN ECOLOGICAL RESTORATION AND CONSERVATION OF THE UPPER PART OF ATOYAC RIVER (ATOYAC, VERACRUZ, MEXICO)

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The river Atoyac originates in a mountainous region located in the State of Veracruz (Mexico) and its waters flow into the river Jamapa, which finally reach the Gulf of Mexico. The upper part of the river is heavily affected by works (dams and water storage reservoirs turning dry the riverbed for several hundreds of meters during the drought season) designed to assure a continuous and constant water flow through a waterway for a local sugarcane plant and sugarcane fields nearby. The river is also heavily polluted due to industrial water wastes but also by the human settlements, affecting its aquatic life. A plan of measurements for an ecological restoration and conservation of the upper part of river Atoyac is herein proposed, as follows: elimination of the pollution sources, detailed studies on local biodiversity in order to protect and conserve rare, endemic, vulnerable, endangered plant and animal species, reestablishment of a permanent water flow in the riverbed, cleaning the river sides, promotion of sustainable development, sensibilization of local community including producers, civil society and authorities to integrate them as protagonist agents of a scenario of preserving the natural resources for a rationale, more effective water use and an economic socio-ecologic development.

671. CHARACTERISTIC OF BARRIERS CAUSING LANDSCAPE FRAGMENTATION FOR LARGE MAMMALS

Gorčicová, Ivana, Evernia s.r.o., Czech Republic; **Anděl, Petr**, Evernia s.r.o., Czech Republic; **Petržílka, Leoš**, Evernia s.r.o., Czech Republic

Submitted results from research work are focusing on the categorisation of overland roads in the Czech Republic

according to their permeability for large mammals. The assessment is based on the technical designs of roads and traffic intensity. The intensity of traffic affects the surrouding landscape by noise and pollution, the affected area is marked as the disturbance zone. From the presented partial maps it is clear that the overall area of disturbance zone in CR equates to c.12% of the country. If we add the size of urban areas to the area significantly influenced by traffic, this will increase to 20%. And this is in a situation where the development of transport infrastructure in CR is far lower than figures in Western Europe (e.g. the motorways length in CR is c. 7 km/ 1000 km^2, in Benelux countries c.50). As a final outcome there is a map presenting categorisation of migration barriers for large mammals, in which apart from transport infrastructures are integrated urbanised areas and proposed development areas. This map is an introductory guide for the protection of main migration corridors in CR.

672. FISH DISTRIBUTIONAL PATTERNS IN STRYMONAS RIVER (GREECE)

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Within the Water Directive 2000/60/EC, fish is one of the biological elements for monitoring and assessing the ecological status of surface waters, due mainly to their significance as monitoring tool to evaluate ecological integrity. The aim of the present study was to record the distribution of the fish fauna and the composition and abundance of the fish species in the Greek part of the transboundary river Strymonas (Balkan peninsula). Twelve sampling stations, located in the main river and its tributaries were sampled by electrofishing during April and August 2008 (high and low flow periods respectively). A total of 19 species belonging to 7 families were recorded, nine of which (47,37%) were endemic to Greece and to the Balkan peninsula. *Cyprinidae* was the most abundant family (58%). *Barbus strumicae* was the most abundant species in terms of number and weight in both periods, while *Rhodeus amarus* dominated in terms of number in spring (41,52%). Fish numerical abundance exhibited a temporal pattern while a spatial pattern based on fish biomass was observed. Richness was lower at the stations affected by anthropogenic pressures, mainly habitat destruction (sand drifting) and obstruction of the free fish movement.

673. GENETIC PATTERNS AND CONSERVATION MANAGEMENT OF THE TERRESTRIAL TORTOISE *TESTUDO GRAECA* IN SOUTHEAST SPAIN

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The knowledge of genetic spatial patterns of species is useful to carry out appropriate management measures, especially if populations are endangered. In the present work we analyzed the genetic structure of the terrestrial tortoise *Testudo graeca* in southeast Spain, recently identified as a recent range expansion from North Africa. Because of its endangered status, numerous reintroduction and translocations schemes have been developed in the past decades, what could have altered the genetic patterns of the species. We used three microsatellite markers to analyze 243 individuals belonging to 17 populations located in the coastal part of the specie range. We found a differentiated main group (n=9) with an isolation by distance (IBD) pattern, covering the whole study area. Algerian individuals were identified or matched with places where translocation or introduction schemes are known to be carried out. These results suggest that the species shows a complex genetic pattern due to the likely existence of different colonization events in southeast Spain and with IBD mechanisms as a consequence of its expansion. Besides, reintroductions or translocations of individuals are altering the genetic patterns of the populations. Therefore these conservation actions should be carried out with caution.

674. VOLUNTEERS FOR NATURE CONSERVATION: "WILDWATCHER" ON-LINE BIODIVERSITY MONITORING PROGRAM

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They live around us but which areas are colonized? Spreading or even collapsing? In danger or endanger? We are searching for answers to questions like these in case of common plant and animal species by the help of a program called 'WildWatcher'. WildWatcher – a new program of the Hungarian Biodiversity Monitoring System (HBMS) – is an interactive online monitoring tool based on the work of volunteers. Components of the program are carefully selected for easy identifiability and wide distribution. For example hedgehog (*Erinaceus concolor*), mole (*Talpa europea*), salamander (*Salamandra salamandra*) are perfect targets from this point of view. The aims of WildWatcher are not only the data collection for selected species but to involve people to a wildlife monitoring program. Home pages of this program containing user guide for identification, photos and background information about targeted species. On-line data sheets are easy to use, GoogleMap based localization helps to find observation points. Data management as the part of Nature Conservation Information System (NCIS) ensures clarified data by expert validation procedure. As the first experiences on squirrel monitoring show the methods applied are well suited for volunteer involvement. Feedback of results to data suppliers is extremely important to motivate volunteers.

675. URBAN POPULATION OF TAWNY OWL (*STRIX ALUCO*) AFTER DECREASE OF ITS MAIN PREY – WARSAW AS A CASE STUDY

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Tawny owl is the only owl species that finds urban habitats suitable and commonly inhabit even big cities of Central Europe. According to studies done in 1970's and 1980's house sparrow (*Passer domesticus*) was the main prey of tawny owl in Warsaw. In recent decades rapid decrease in house sparrow number was noted. The aim of our study was to assess how the tawny owl population coped with this new situation. Therefore between 2004 and 2008 we studied its distribution, breeding performance and food composition and compared our results to the literature data from 1970-1980's. We found out that percentage share of *Passer* spp. among all identified prey items dropped from more than 50% to around 30% while share of rodents (mainly *Apodemus agrarius*) doubled (from 17 to 34%). Breeding performance did not differed significantly between these two periods. We observed however, that tawny owl withdrew from the strict city centre (where it used to prey mostly upon sparrows) while outside strict central zone its distribution did not change. To conclude, tawny owl adapted to this new situation by changing its food habits and switching from birds to rodents.

676. ELABORATION OF THE NATURA 2000 MONITORING SYSTEM OF CERTAIN, SELECTED SPECIES AND HABITATS IN HUNGARY

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The Hungarian Biodiversity Monitoring System (NBmR) has been operated for ten years. This system has accumulated a large database on habitats, communities, plant and animal species, but it has also several incompatibilities regarding reporting obligations under the Birds and the Habitat Directives. The aims of this research were: 1) to fill these gaps by elaborating uniform methodology for 44 selected species; 2) to produce good quality collection data of birds for less explored SPAs; 3) to carry out survey and mapping of habitats of community importance on certain, selected Natura 2000 sites; 4) to develop methodology for the conservation status assessment (classification according to EU criteria) of habitats of community importance and monitoring methodology of conservation status change. For this purpose, protocols for monitoring distribution, range, structure and function were developed. A completely new methodology was elaborated for the monitoring of structure and function on the so-called intensive and extensive sampling sites. Additional impacts of the project were: 1) providing improved information about selected species and habitats; 2) calculating or estimating the size of stable and/or well-known populations; 3) identification and investigation of poorly known populations, refinement of species distribution maps; 4) new information about bionomics of studied species.

677. HABITAT SELECTION OF WILD GOOSE SPECIES IN THE HORTOBÁGY (HUNGARY)

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The Hortobágy is one of the main wild geese migrating site in Europe. This main habitat types are natural grasslands and marshes which has a rich flora and fauna. Regular observations were made weekly in the migrating seasons between 1989 and 2008. The main periods of the migration also specified in each year, as well as the habitat preference. The White-fronted Goose (*Anser albifrons*) contributes most of the total number of geese population, the number of Bean Goose (*Anser fabalis*) is decreased in the last years. The Greylag Goose (*Anser anser*) is the only nesting goose species in Hungary and the Hortobágy is one of the main nesting place of this species. Two globally protected species the Lesser White-fronted Goose (*Anser erythropus*) and the Red-breasted goose (*Branta ruficollis*) are regular in migration, but in small number. The main resting places for geese are artificial fishponds, these lakes are similar to the ancient marshes. The main feeding sites are the agricultural fields around the Hortobágy National Park. The migrating goose flocks use different habitats in each season depending on the food supply and disturbance, to protect the rare species feeding sites have to be created inside the protected area.

678. PRELIMINAR CHECKLIST LIST OF ALIEN PLANT SPECIES OF MONTENEGRO

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Preliminary checklist of alien plants of Montenegro includes all registered alien vascular plants occurring within the boundaries of Montenegro. It includes alien plants, casual alien plants, naturalised plants, invasive plants, alien transformers, alien weeds (according to proposal of Pyšek & al. 2004, Taxon 53(1)). The main data sources for the drawing up of the list were: the main regional flora's which treats the territory of Montenegro: Prodromus Florae Peninsulae Balcanicae (Hayek 1924-1933), Concpectus Florae Montenegrinae (Rohlena 1942), Građa za floru Crne Gore (Pulević 2005); all floristic published works has been used as working inventory. The author's personal unpublished data were also used. As very dangerous invasive plant species with great negative impact on biodiversity of Montenegro we can underline: *Paspalum distichum* subsp. *paspalodes*, *Ambrosia artemisiifolia, Ailanthus altissima, Solanum eleagnifolium, Amorpha fruticosa, Robinia pseudaccacia, Opuntia ficus-indica* etc.

679. GENETIC CONSEQUENCES OF POPULATION DECLINE IN EURASIAN OTTER (*LUTRA LUTRA*) POPULATIONS IN THE CZECH AND SLOVAK REPUBLICS

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The Eurasian otter (*Lutra lutra*) is one of the large vertebrate species which underwent significant population decline over the past century. For populations in the Czech (CR) and Slovak Republics (SR), this recent population decline was documented also through genetic evidence. The aim of our project (2008-2010) is analysis of present and past microsatellite DNA variability in CR and SR otter populations, and assessment of genetic consequences of the recent population decline. We will focus on detection of recent and ancient population bottlenecks, assessment of present and past effective population size and analysis of population genetic structure. The project is based on analysis of DNA extracted from tissue samples from otter carcasses (contemporary population) and DNA extracted from teeth from skulls and other material from museum collections (historic population). We have already analysed almost 200 tissue samples for 10 microsatellite loci. At present, we work on optimization of additional 6-8 loci and test of DNA extraction from teeth. Based on preliminary data, no evidence for increased level of inbreeding in populations was found. However, relatively high level of genetic differentiation (FST = 0.15) indicates existence of a gene flow barrier between the Czech and Slovak population.

680. TO CHOOSE OR NOT TO CHOOSE A BREEDING SITE – THAT'S THE QUESTION FOR BREEDING WADERS

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The population of breeding waders is demising in the Danish Wadden Sea as shown by surveys since 1991. Our topic was to identify differences in characteristics between fields attractive and not attractive to waders. As indicator bird we choose Black-tailed Godwit (*Limosa limosa*). We invented 36 fields/meadows for biotic as well as non-biotic factors during 2007-2008. In half of the sites *L.limosa* had bred in 2006. The numbers of *L.limosa* in each field was recorded 2-3 times during spring. The localities were characterised by: area, soil properties, physical structure of soil surface and vegetation, bare soil, wetness, species composition of the vegetation, structure and vegetation of field boundaries and information from farmers about their management. N mineralization rate, large scale heterogeneity, number of tall growing plant species, two or more field boundaries with low vegetation and use of fertilizer related negatively to

numbers of *L.limosa*. Positively related were soil clay, bare soil in silt trenches and presence of moss carpet. Surprisingly, the number of *L.limosa* was not related to nature quality measured from the species composition of the vegetation. The results are used to persuade the farmers and the national nature administrators to implement better management for waders.

681. RESULTS OF THE HUNGARIAN MEADOW VIPER (*VIPERA URSINII RAKOSIENSIS*) CONSERVATION PROGRAM

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Rough estimations were putting surviving numbers of Hungarian meadow viper (*Vipera ursinii rakosiensis*) below 500 individuals, with three major occurrences in Hungary and one recently discovered population in Romania. MME BirdLife Hungary together with relevant National Parks started a complex conservation program in 2004, supported by the Ministry of Environment and the EU LIFE-Nature fund. Grassland reconstruction on 26 ha area targeted those false acacia and pine tree plantations that robbed the species from safe hibernating places, and created a barrier between two recent populations. There are already clear signs of repopulation by species from the grassland. As part of monitoring we regularly assess characteristics of vegetation, availability of hiding places and density of prey items, like Orthopterans, lizards, rodents, with evaluation of current and historical site management. Public awareness campaign was carefully designed with organised public forums and press conferences, production of leaflets, brochures and information boards. Website (www.rakosivipera.hu), with regular updates was started. Viper Conservation and Breeding Centre was started with 10 adult individuals, collected from 4 different populations, and after five successful breeding periods number of vipers reached 390. Tests show that offsprings have higher genetic variability than their parents. We plan first reintroduction next year.

682. AGE STRUCTURE DETERMINATION ON EURASIAN BEAVER (*CASTOR FIBER*)

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For our further research we wanted to know age structure of the Eurasian beaver population in study areas. Most often used method for age determination of live-trapped animals is categorization based on weight. This method is not fully reliable, because the weight frequently reflects the individual's condition and quality of habitat. Wight of animal has included large seasonal effect. We decided to find out better way to determine age classes. We analyzed 43 skulls of the European beaver, which we obtained from dead found animals. Basal cranial measurements were measured in all skulls. According to the tooth development the individuals were assigned to three categories. Juvenile category (up to one year) and subadult category (up to three year) were distinguished according to convergence of the lower external edge of loops and closure of the root. Animals of adult category (more than three year) were determinate by a number of cement layers. We knew allometric characteristics of 13 dead animals from our sample. This data were compared with characteristic of age known skulls. By the integration of three methods (skulls and teeth characteristics, measurement, weight) we attained to the specification of age determination which can be use for following research.

683. IS FARMLAND BIODIVERSITY A STEP-CHILD TO FARMERS?

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In light of the current EU subsidy framework with the explicit environmental goals but largely voluntarily farmer participation, it is vital to include actor-oriented and behaviourally grounded components into models of agricultural change. Here we pool results from two sociological studies in Estonia and Finland. One is exploring farmers' interest in and knowledge of farmland wildlife, their understanding of the concept of biodiversity, and awareness of the potential causes behind declines of farmland birds as components in decision-making on nature-friendly management. The other draws from the experience on regional planning for biodiversity conservation in Finnish farmland. The major results reflect that for farmers biodiversity is a welcome component as long as it does not interfere is production goals, and farmers' concern for species decline is related to their personal experience of declines in conspicuous species. The evaluation of the regional planning - aimed increase in participation of farmers in the agri-environment scheme designed for biodiversity - demonstrated that such actor-oriented policy enforcement promotes awareness and enhances farmer-official co-operation but comes at a considerable cost. It also failed in creating networks of ecologically valuable or restorable sites, and should be better integrated into the rural development process.

684. TIME PREFERENCES AFFECT CONSERVATION PRIORITIES FOR MULTIPLE SPECIES

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Time preferences play a decisive role for the economic evaluation of environmental problems. As an example, the perceived consequences of climate change depend heavily on how we weigh benefits of today as opposed to benefits of future generations. Yet, while time preferences are heavily debated in climate change research, conservation biology has widely neglected this issue so far. In this study, we show that, while the choice of time preferences does not change the ranking of conservation options for single species under stationary conditions, it may substantially change conservation decisions for multiple species. We conclude that it is of crucial importance to investigate the sensitivity of model results to the choice of the time horizon or other measures of time preference when prioritizing biodiversity conservation efforts.

685. THE CHANGE OF THE RELATIVE DISTRIBUTION FREQUENCY OF HUNGARIAN MEGACHILE SPECIES (HYMENOPTERA: *APOIDEA*) IN THE LAST SIXTY YEARS

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Bees are the most specialized insect pollinators. In recent years a pollination crisis was prognosticated from many parts of the world, because of the great decline in diversity of bees. In this paper we evaluate the changes in the distribution of *Megachile* species in Hungary in order to estimate the endangerment of these species. The species distributional data were collected from private and public collections and from the available (mostly Hungarian) scientific literature. The relative distribution frequency of the species was calculated using UTM maps. The distribution frequencies of the different species were calculated for 10 years intervals in order to following the changes. The total database contains about 4000 distributional records of 30 *Megachile* species. Our summarised data covered the 30% of the UTM squares in Hungary. There was not enough data for any conclusion at ten species. Only one species showed increasing trends, while ten had fluctuations in their frequencies of occurrence without an obvious trend. The remaining nine species showed decreasing trends; five of them obviously, the other four only slightly decreased in the last few decades. These last nine species can be classified at least "endangered" or "vulnerable" in according to the IUCN Red List criteria.

686. GRASSLAND MANAGEMENT BY MOWING OF *CALAMAGROSTIS EPIGEIOS* (L.) ROTH IN THE WESTERN-CSERHÁT, HUNGARY

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The *Calamagrostis epigeios* can slow down or arrest the old-field succession. We studied the role of this species in the West Cserhát-hills in Hungary, in abandoned vineyards. Diversity of *Calamagrostis* dominated patches varies from low to medium level. The most frequent species occurring together with *Calamagrostis* are *Dorycnium herbaceum*, *Inula ensifolia*, *Festuca rupicola*, *Brachypodium pinnatum*, *Agrimonia eupatoria*. In May 2001 we established permanent quadrates to understand if *Calamagrostis* can be repressed with mowing. Three abandoned fields were selected on north facing slopes where the cover of *Calamagrostis* was 64, 57, 62 %. There are 8 homogenous 3x6 m² plots in each field. Half of the plots are mowed twice a year, the other half is left as control. Before and after cutting the percentage cover of species are recorded in 2x2 m quadrates. 7 years after the first cutting there was a significant decrease in the cover of *Calamagrostis* (4,37; 3,01; 3,76% respectively). The response of subordinated species was strong, the main cover of *Festuca rupicola* increased from 1,12 to 34,37%. Although average Shannon-diversity is not significant increased; from 1,06 to 1,44. Mowing increased species richness (from 13,75 to 23,5) of vegetation, and successfully controls the *Calamagrostis*.

687. RESTORATION OF CENTRAL EUROPEAN LICHEN PINE FORESTS BY REMOVAL OF LITTER AND HUMUS

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Lichen pine forests (Cladonio-Pinetum) are a characteristic feature of extremely nutrient-poor, acidic sandy soils in Central Europe and protected according to the EU Habitats Directive (code 91T0). They are highly endangered by nitrogen depositions which promote humus accumulation, and missing anthropogenic nutrient removal. We investigate whether experimental removal of ground vegetation, litter and humus layers simulating historical "sod cutting" is an appropriate and lasting technique for their restoration. We selected eight stands in the transition to more nutrient-rich, lichen-poor pine forests in the Elbe region (Lower Saxony, Germany). In a randomized block design 100 m² subplots with different treatments were established in autumn 2007: humus removal, humus removal plus inoculation with lichen material previously collected on the plot, and control. In 2008 successful initial colonization of lichens and bryophytes mainly via thallus fragments was recorded on the sod-cut plots, resulting in species numbers on the level of the controls and including endangered species. Vascular plants exhibited lower colonization. Species number and cover of lichens were higher in inoculated compared to non-inoculated plots, while bryophyte diversity was not influenced by treatment. Successive years will show whether full restoration of lichen pine forest will happen.

688. HIGHWAY FENCING AND MOOSE MIGRATIONS IN NORTHERN SWEDEN

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We studied the effects of road fencing and snow depth on moose migration in northern Sweden. Snow tracking before and after fencing of a coastal highway showed that the barrier effect of fencing was about 80 %. In the first years after fencing, large numbers of moose accumulated along the road, particularly during early winter, causing severe local damage to pine plantations. But also after fencing, moose occasionally passed the road at available openings at road crossings and lakes. Observations of marked moose showed that individuals "trapped" on the coastal side moved frequently along the coast and between islands in the archipelago, thereby forming an elongated but continuous population. A meta-analysis of moose migration studies showed that the migration distance, and probably also the proportion of migrants in the population, was higher in areas with deeper average snow layer. The results suggest that landscape fragmentation by roads can be a problem to moose demography and management. Our study highlights the importance of maintaining landscape connectivity for large animals, particularly in times of environmental change, but it also indicates that migratory behavior in moose, which is characteristic for northern Scandinavia, may change with a changing climate.

689. PAST LAND USE, LANDSCAPE STRUCTURE AND CURRENT DISTRIBUTION OF DRY GRASSLANDS

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Strong recent changes in landscape, in terms of its structure and land use, have initiated research on how landscape structure and past land use influence distribution and dynamics of plant species richness at the landscape level. Whereas different studies showed the importance of past land use for some species, little is known about the relation among landscape structure, past land use and species dynamics at the landscape level. In our project, we focused on habitats of dry grasslands in an agricultural landscape (50 km^2 approx.). The first task of the project was to describe dynamics of the habitats in the landscape over the last 60 years. This was done by analyzing data on land use in different time periods using GIS. The results show strong changes in land use at the localities of current dry grasslands. They also show that many grassland localities existing in the landscape 60 years ago disappeared. In the future we plan to incorporate these data into a dynamical model predicting changes of species distribution in the landscape.

690. THE EFFECT OF SEX HORMONES ORIGINATING FROM CATTLE MANURE ON A SOIL MICROBIAL COMMUNITY: A VERTICAL PROFILE STUDY

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Cow manure is an organic amendment extensively used in agroecosystems, however, it is known to contain endogenous sex hormones (progesterone, testosterone, 17β estradiol) that may induce abnormal development of the endocrine system of various organisms. The microbial community as part of the soil milieu is responsible for organic matter degradation and is considered a valuable bioindicator in soil for environmental changes. This study evaluates the hormonal load from cattle manure accumulation after 40 years in a soil vertical profile (-10 m) of a microbial community and its functional diversity. Preliminary results indicate: (1) there were no differences ($p>0.05$) in microbial biomass and CO_2 evolution along the profile under cattle-manure accumulation (treated site); (2) the above parameters were higher at the control (uncultivated) site compared to the treated site; (3) at the treated site, substrate utilization levels were high at 0-7 m, but at the control site – only at 0-2 m; (4) functional diversity was constantly higher at the treated site compared to the control at all depths (besides surface); (5) 17β estradiol was found only beneath the cattle-manure stock. Our findings elucidate the importance of the soil microbial community as bioindicators of human impact.

691. DO FRAGMENTATION EFFECTS STEP FROM DISPERSAL TO RECRUITMENT IN ORNITHOCHOROUS TREES?

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Seed dispersal by birds is suggested to play a key role in overcoming barriers to forest recovery in degraded areas. However, developing forest restoration plans based on passive tools needs, first, to disentangle the mechanisms by which fragmentation influence bird-generated dispersal patterns and, second, to assess how much of fragmentation effect step from seed rain to seedling establishment patterns. We investigated these topics in two fleshy-fruited species (*Crataegus monogyna* and *Ilex aquifolium*) coexisting in a fragmented forest of northern Spain. The presence of perches and the availability of fruits surroundings these perches, rather than forest cover itself were the key features conditioning seed dispersal through the fragmented landscape. Seedling density was positively related to seed density in *C. monogyna*. In the case of *I. aquifolium*, postdispersal seed looses overwhelmed the effect of bird-generated template in early recruitment. We suggest that habitat management decisions oriented to accelerate forest recovery must include the preservation and even the increase of fleshy-fruited trees in the non-forested matrix given their capacity to commute the reduced tree canopy for bird attraction. Further, an integrated management strategy must consider explicitly postdispersal processes.

692. OLD-FOREST ASSOCIATED LICHENS IN *PICEA ABIES* PLANTATIONS

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The natural *Picea abies* forests within the oceanic region of Central Norway harbour a unique epiphytic lichen flora. The lichens in these natural forests are well documented. However, the occurrence of old-forest associated lichens in plantations has so far been paid little attention. Studying 71 plantations we observed a high frequency of *Alectoria sarmentosa*, *Lobaria scrobiculata*, *Platismatia norvegica* and *Ramalina thrausta* in several young plantations. The frequency was significantly influenced by plantation age (*A. sarmentosa* and *P. norvegica*), stream distance (*R. thrausta*) and the presence of intact branches in lower canopy (*A. sarmentosa*, *L. scrobiculata* and *Nephroma* spp.). We also showed that the success of establishment of diaspores of old-forest lichens was as high in 40 years old plantations as in old natural stands. The results from these studies are promising for the potential to conserve and increase populations of old-forest lichens in managed forests. Increasing the number of branches in the lower canopy, by increasing the distance between the spruce seedlings, might be one way to promote the conditions in plantations. The ability of the studied species to grow in plantations is related to the species-specific needs and constraints. This emphasizes the importance of single-species approaches in future studies.

693. TRAFFIC MORTALITY OF FAUNA IN THE CZECH REPUBLIC

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Fast development of new transportation infrastructure and growing intensity of traffic bring new impacts on nature. The fragmentation of habitats and mortality of fauna on roads belong to the most serious factors. The goal of our study was to bring the first estimate of numbers of animals which are killed by traffic in the whole country per year. The chosen section on different road levels (highways, 1st class roads, local roads) were checked by pedestrial control periodically and all dead vertebrates were recorded. During the study 1282km of roads were checked (passing through each segment twice to check both sides of the road). During 12 months 2149

pieces of vertebrates in 103 species were found. Of the total number there were 54 % of mammals, 25 % of birds, 17 % of amphibians and 4 % of reptiles. On base of these data the distribution of fauna mortality in different seasons of the year and on different types of road was analysed. This study brings the first assumption of the total traffic mortality of different species in the whole country.

694. MIGRATION CORRIDORS FOR LARGE MAMMALS IN THE CZECH REPUBLIC AND LINKAGES TO NEIGHBOURING STATES

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Landscape fragmentation due to growing anthropogenic impacts especially by the transportation network is a serious problem at present time. One of the most affected group of animals are large mammals because of their large territory area requirements and inclination to undertake long distance migration. As a target species that have been taken into account within the project are the European Lynx (*Lynx lynx*), the Brown Bear (*Ursus arctos*), the Grey Wolf (*Canis lupus*), the Eurasian Elk (*Alces alces*) and the Red Deer (*Cervus elaphus*). Migration corridors on the Czech territory will be identified on the basis of current occurrence and migration data as well as historical distribution of focal species. Main axes of migration corridors will be preferably delineated using GIS in concordance with known habitat preferences for forests and other wooded areas. Main output of this project is to ensure migration permeability for large mammals with crucial respect for continuing transboundary connection to neighbouring states because the animals know no boundaries.

695. ASSESSMENT OF CONSERVATION STATUS OF ORTHOPTERANS IN THE CZECH REPUBLIC

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There are ninety-seven species of orthopterans known from the territory of the Czech Republic today. The first conservation status assessment of this group was done in 2005 in the Red List of threatened species in the Czech Republic – Invertebrates (Holuša Kočárek 2005). Twenty-nine species are listed there, many others could not be assessed due to lack of actual information. More intensive research conducted in last four years allows revise orthopteran conservation status assessment. Thirteen species need to be considered extinct now. Forty percents of remaining species occur on very restricted area up to 1% (26 species) and 5% (13 species) respectively of standard grid mapping squares (11x12km). Restricted distribution of those species is influenced by geographical location of the country (18 species overlap territory of the country only minutely on the south and east respectively) or by limited supply of preferred habitats, often by both factors simultaneously. Most of those species are highly endangered in the Czech Republic, only a few of them are spreading quickly there by contrast. Actualised conservation assessment of the orthopterans using IUCN categories and criteria is given. Selected species are commented.

696. HOW STEPPE-GLACIAL RELICT DISCOVERS GARDENS: EXPANSION OF THE ROSE CHAFER *OXYTHYREA FUNESTA* IN THE CZECH REPUBLIC

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Oxythyrea funesta is a rose chafer protected by a Czech law. This beetle was considered as a steppe-glacial relict occurring mainly on xeric localities. Larvae live in decaying plant residues, adults are floricolous. In the period 1950-1990, a sharp decline in its distribution area was recorded, however since than *O. funesta* has been expanding. We studied distribution pattern of this species and tried to identify key factors influencing its expansion on landscape level. Modelling of *O. funesta* distribution was based on occurrence records and generated pseudo-absence data. Generalized linear model was used to estimate its occurrence probabilities in relation to investigated environmental variables. Our preliminary results show that *O. funesta* prefers warmer areas and closer distance to rivers leads to its higher occurrence probability. In recent years this species expands also to higher altitudes. Moreover, mosaic of agricultural landscape with natural vegetation patches, discontinuous urban areas, industrial or commercial areas seem to be the most preferred land cover categories. *O. funesta* probably scores shift in its development; larvae have adapted to anthropogenic substrates (e.g. compost) and also adults have been recorded in variety of habitats from natural steppes, through wet meadows, to ruderal and anthropic vegetation sites in urban landscape.

697. DEVELOPING PROTOCOLS FOR MONITORING NATURA 2000 SITES IN HUNGARY

Horváth, András, Institute of Ecology and Botany, Hungary; **Bartha, Sándor**, Institute of Ecology and Botany, Hungary; **Bölöni, János**, Institute of Ecology and Botany, Hungary; **Molnár, Zsolt**, Institute of Ecology and Botany, Hungary; **Kovács-Láng, Edit**, Institute of Ecology and Botany, Hungary; **Török, Katalin**, Institute of Ecology and Botany, Hungary

For developing and testing National Protocols in Hungary, we had rather short time (one year). Therefore our activity was based on experiences from previous programs. For monitoring Range and Distribution of Natura 2000 habitats, we tested and updated the ongoing system of the National Biodiversity Monitoring Program. Beside landscape level habitat monitoring (mapping of 124 areas, 3% of the country is covered), at each Structure and Function monitoring sites, the area of the Natura 2000 habitats is mapped. As an optimal program, complete mapping of all Hungarian Natura 2000 habitats are planned at the scale of 1: 25 000, in every 12-18 years. Structure and Function monitoring (repeated in every 2-6 years) have special emphasize on horizontal and vertical vegetation structure, litter accumulation and soil erosion, and surveying invasive species and endangering factors. Protocols were based on our previous results in vegetation dynamics and on experiences of ongoing Life Projects. 4800 sites were selected for routine surveys. Relative sample sizes of the particular habitats are in accordance with their total area, diversity and importance. For calibrating and checking

the results of the routine survey we have 1200 sites for more detailed data collection with phytosociological survey and sampling for biomass.

698. PLANKTONIC CRUSTACEANS AND INVERTEBRATES AS A POTENTIAL FOOD SOURCE FOR WATERBIRDS IN A HUNGARIAN WETLAND RECONSTRUCTION AREA

Horváth, Zsófia, Eötvös Loránd University, Hungary

My investigation took place in the Nyirkai-Hany wetland reconstruction (Fertő-Hanság National Park, Hungary). This wetland area was created in 2001-2002 to restore a part of the formerly drained large marshland called Hanság and to offer a suitable habitat for feeding and breeding to waterbirds. From April 2007 until May 2008, I collected plankton, benthos and metaphyton samples from 10 locations belonging to different habitats monthly, and by using statistical and multi-dimensional analyses I studied the correlation between existing density data of waterbird trophic guilds and potential food source. There were large differences in invertebrate biomass between locations belonging to different types of vegetation and it had its largest density in the shallow waters. Significant correlations showed that the area offered good food sources for benthos, macrophyte and nekton-consumer decomposition accelerating guilds. According to my results, if the purpose of a wetland reconstruction area is to be a suitable habitat for birds for feeding, it is recommended to use a lower water level because it is favourable for the development of a higher amount of invertebrate biomass.

699. CORAL REEF FISH AND THE AQUARIUM TRADE: ECOLOGICAL IMPACTS AND SOCIO-CULTURAL INFLUENCES IN SRI LANKA

Howard, James, University of Durham, United Kingdom; **Bell, Sandra**, University of Durham, United Kingdom; **Lucas, Martyn**, University of Durham, United Kingdom; **Kumara, Terney**, University of Ruhuna, Sri Lanka

Marine conservation is nowadays recognised as an interdisciplinary activity where the preservation of marine biota cannot be separated from human development and welfare. Statistics on the relationships between coral reef degradation and the livelihoods activities of reef dependent communities such as those of southern Sri Lanka are poor, especially given the tendency for research data to focus exclusively on biodiversity conservation. Lack of knowledge concerning this complex relationship contributes to both the deterioration of coral reef productivity and the benefits that reef dependent communities can accrue from coastal livelihood activities in general and from the ornamental fish trade in particular. Using a collaborative, participatory approach to gather both ecological, economic and socio-cultural data, it was found that while coral reef fishing for the ornamental trade is a substantial contributor to reef damage, it also contributes markedly to local village household incomes and the development of economically viable fishing skills. Ongoing work will use the data to explore with local coastal groups, alternative income generating opportunities that can replace or greatly reduce the destructive reef fishing methods used for the aquarium trade.

700. BREEDING BIOLOGY AND POPULATION STRUCTURE OF TENGMALM´S OWL (*AEGOLIUS FUNEREUS*) IN THE KRUŠNÉ MTS. IN 2006-2009

Hýlová, Alena, Czech University of Life Sciences, Faculty of Environmental Sciences, Czech Republic; **Hanel, Jan**, Czech University of Life Sciences, Faculty of Environmental Sciences, Czech Republic; **Slámová, Petra**, Czech University of Life Sciences, Faculty of Environmental Sciences, Czech Republic; **Šťastný, Karel**, Czech University of Life Sciences, Faculty of Environmental Sciences, Czech Republic; **Popelka, Jan**, Jan Evangelista Purkyně University, Faculty of the Environment, Czech Republic

Monitored locality is situated in the Krušné Mountains on an area of 70 km^2. The fruitfulness of nesting is measured through periodic controls of 132 nest boxes. Blood samples of all captured and hatched individuals were taken from their brachial arteries. DNA analyses were realized by micro satellites in sequence machine (ABI PRISM 3130). There were 24 nesting pairs monitored in 2006, 11 pairs in 2007 and 14 in 2008. By means of periodic catching of small terrestrial mammals different food supply was detected, strong in 2007 (5 individuals/100 trap nights), weak in 2006 and 2008 (1 individual/100 trap nights). This level affects the date of nidation, collection size, fruitfulness of incubation, fly up of nestlings and total breeding success, that was 58 % in 2006, 73 % in 2007, 50 % in 2008. The most frequent reasons for unsuccessful nesting were desertion (middling 21,5 %) and predation from pine marten (middling 16,7 %). In 2006 12,5 % nests were destroyed by predation, in 2007 9,1 %, in 2008 28,6 %. Results from DNA analyses suggest recent studies about strict monogamy of Tengmalm's female, without sequence polyandry. Results from 2006-2008 indicate that genetic variability of population in the Krušné Mountains descents.

701. ORNITHOLOGICAL IMPORTANCE OF MIA MILIA SEWAGE TREATMENT PLANT, NICOSIA, CYPRUS

Charalambidou, Iris, Unit of Environmental Studies, Cyprus Centre for European and International Affairs, University of Nicosia, Cyprus; **Gucel, Salih**, Environmental Sciences Institute, Near East University, Cyprus

In Cyprus, which faces severe water issues, wastewater treatment plants provide important habitat for birds. Systematic monitoring of waterbirds at Mia Milia Sewage Treatment Plant, from July 2007 to June 2008, demonstrated the treatment plant as one of the most important wetlands in Cyprus in numbers and species of birds recorded. The treatment plant consists of five anaerobic and four aerated lagoons, and three facultative and two maturation ponds. The site was predominantly used by wintering and migrating birds, reaching a maximum count of 1721 individuals in February, while Common Coot, Common Moorhen, Little Grebe and Spur-winged Lapwing also used the site for breeding. Thirty-three species were documented, with 8 (24%) in the aerated lagoons, 14 (42%) in the anaerobic lagoons, 19 (58%) in the maturation ponds and 28 (85%) in the facultative ponds. Fewer birds on average were recorded at the aerated (3%) and the anaerobic lagoons (5.5%), with higher numbers at the maturation (34%) and facultative ponds (57%). The anaerobic lagoons provided important breeding and feeding habitat for Spur-winged Lapwing, while the aerated lagoons supported the largest wintering population in Cyprus of the same species. The maturation and facultative ponds predominantly supported wintering populations of ducks and coot.

702. LEOPARD POPULATION DYNAMICS, TROPHY HUNTING AND CONSERVATION IN THE SOUTPANSBERG MOUNTAINS

Chase Grey, Julia, Durham University, United Kingdom

The leopard is heavily hunted across South Africa both legally and illegally. However, few data exist on population numbers and thus current hunting pressure may be unsustainable. Many leopards are killed as livestock predators and are viewed by landowners as a drain on economic resources. However, trophy hunting may be used as a tool to conserve leopards if local communities profit from it and off take numbers are sustainable and based on empirical data. Money gained by

landowners or local communities from selling trophy hunting permits can be used to offset stock losses, be channelled back into the community, encourage the toleration of leopards on private land and prevent illegal poaching. A camera trapping and GPS telemetry study of leopards in the Soutpansberg Mountains, Limpopo Province, South Africa was undertaken to obtain information on local leopard population density and dynamics. This biological research was integrated with a detailed study of local perceptions of leopards and leopard predation using anthropological methodologies to investigate the effectiveness and potential of trophy hunting as a conservation tool for leopards. Findings from the research will be used to inform sustainable management decisions for leopards and improve the economic benefits of trophy hunting for local communities.

703. PRELIMINARY STUDIES ON NORTHERN RED OAK INVASION IN SOUTHERN POLAND

Chmura, Damian, Institute of Nature Conservation Polish Academy of Sciences, Poland

Red Oak *Quercus rubra* L. is a species of North American origin. In Europe, including Poland, this tree is considered an invasive plant. The paper presents preliminary study on the ecological causes of the invasion of this species in woodlands of the Silesian Upland, the region situated in Southern Poland. Although Red Oak was planted tree, it is capable to spread spontaneously into forest interiors, form self-sustaining populations and is said to compete with native trees, shrubs and herbaceous species. The phytosociological survey was performed, soil samples were taken from each plots, and permanent plots for population studies were laid out. The preliminary geobotanical investigations revealed that the species is confined mainly to managed and disturbed pinewoods growing dry and acid soils based on environmental studies and Ellenberg indicator values. Of the almost 500 stands ca 40% are self-sustaining populations i.e. Red Oak individuals were present in each layer of community. The phytocoenoses with the occurrence of this oak are poorer in relation to species richness than stands with native oaks. In herb layer the species forms dense patches of seedlings and juveniles which outcompete with herb species. The invasion of Red Oak is chiefly caused by forest management practices.

704. FRAGMENTATION OF BROAD-LEAVED FORESTS IN LATVIA IN RELATION TO OCCURRENCE OF HEMEROPHOBIC EPIPHYTE SPECIES

Ikauniece, Sandra, University of Daugavpils, Latvia; **Brumelis, Guntis**, FAculty of Biology, University of Latvia, Latvia; **Zarins, Juris**, Latvian State Forest Research Institute, Latvia

The study tests the hypothesis that landscape fragmentation due to past history of forest management is a limiting factor for dispersal of hemerophobic epiphyte species. Coverage of broad-leaved forests with oak, ash, and lime in Latvia has become extremely fragmented from an estimated 10% at climatic optimum to only 0.3% today. Inventory of Woodland Key Habitats (WKH) has been conducted in Latvia since 1997 to identify biologically valuable forests with specialist species that cannot survive under conventional forestry. The inventory criteria include 53 indicator species and 25 structural forest elements (e.g. dead wood). Presently WKH cover 3% of the State forests in Latvia (ratio State/private forests is about 50/50), of which 5% are broad-leaved forest classes. Digitized spatial inventory data on broad-leaved forest classes in the WKH database, and on potentially biologically valuable forests (broad-leaved tree species >100 years of age) from the State Forest Register were included as layers in a GIS database. FRAGSTAT metrics were calculated for regions and their relationship with occurrence of specialist epiphyte species was determined. Occupancy of habitat was determined by connectivity and patch size (e.g. *Lobaria pulmunaria* and *Metzgeria furcata*) and biogeographical differences (e.g. *Neckera pennata*).

705. ECOLOGY AND GENETICS OF THE AESCULAPIAN SNAKES (*ZAMENIS LONGISSIMUS*) IN THE RHEINGAU-TAUNUS

Ina, Groß, Ruprecht-Karls-Universität Heidelberg, Institut für Pharmazie und Molekulare Biotechnologie, Abteilung Biologie, Germany; **Michael, Wink**, Ruprecht-Karls-Universität Heidelberg, Institut für Pharmazie und Molekulare Biotechnologie, Abteilung Biologie, Germany

Although Aesculapian snakes (*Zamenis longissimus*) are widely distributed in geographical Europe, this species seems to decline in many countries. Especially in northern Europe *Zamenis longissimus* occurs in a patchy distribution, with several isolated populations. In Germany they occur in four separated populations, three of them are isolated, therefore Aesculapian snakes in Germany are presumed to be highly endangered. Besides direct habitat destruction, like the decrease of native forest, the increase of urban development and roadbuilding, Aesculapian snakes are threatened primarily by habitat fragmentation. This is a big problem especially for isolated populations, because effective barriers have an effect on the exchange of individuals between subpopulations. Isolation frequently causes a loss of genetic diversity and therefore accelerate their extinction. A study of one of the northernmost populations of the Aesculapian snakes in the Rheingau-Taunus is in progress since three years. The main focus is on genetic analyses, to determine the loss of genetic diversity within German populations with further investigation of the ecology and reproduction of this species.

706. ASPECTS CONCERNING BIOLOGICAL CONSERVATION OF THE PROTECTED ZONES FROM BORDER REGION BETWEEN ROMANIA AND THE REPUBLIC OF MOLDOVA

Ion, Constantin, Alexandru Ioan Cuza University of Iaşi, Romania; **Zamfirescu, Stefan Remus**, Alexandru Ioan Cuza University of Iaşi, Romania; **Ion, Iordache**, Alexandru Ioan Cuza University of Iaşi, Romania

The border region between Romania and the Republic of Moldova is situated on the Prut River. In the Prut Valley there are 90 protected areas (62 on Romanian territory and 38 on Moldavian territory). During our investigations, we have recorded in the entire drainage basin of the Prut: 44 species of fish; 15 species of amphibians; 14 species of reptiles; around 270 species of birds; 61 species of mammals. Most of the species have European protective status. Due to the border police and a low economical development, the biological conservation status is better in northern protected areas than it is in the southern ones. In the North, farmland development and poaching are reduced and the habitats are very divers. On the other hand, in the South, intensive pisciculture, poaching, a high degree of human impact and pollution from the industry alters the biological diversity. In the future, it is necessary to establish a strong collaboration between Romania and the Republic of Moldova regarding the permanent monitoring of fauna and flora. We consider that the foundation of a transboundary park which would include the protected areas from both countries and the river will contribute to the conservation of the regional biodiversity.

707. COMPARATIVE STUDIES ON CENTIPEDE (MYRIAPODA: CHILOPODA) FAUNA FROM URBAN AND PERIURBAN GREENS

Ion, Constanta Mihaela, Institute of Biology, Romania

Management of biodiversity in human dominated habitats must start with a thorough research of the flora and fauna in the cities as well as the differences that appear as we travel further away from the city center. Species richness and density of centipede populations in periurban and urban sites in the city of Bucharest were studied. Ten species representing 10% of total species present in Romania were found in central parks. Numerical densities of centipedes are higher in periuban greens (Cernica, Mogosoaia) than in urban sites (with only 1,78-18,77ind/m¬3). *Lithobius lucifugus* (L. Koch, 1862) and *Lithobius muticus* C.L. Koch, 1847) are two of the most frequent species, present in other cities throughout Europe, which suggest a high capacity to cope with quickly changing forces encountered in the habitats modified by humans. Leaf litter removal from parks, seems to be an important factor that reduce the numerical densities and diversity of centipedes and other arthropods, so, by decreasing the frequency and the proportions of this management measure, we could protect the soil and the biodiversity as well.

708. MONITORING OF EARTHWORM COMMUNITIES ON COASTAL GRASSLANDS IN ESTONIA

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Coastal grasslands in West-Estonia are valuable wildlife habitats. A key factor for preservation of the biodiversity of coastal grasslands is the continuation of traditional land-use practices, especially regular grazing. On the aspects of ecosystem functioning and application of conservation measures its important to know the most essential groups of invertebrates in food web and nutrient cycling. *Lumbricidae* possess a number of qualities needed in animals used for biomonitoring of terrestrial ecosystems, they are appealing to nature conservationists as the main food source for many aboveground living animals. The number of earthworms (collected by hand sorting and/or vermifuge methods) in the soil of coastal grasslands was 2 - 44 individuals per m-2. The epigeic species were dominating on areas closed to coastline, the dominant species was *Lumbricus rubellus*, the abundance of *Dendrobaena octaedra* was relatively high. Endogeic species *Aporrectodea caliginosa* and *A. rosea* inhabited the soil where high moisture content and deficient aeration did not limit the distribution of these species, i.e. the soil of areas located higher of sea level. Semi-aquatic *Octolasion lacteum* was found on areas of permanent flooding. A few of individuals of epigeic *Lumbricus castaneus, Dendrodrilus rubidus* and *Eiseniella tetraedra* also were presented on coastal grasslands.

709. ACTIVITIES FOR PROTECTION OF THE ECO-SYSTEMS ALONG RIVERS DRAVA, MURA AND DANUBE ON THE NATIONAL AND TRANSBOUNDARY LEVEL

Ivičić, Biljana, State Institute for Nature Protection, Croatia; **Rodić Baranović, Petra**, State Institute for Nature Protection, Croatia; **Trenc, Neven**, State Institute for Nature Protection, Croatia

Rivers Mura, Drava and Danube are of exceptional importance as one of the last remaining semi-natural lowland watercourses in the Central Europe. This area is characterized by the variety of wet habitats, which are among the most threatened in Europe: flood forests, wet grasslands, stagnant backwater, abandoned riverbeds meanderings, steep banks, river bars etc. Drava and Mura are distribution area of many endangered and protected bird species and present important sites for their conservation. The proposed site provides habitat for many fish, amphibian, reptile and dragonfly species. To conserve these values activities have been undertaken to establish appropriate protected area. It is already under the preliminary protection as regional park and an area of National ecological network. It is also proposed for transboundary UNESCO biosphere reserve. For permanent protection in line with these categories the multidisciplinary study/nomination has to be prepared which will valorize the natural values, propose preliminary zonation and management framework, determine consequences for stakeholders etc. In this poster results of these activities and problems encountered will be presented.

710. THE UNIQUE GENETIC PROFILE OF THE BROWN TROUT POPULATION IN THE KRKA RIVER, CROATIA

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Molecular genetic studies of brown trout *Salmo trutta* L. throughout its natural range have demonstrated five major phylogenetic lineages. Such studies have revealed that the species is genetically and geographically highly structured. It is especially important for highly structured species, such as brown trout, that conservation activities are focused at population level. The brown trout population from the Krka River represents the natural population of brown trout from a poorly studied area of south-east Europe. A 562 bp fragment at the 5'end of mitochondrial DNA control region was sequenced from the population representatives and compared to corresponding brown trout sequences obtained in previous studies. Sequence analysis of the mtDNA control region of brown trout from the Krka River revealed the existence of four major phylogenetic lineages. The native status is assigned to the Adriatic, Mediterranean and marmoratus lineages, while the presence of the Atlantic lineage is a consequence of stocking practice. The results of this study show that brown trout population in the Krka River possesses a unique genetic profile that should be taken into account in future conservation strategies.

711. A QUICK FIELD INVENTORY METHOD OF THE RED LIST SPECIES. RESULTS OF FOUR YEARS' SURVEY FROM SECLERLAND (EASTERN TRANSYLVANIA, ROMANIA)

Jakab, Gusztav, Szent István University VKK Faculty of Enironmantal Sciences, Hungary; **Csergő, Anna-Maria**, Sapientia University, Romania; **Ambrus, László**, Agora Working Group, Romania

Biodiversity loss urge conservation biologists to rapidly assess the imperiled species' geographic distribution and design an adequate nature reserve network to protect them. In the insufficiently explored natural landscape of Transylvania, important natural values run the risk of being lost before getting into the records of the scientific community. Several floristical data have not been confirmed during the last 300 years because of scarcity and uneven allocation of floristical research. Using the GPS and a GIS that we progressively filled up with information on the populations' estimated size, habitat and state of conservation, we managed to inventory a large number of species from the red list of Romania in a relatively short period. The records were taken in Seclerland, a well-defined historical and ethnographical region of Eastern Transylvania, on an area of c. 13000 km^2. During the last four years, we registered ca. 1000 records of endangered species, we have found 6 new rare taxa for the area and we confirmed dozens of old or uncertain floristical

data. Based on the collected evidences, we designed a new nature reserve of national importance in this area. The inventory method proposed here can be used successfully in future monitoring activities of the recorded populations.

712. NATURAL WATER FLOW RENEWAL IN DÝŠINA, WEST BOHEMIA, PILSEN REGION

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The subject area is located northeast of Pilsen, on the outskirts of the city limit. The countryside is strongly influenced by human activities. However, the ratio of the underdeveloped to developed (that is build upon) territory comply even today with the typical standard characterizing the contemporary countryside. I any case, the most prevailing and dominating features of the Dýšina landscape are the abandoned former industrial production plants. Most of them are grown-over with weeds of all kind, as the new assigned owners take very little or no care of their dubiously gained property and even the minimal maintenance is almost non-existent. All over you feel the air and mood of negligence, absence of care-taking of nature, combined with a number of pressing needs and serious problems, which need to be positively addressed, defined, and immediate remedies have to be applied. One of the most pressing problems of our times in general and of the subject area in particular is to take care of the water flows in regard of their functionality.

713. THE IMPORTANCE OF GREEN VEGETATION WILDLIFE MANAGEMENT IN THE AGRICULTURAL LANDSCAPE IN PODŘIPSKO (CZECH REPUBLIC)

Janota, Jiří, Czech University of Life Sciences Prague, Faculty of Forestry and Wood Sciences, Prague, Czech Republic; **Kůtová, Jitka**, Czech University of Life Sciences Prague, Faculty of Forestry and Wood Sciences, Prague, Czech Republic

The green belt and holding covers are important for the landscape and wildlife environment. This green vegetation is very useful for local living conditions of game species. Selected hunting districts were explored by the presence of border lengths and the presence of wild game in Podřipsko. The interdependence between border lengths and the presence of partridge (*Perdix perdix*), roe deer (*Capreolus capreolus*), pheasant (*Phasianus colchicus*) and brown hare (*Lepus europaeus*), was confirmed. Positions of green vegetation components were found after data analysis. Suggestions for improvement were made for areas where there was a lack of green vegetation.

714. THE IMPACTS OF HERBIVORY ON LIFE CYCLE OF *SUCCISA PRATENSIS*

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Understanding the population dynamics of vulnerable plant species is important issue for their conservation. Yet such studies often don't assess the influence of biotic interactions on focal species. We studied the impacts of herbivory on life cycle of *Succisa pratensis Moench*, a typical wet meadow species that suffered a severe decline due to habitat destruction and management intensification. It's being extensively grazed – leaf rosettes by molluscs, flower stalks by cattle and roe deer. We measured demographic rates, size-related traits and herbivory at nine sites in two regions in three successive years. The effects on demographic rates were tested by generalised linear models. Mollusc grazing affects negatively both vegetative and flowering plants. The effect is much greater in flowering plants and results in more than 20% lower survival and flowering in the next year. On the other hand vertebrate grazing affects negatively current year's reproduction but enhances survival and flowering in the next year. We conclude that mollusc grazing influences strongly population dynamics of *Succisa* and considerably contributes to differences in plant's performance between sites. The importance of mollusc grazing is comparable to importance of size-related traits. On the contrary, vertebrate grazing is of lesser importance, although significant.

715. IMPACT OF POPULATION HISTORY ON *VIOLA CALAMINARIA* CONSERVATION, AN ENDEMIC SPECIES OF CALAMINE SITES

Jean-Philippe, Bizoux, Laboratory of Ecology, Gembloux Agricultural University, Belgium; **Grégory, Mahy**, Laboratory of Ecology, Gembloux Agricultural University, Belgium

The zinc violet, *Viola calaminaria* is a threatened species, endemic to calamine sites in Belgium and West Germany. Since the end of 19th century, the *V. calaminaria* habitat network have exhibited a huge dynamics, with creation of new habitats resulting from industrial pollution and destruction of habitats by urbanisation and site remediation. In the present study, we analysed the effect of population history (recent/ancient population) on genetic diversity, fitness and reproductive success in order to discuss conservation strategies for the species. Recently founded populations exhibited similar level of genetic diversity (Hs) as ancient populations but showed a lower genetic differentiation among population (Fst). No indication of strong founder effects in recently established populations was detected. Plant fitness (seed set and germination percentage) was higher in recent populations while other reproductive traits (vegetative density, flower density, fructification percentage) did not differ according to population history. Results suggest that the creation of habitats through human activities can provide new opportunities for conservation of this species. In increasingly disturbed environments, this indicates that, at least for some species, conservation strategies should not focus solely on traditional and natural habitats but also consider the potential benefits offered by modified landscapes.

716. MONITORING OF BUTTERFLIES WITHIN A LANDSCAPE CONTEXT IN SOUTH-EASTERN SWEDEN

Jonason, Dennis, Swedish University of Agricultural Sciences, Sweden; **Milberg, Per**, Swedish University of Agricultural Sciences, Sweden; **Bergman, Karl-Olof**, Dept of Biology-IFM, Linköping university, Sweden

Monitoring of butterflies is most often directed towards grassland fauna, creating a bias of both information and conservation efforts aimed at only a part of the species pool. The aim with this study was, in contrast, to perform and evaluate a landscape-based monitoring method for butterflies in diverse habitats and more specifically (i) evaluate the impact of environmental variables on butterfly abundance, (ii) compare the distribution of butterflies in different habitats, and (iii) analyse the data with the aim of improving the method. Eight randomly placed study sites (750 m x 750 m) located in south-eastern Sweden were used. The butterfly composition varied depending on landscape structure and tree cover was the environmental variable with largest impact on butterfly abundance. Of 54 species found, only 22 were found in semi-natural grasslands, instead other grasslands and clear-cuts harboured highest diversity and abundance, respectively. Semi-natural grasslands, where the nationally-based monitoring of butterflies in Sweden currently is being performed, constitutes <1% of the total land area but consequently 100 % of the monitoring of butterflies.

Using the landscape-based kind of monitoring presented here can, if performed regularly, increase our knowledge of how structural landscape changes affect butterflies and improve conservation efforts between species.

717. LICHEN DIVERSITY IN MANAGED AND UNMANAGED WOODED MEADOWS ON GOTLAND

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Wooded meadows maintained by a long history of traditional management (i.e. hay-cutting, grazing and pollarding), harbour diverse communities of epiphytic lichens that are unique also in an international perspective. This study examines the influence of management on local communities of epiphytic lichens in wooded meadows on the island of Gotland; Sweden. Our results confirmed that the management of wooded meadows is an important determinant of lichen species richness and community structure at nested spatial scales; site level and tree level. Tree- and site-level lichen diversity was greater within managed wooded meadows compared with unmanaged meadows. Our results suggest that epiphytic lichen metacommunities are closely adapted to the relatively open canopy cover created through grazing or traditional methods of cultivation in wooded meadows. Moreover, historic habitat structure (i.e. 1930s canopy cover) did also influence present-day lichen diversity. Also, different functional groups of lichens responded differently to management, whereby grazing and traditional cultivation had a notably positive affect on the diversity of fruticose, crustose (without the *Trentepohlia photobiont*), and red-listed groups. Our results also showed that the inherent properties of the tree, such as its identity and size, interact with management regime to set the prerequisites for the lichen community.

718. INVESTIGATING OF MERCURY-RESISTANT BACTERIA FROM RIVER SEDIMENTS

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Industrial use of mercury, a highly toxic metal, has led to significant mercury pollution of the environment. Cleanup technologies which are capable of treating large volumes of soil, water, or sediment contaminated with relatively low levels of mercury in a cost-effective way are urgently needed. In a great variety of eubacteria, the mechanism of resistance to mercurial compounds is the reduction of Hg (II) to the volatile form Hg (0). Mercury reduction encoded by the microbial mer operon is an efficient resistance mechanism that is widespread among gram-positive and gram-negative microorganisms. In this study, we have examined isolation of mercury resistant bacteria from river sediments. The samples were collected in September 2006 and March 2007. Diluted sediment samples were inoculated on Luria Bertani Agar medium which were added HgCl2. Mercury resistant thirty strains were isolated and 11 selected bacterial strains were identified. For all isolates, gram negative, oxidase positive, and motile were found. Phylogenetic analysis using 16S rDNA sequences indicated that the 11 strains belonged to γ-proteobacteria (*Pseudomonas putida, P. alcaligenes, P. lubricans, P. stutzeri, P. anguilliseptica* and *Klebsiella pneumonia*). These isolates have been investigated in respect of mer operon which carried out biotransformation of mercury.

719. EFFECT OF LAND USE AND CLIMATE ON DIVERSITY OF MOTH GUILDS WITH DIFFERENT HABITAT SPECIALIZATION

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Diversity changes in urban habitats are mainly affected by overbuilding and destruction of seminatural habitats, but also by successional processes of appropriate biotopes. This succession could be further accelerated by climate changes. Habitat specialists react dramatically to those changes, but some species, generalists, could ignore these processes. We analysed diversity changes in moths from suburb of Prague (50°5'11"N, 14°18'06"E). Data were collected by a highly efficient mercury light trap for 23 years (1967-1976, 1980-1992). All 424 moth species were divided into guilds (generalists, forest species feeding on trees and shrubs, forest species feeding on woodland herbs and lichens, arable land, forest-steppe, grassland and wetland species) and analysed using species numbers S, Shannon's diversity H and evenness J (response variables) and the individual years of monitoring and effects of mean annual temperature and precipitation (explanatory variables). Species numbers of specialists with declining habitats in extent decreased, the numbers of those whose habitats remained intact did not exhibit any particular trend, whereas the numbers of generalists increased, and their diversity positively responded to warming. Generalists appear more sensitive indicators of climate changes than specialists because for the latter the indication of climate changes can be overlaid by changes in habitat use.

720. THE REPATRIATION PROGRAM OF BLACK GROUSE (*TETRAO TETRIX*) IN HUNGARY

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Black grouse in Hungary is an extinct but a native and protected species now. A program was started in 2006 to naturalize these birds again by means of breeding them in artificial conditions. In a few years it is hoped we will be able to accomplish a wild population in a natural habitat. 4 stock breeding farms are now operational, in which the total bird-stock is now 97 grouse. Last year we obtained 204 eggs from these birds, from which 47 nestlings were hatching. To preserve biodiversity we need to protect black grouse for our descendants.

721. COMMON FRESH WATER FISHES OF BIÉ PLATEAU IN ANGOLA; AFRICA HEAD WATERS REGION

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We present common fresh water fishes that were identified during our ichthyological survey in Bié province in Angola. Due to several decades of civil war there is almost no

data available regarding fish diversity of central Angolan plateau that is an important African head waters region. The area includes tributaries of important sub-Saharan rivers as Kwanza, Okavango, Zambezi, Congo and Kunene. The ichthyological survey faced to number of difficulties e.g. land mines and lack of infrastructure, therefore it was not possible to make overall screening. Anyhow, presented data are the first after year 1967. The study was supported by grant of official Czech Development Cooperation No. MZe B/2; also by IRP FAFNR, CULS No. MŠMT 6046070901 and IRP IAPG No. AV0Z50450515.

722. ASSESSMENT OF THE LOCATIONS PROPOSED FOR MARINE PROTECTED AREAS IN THE MONTENEGRO (ADRIATIC SEA)

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Investigation is conducted for the purpose of estimation of biodiversity on the locations proposed for Marine Protected Areas. Study is performed by SCUBA diving on sixth sites along the Montenegrin coast, in the period of summer 2008. Throughout field work special attention was paid on the most important benthic assemblages, including dominant mega-fauna and mega-flora species and on the habitat structure of the infralittoral zone of the selected sites. On the basis of obtained results two sites could be adopted as MPA.

723. STUDIES OF THE PECULIARITIES OF SALMONIDS ORGANISM RESPONSES TO ENVIRONMENTAL STRESSORS

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The aim of the study was to determine effects of individual environmental stressors and their combined action on sea trout (*Salmo trutta trutta* L.) reared for restocking into natural waters, in its early ontogenesis; to estimate alterations of physiological, immune and microbiological parameters as a response to the stressors; to evaluate links between the response and the individual stressors or their complexes. Multiple research methods were applied in the study. Affecting fry at the beginning of active feeding stage by individual environmental stressors (fish density, water flow) and their combined action, alterations of morphophysiological, morphopatological, physiological and microbiological parameters were found. Combined action of the two environmental stressors evoked more significant alterations than the effects of a single stressor in the majority of studied parameters. Under adverse conditions opportunistic pathogens *Aeromonas hydrophila* and *Pseudomonas* genus bacteria became the primary pathogens and began to reproduce abundantly inducing fin necrosis. Combined action of the stressors accelerated this process. Based on the results, a complex of measures reducing the impact of stressors is proposed, which would facilitate prevention of fish pathology development. These measures will also increase fitness of the fish reared for restocking.

724. HERBIVOROUS FISH SPECIES BECAME PREDATORS: THE CASE OF *SCARDINIUS ACARNANICUS* IN LAKE TRICHONIS (GREECE)

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Scardinius acarnanicus is an endemic fish species in lakes and rivers of the western Greece. The present study provides preliminary results on its diet using gut content analysis on specimens collected during spring, summer and autumn 2008 from Lake Trichonis (Greece). Of the 53 stomachs examined, 18 (34.0 %) contained aquatic vegetation along with *Atherina boyeri*'s remains, 16 (30.2 %) unidentified fish remains and vegetation, 14 (26.4 %) contained only vegetation and 5 (9.4 %) were empty. There were no differences of the Shannon's diversity index between seasons or sexes. In the only previous study on the feeding of *S. acarnanicus* conducted 30 years ago in the lake, its diet consisted solely of aquatic vegetation and phytoplankton. Thus, it seemed that this species have altered dramatically its dietary preferences, while this is the first record of fish predatory for the entire genus *Scardinius sp*. worldwide. This interesting phenomenon could be related to the presence of *A. boyeri*, a sea-species historically acclimatized in the lake and, nowadays, being dominant in the fish community. To explore this hypothesis, the diet of S. *acarnanicus* should be investigated in detail and compared to other aquatic ecosystems from which *A. boyeri* is absent.

725. KEY HABITATS ON MICRO-SCALE: WHERE RARE SPECIES ARE COMMON

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The general relationship between niche breadth and rarity of species is well known on a regional scale. This phenomenon is less frequently explored on micro-habitat scale. Micro-scale relationships were studied to derive information on conservation implications of micro-site preferences of land snails. Four microhabitat types (rock, litter, live wood, dead wood) were sampled in 16 dolines of Alsó-hegy (Aggtelek National Park, Hungary) in the present study. Three replicates per microhabitat types per dolines were used (192 samples of 5 minutes timed searches). Out of the 21 species found, six were generally widespread among the microhabitats, four were associated with live wood, five with dead wood and six with rock microsites. None of the five top priority species (rare on the national level) proved to be rare on the landscape scale. We found relationship between the rarity and the microhabitat preferences of the species: specialists (associated with one microhabitat type) were rarer than generalists. Our results show that regional scale rarity of forest snail species is related to biogeographic effects, however, it is necessary to preserve key habitat structures to ensure their existence as the most species (including the locally common but regionally rare ones) find favourable conditions in small patches.

726. OLD GRANARIES AS SOURCES OF NATURE RECONSTRUCTION

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Connections between humans and nature, especially vegetation, can be observed by archaeobotany. Moreover, this science is suitable for exploring the period of the development of certain land use patterns and clearing the maintenance methods (arable lands, pastures, hayfields etc.) due to plant remains (seeds and kernels). Two areas were observed in Hungary. One is the granary of the Roman fortress (castrum) from the 5th century near the western coast of Lake Balaton (Fenékpuszta), the other is a granary built in the 18th and burned in the 19th century, then renovated, situated in the Bakony Mts. (middle Transdanubia) near Zirc-Akli village. These places offer a great amount of untouched plant remains which give opportunity for drawing the inference on the environment and landscape management past of the two different ages, settlements. Thus, a thorough view on the one-time land cover can be compiled from arcaeobotanical data with different sciences such as coenology, grassland management, plant production etc. During the exploration of the areas, one-time land use, cultural landscape and produced plant species may give a view on landraces and eco-types and on the spread of weeds.

727. NATURA 2000 FISH SPECIES CONSERVATION IN LITHUANIA

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The freshwater fish fauna of Lithuania consists of 3 lamprey and 66 fish species. Twenty six of them are protected by Bern Convention, 1 by Bonn Convention (1998) and 20 by Habitat Directive (1992), respectively. Eight fish species are included into Red Data Book of Lithuania (2007). The number of protected fish species significantly increased in Lithuania after ratification of Habitat Directive. Even 14 fish and lamprey species inhabiting Lithuanian waters are listed in Annex II of Directive. Aiming to assess current status of protected species, methodological requirements for monitoring were developed, and monitoring itself took place in 2008 in the inland waters and Curonian Lagoon. Investigations were conducted overall in 150 sites, in 127 territories covered by Natura 2000 network, and in the neighboring territories. Abundance and status of Natura 2000 species varied depending on water body type and general ecological situation (human impact). The status of majority of species which are common in Lithuanian inland waters (brook and river lamprey, bitterling, Spined loach, sculpin, asp) is considered as good and stable. Status of Baltic salmon and Twite shad increased remarkably as a result of decrease in water pollution, and application of protection and stocking (salmon) measures. Sea lamprey, Atlantic sturgeon and Lake minnow remain extremely rare.

728. MODELLING THE EFFECTIVENESS OF PROTECTED AREAS FOR CONSERVING SPECIES ON BORNEO AND THAILAND UNDER FUTURE CLIMATE WARMING

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Understanding the impacts of global warming on species is of current concern, especially in tropical regions. My project uses modelling to predict potential future distributions of species (particularly butterflies) as a consequence of changing climate, and how the effectiveness of protected areas on Borneo and Thailand may change in the future. My analysis of environmental data show that protected areas tend to occur at higher elevation. I modelled the distribution of butterflies across Borneo and Thailand and ranked protected areas in terms of their current and future conservation value based on butterfly species richness and forest cover. To maintain their effectiveness, more protected areas are needed to increase environmental heterogeneity and habitat connectivity, and translocation programs may be needed to preserve some species.

729. GENETIC DIVERSITY: LINEAR HABITAT ELEMENTS IN A VITICULTURAL REGION (WACHAU IN EASTERN AUSTRIA)

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Along the Danube River near Krems the Wachau region represents one of the Central European hotspots of plant and animal species diversity. Nowadays, typical landscape elements are viticultural fields, mostly established as linear elements along the slopes and hills. Here, we find a typical species-rich flora on embankments accompanying these vineyards. In this study we address the question how the genetic variation of four target species, which were selected as representatives of open grassland vegetation types, is distributed. We ask the question if levels of genetic diversity and distribution of genetic diversity are correlated with or even depend on these linear and networked habitat elements. We could conclude that we found some significant correlation of genetic variation with geographic and linear distribution. We also observed high levels of gene flow between various adjacent embankments. Out of the four selected target species three, namely *Gentianella aspera*, *Pulsatilla grandis* and *Stachys recta*, showed correlations of genetic diversity with geographic distances. For *Aster amellus* we observed so significant correlation. Species-specific characters such as life-cycle, seed dispersal, or soil seed bank longevity influence the distribution and maintenance of genetic diversity within the landscape in all four species in different ways.

730. LAMPREYS IN SLOVAKIA: STATUS, RECENT THREATS AND MAJOR ENVIRONMENTAL CORRELATIONS OCCURRENCE

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Three valid lamprey species were recorded on the territory of Slovakia, although several doubts about two more species occurring in Slovakia were raised in the past. Relatively common *Lampetra planeri* that occurs in all European watersheds - except for the watersheds of Black, Adriatic and Caspic Seas, was recorded only in Vistula basin in Slovakia. The most common *Eudontomyzon danfordi* distributed in the Eastern tributaries of the middle Danube occurs in the upper reaches of Tisza tributaries in Slovakia. The less common *Eudontomyzon mariae* (occuring alopatrically with *E. danfordi*) spread in Black, Adriatic, Caspic and partially Baltic Sea watersheds, is distributed in Danube and its tributaries in Slovakia. The correlations of lampreys' distribution with altitude, drainage area, river slope, and distance from source, land use and co-occurring species, were analysed. In regard to results, effective preservation should be based on protection of their larval stages. The sediment silts - necessary for the lamprey larval development, the river segmentation, water quality and the stability of the rivers hydrological regimes preservation, should be of high concern. The study was made within the research projects VEGA Nos. 1/0352/08, 1/0718/08 and APVV-0154-07.

731. RADIOTELEMETRIC STUDY OF TENGMALM'S OWL (*AEGOLIUS FUNEREUS*) IN THE KRUŠNÉ MTS. AND THE JIZERSKÉ MTS

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In 2008 totally six Tangmalm's Owl (*Aegolius funereus*) males nesting in the nest boxes were caught and equipped with tail-mounted radio transmitters and were tracked through the VHF telemetry. Four of them were tracked in the Krušné Mts. and two of them in the Jizerské Mts. Both regions were damaged by air-pollution calamity in the past. Locations of nocturnal hunting (each male was tracked for 5 nights) were gained by triangulation. Locations of diurnal roosts were gained directly by finding roosting males. Hunting home ranges were shaped by minimum convex polygons (MCP´s) and kernel density estimates (KDE´s). In most cases, monitored males hunted in open canopy young Norway spruce (*Picea abies*) and Blue spruce (*Picea pungens*) stands. For diurnal roosting they usually chose rests of original Norway spruce woods – 85 % of all cases. Average sizes of nocturnal hunting home ranges with appropriate standard deviations were counted as follows: according to 90&#xKD;E´s 230,3±50,3 ha, 95KD;E´s 279,6±64,1 ha and MCP´s 272,0±67,5 ha. Diurnal roosting home ranges were according to MCP´s 81,6±72,4 ha in average. The largest hunting home range measured 294 ha and the smallest one 147 ha according to 90KD;E´s.

732. DISTRIBUTION OF MAMMALIAN PREDATOR IN FRAGMNETED LANDSCAPE

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Several mechanisms were suggested to explain increased predation along habitat edges but many studies were not able to explicitly test the mechanistic explanations of edge effect due to drawbacks associated with experimental design. In this study, we recorded simultaneously distribution of mammalian predators, predators' main prey, and predation rates on simulated nests in four types of landscape elements corresponding to edge gradient between two habitat types in mosaic, agriculture dominated landscape of Central Europe. The predator occurrence was significantly higher along habitat edges than in habitat interiors but availability of their main prey was similar in edge and interior habitats in year with high rodent densities. Our results thus do not suggest that edge effect arises as a consequence of predator overflowing from the habitat of higher quality through the edge into the habitat of lower quality but showed that most predator species point their activity specifically to edge structures. Nevertheless in year of low densities of small mammals, predator searched in all habitat types with the same intensity. We did not find clear relationship between carnivore activity and predation on artificial nests. Our study indicates that the effect of edges on predator movements should be considered a dynamic process.

733. EFFECTS OF CLIMATE CHANGE ON THE GERMINATION BEHAVIOUR OF THE ENDEMIC SPECIES OF CYPRUS *SAPONARIA CYPRIA* BOISS

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The Troodos National Forest Park (TNFP) is the most important area for plant diversity in Cyprus. It covers 1% (9029 ha) of the island's surface and hosts 786 plant taxa (40% of Cyprus' flora), out of which 74 are endemic to the island. The present study is part of a wider project, which investigates the effects of climate change in critical parameters of the reproductive biology of local endemic plants of TNFP; data for *Saponaria cypria* Boiss are presented here. Seeds of this species were collected from the wild from three elevations, i.e. from the lowest site of the species distribution to the highest, and its germination ecophysiology was studied in various temperatures and conditions. A second set of experiments is carried out in temperature conditions simulating those prevailing in the field using temperatures according to present and projected (end of this century) meteorological data. Preliminary data show that the species' seeds are dormant; the breakage of dormancy can be achieved either by chipping, chilling (for 10 weeks) or imbibition with nitrate ions. Highest germination and germination rates were achieved at 15 and 20°C. The data show that the germination currently occurs at the end of winter – beginning of spring, while mechanical friction promotes germination.

734. BIOBLITZ ACTIONS IN HUNGARY 2006-2009

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Establishing baselines for broad-based biodiversity trends based on regularly conducted standard surveys and observation is a complex and expensive undertaking. Rapid biodiversity assessments (RBA) of specific ecounits are used in order to develop a quasi-complete inventory of species that is usually expensive and time-consuming with conventional methods. One of the possibilities to carry out a RBA is

a volunteer and expert-based 24-hour quick survey. The first Hungarian BioBlitz-type RBA was organized on 20-22 May, 2006. The selected location, Gyűrűfű in Southern Hungary is an iconic place, well known in Hungary as a village abandoned in 1971 and re-established by eight families in 1991 as an eco-village. The BioBlitz was repeated in June 2007 and October 2008 outside of the village of Porva in the Bakony Hills of Western Hungary and a transboundary survey between Hungary and Slovakia in the Drégelypalánk/ Ipolyhídvég (Ipel'ske Predmost) areas. The RBAs have provided new data of Natura 2000 species as well as rare or very rare species such as *Arytrura musculus* or *Cordulegaster heros*. The three events in Gyűrűfű have lead to the identification of some 2,500+ species, while the number of the observed species in Porva was 1,736 and 1,726 in Drégelypalánk-Ipolyhídvég.

735. DIVERSITY INDICES AND DIVERSITY RANKING IN ANALYSIS OF WEED-COMMUNITIES ON CROP FIELDS

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The objectives of this paper are (1) to describe weed communities of variants of tillage examined by statistics of diversity and (2) to answer that they can be ordered by diversity or can not. It can be stated that one diversity measure or one diversity function is not enough to describe communities. To get a real picture, more methods should be used in parallel. To understand diversity properly, scale-dependent description of diversity is necessary, which provides us with new information that are not revealed by traditional methods. Place of experiment: Csárdaszállás, Hungary. The 15 ha area was divided into 4 plots that were cultivated by using the variants of tillage. Diversity ordering of variants of tillage based on data collected spring time can be executed, since diversity profiles do not cross. The order is the next: 1. direct drilling ➔ 2. field narrowly ploughed ➔ 3. traditional tillage ➔ 4. disk-ripped tillage. In summer time, diversity profile for direct drilling, however, crosses the profile for narrow tillage. Therefore, they can not be ordered, which means that they can not be ranked by diversity. Despite of not being ordered, that situation can be interpreted from ecological aspect.

736. CHANGE IN MIGRATION PHENOLOGY OF GARDEN WARBLER (*SYLVIA BORIN*) AT THE ÓCSA BIRD RINGING STATION BETWEEN 1984-2007

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The distribution area and the timing of migration of many bird species have changed recently, presumably due to climatic factors. In our study we have used the data of 6760 garden warblers caught and ringed at the Ócsa Bird Ringing Station between 1984-2009. in Hungary. We handled the age groups separately. Our results show that the timing of the spring migration of this species shifted 6.5 days earlier. A possible explanation of this phenomenon might be related to the optimization of reproduction, since earlier birds can occupy better territories. On the other hand birds optimize their autumn migration to survival. Adult garden warblers gain weight faster, and hence migrate earlier than juveniles. The timing of autumn migration of adults did not change during the past 24 years, while juveniles shifted their timing 13 days later. During the period of survey the average body mass decreased and the average wing length increased in the migrating population. This phenomenon can be explained by the changing population structure, by the increasing rate of north breeding birds in the migrating population. Therefore a northward shift in the distribution of this species is probable.

737. MODELING THE INFLUENCE OF MANAGEMENT SCENARIOS ON ABUNDANCE AND SURVIVAL OF NATTERJACK TOAD (*BUFO CALAMITA*) IN CENTRAL POLAND

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The Natterjack toad *Bufo calamita* is declining on the edges of its distribution in Europe. Very little is known about its recent distribution and abundance in Poland. Furthermore, it is unclear how different management decisions will affect this species. We investigated the effects of four landscape development scenarios based on existing management plans for central Poland on habitat capacity and population dynamics of Natterjack toad. We used PVA software RAMAS GIS to first determine size and location of habitat patches in the landscape and then run a metapopulation model. For parameterization, we performed an extensive literature review of studies of *B. calamita*. Predicted total carrying capacities were similar in the four analysed management scenarios. Only the reforestation scenario resulted in a marked loss of habitat and, in turn, capacity by 15%. However, in some scenarios population size can decrease by up to 93% when the impact of roads is included. For the restoration scenario, we found road impact mitigation to be highly effective. More importantly, the effect of road infrastructure development might be much more severe than habitat changes. To support decision-making, we provide a ranking of the alternative development scenarios based on changes in species abundance and survival probability.

738. LARGE WOOD STABILIZATION IN THE MORAVA RIVER, CZECH REPUBLIC - HOW TO CONSERVE THE WOOD IN A NATURAL RIVER

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Large wood plays an important role in natural streams. Anchoring of fallen trees to the river bank is one of possible methods to stabilize large wood in river channels in protected areas, where presence of wood in streams is desirable. Anchoring of 70 hardwood trees (ash, maple, oak, average length 20 meters) in the „Vrapač" reach of the Morava river (Strahler order 6) in the Litovelské Pomoraví Protected Landscape Area was realized in 2003. At five concave reaches trees were uprooted from the river banks to the channel and stabilized by steel wire rope to trees on the bank and also by each other. This precaution almost doubled the mass of large wood in the river up to 149 m^3. ha-1. Moreover, the logjams induced accumulation of driftwood, so the total amount of large wood was approximately 170 m^3 .ha-1 in 2008, which is rare in the European rivers. By the method of tacheometrical mapping of individually tagged logs the stability of anchored trees was monitored. Although one logjam in the rapidly eroding meander no. 5 collapsed during one in twenty years flood in 2006, other wood

structures remained untouched or only slightly moved.

739. MULTI-SCALE MODELING OF AMPHIBIAN POND-BREEDING HABITAT: THE EFFECT OF LANDSCAPE CHARACTERISTICS ON SPECIES DISTRIBUTION AND COMMUNITY STRUCTURE

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Conservation strategies of amphibian population must be based on better knowledge of habitat and landscape-scale characteristics. The amphibians were studied in Dadia National Park (northeastern Greece) at 57 ponds in 2007 and eleven species were detected. The relationship between species richness and environmental, landscape variables at four spatial scales as well as isolation features was investigated. Based on linear regression very few variables were related to species richness. There was a significant positive correlation between species richness and the percentage of open areas in two spatial scales, with pine coverage at all scales, but a negative correlation was investigated with broadleaves forest. The effect of roads as well as other isolation variables does not have any negative influence on amphibians' species richness. Three main groups of amphibians were distinguished using Canonical Correspondence Analysis. The first group dominated by *Bufo viridis* is characterized by a human-dominated landscape, the second one, represented by *Salamandra salamandra* and *Bombina variegata*, by more forested habitat and the third one, represented mainly by *Pelobates syriacus* with a distinctive avoidance of river habitats. The landscape characteristics act in a different way for each species of amphibians and the conservation of their assemblage must be adapted on it.

740. *ARCYNOPTERYX COMPACTA* (MCLACHLAN, 1872) - RESEARCH OF CRITICALLY ENDARGERED SPECIES IN THE MORAVSKOSLEZSKÉ BESKYDY MTS. (CZECH REPUBLIC)

Kroča, Jiří, T.G. Masaryk Water Research Institute, Public Research Institution, Czech Republic

Arcynopteryx copacta belongs to boreo – alpine holarctic species of Plecoptera, family *Perlodidae* (Kiss, 1974), which is considered as critically endangered in the Czech Republic. So far, locality of its occurrence has been known in the Czech Republic in the Krkonoše Mts. only (Bojková & Špaček, 2006). This species was found also in the Moravskoslezské Beskydy Mts. in the 80´ies of the 20th century, but these records were impeached. The occurrence was confirmed in 2006 and large research was carried out in 2007. This research aimed at discovering other localities of possible occurrence of these species in the area of the Moravskoslezské Beskydy Mts. The research was situated on 60 sites, where larvae of plecoptera (both Perlidae and Perlodidae families) were taken. Its occurrence was confirmed in 11 localities situated on 9 brooks. Study of *A. compacta* was focused on two brooks with occurrence, and one brook with absence of these species in 2008 year in the Morávka River basin. This research was targeted to define the communities of plecoptera and trichoptera (in according to with imago) and assessment of chemical parameters of the aquatic environment.

741. LIVING ELBE – BUILDING WEIRS OR UNIQUE ECOSYSTEMS?

Kubačáková, Vendula, Arnika, Czech Republic; **Vitnerová, Jana**, Arnika, Czech Republic; **Dvořáková, Tereza**, Arnika, Czech Republic

Elbe is a unique European river. It is one of the longest natural-like river segments in Europe. The Elbe flows freely from Střekov to estuary and offers great conditions for living of many animal and plant species. That makes Elbe one of the richest ecosystems in Europe. The river hasn't been significantly regulated for last 100 years which established ecosystems depending on fluctuant water level and natural stream. Building weirs, proposed by the Czech Ministry of Transport, would slow down the water flow and stop water fluctuation in the „level of uneconomic draft". By the disappearance of habitats not only favorite and often mentioned species like beaver, otter or strapwort (*Corrigiola litoralis*) but also whole ecosystems would be threatened.

742. "THE NEIGHBOUR WOLF": CONSEREVATION OF LARGE CARNIVORES IN THE BESKYDY MTS., CZECH REPUBLIC

Kutal, Miroslav, Hnutí DUHA Olomouc /Friends of the Earth Czech Republic, Czech Republic; **Praus, Libor**, Hnutí DUHA Olomouc /Friends of the Earth Czech Republic, Czech Republic

Project "The neighbour wolf" is aimed to protect and develop the natural and socio-political conditions necessary for the return and the maintenance of large predators to the areas of their original existence in the Beskydy Mountains. The main objective is to suppress illegal hunting – the major threat for large carnivores in the Czech Republic – through a comprehensive system of educational and public awareness activities. It also deals with monitoring of the species, support of damaged farmers and participation in decision making processes. Some activities were set for specific target groups – hunters, farmers, tourists and local opinion leaders. Monitoring of large carnivores utilizes new methods (camera traps, non invasive sampling of hairs and simulated howling) as well as classifies all data from field monitoring according the new methodology. Especial emphasis is placed on migration corridors of large carnivores. Preliminary analysis shows that only 3 out of 15 possible migration corridors in south part of Beskydy are partly protected by land use plan. More over, one migration corridor has being currently destroyed by new build-up area of family houses. This indigested building can seriously influence the migration possibilities of large carnivores into new areas and also within their habitat in the West Carpathian Mountains.

743. THE IMPORTANCE OF FEEDING AND BROWSING GROUNDS FOR SELECTED SPECIES IN PODŘIPSKO (CZECH REPUBLIC)

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The structure of landscape is important for the presence of game species. Escape cover, standing place, space and food are essential living conditions for game species. The local carrying-capacity was explored by the offer of food, which is offered in this area by huntsmen. This carrying-capacity was described by area, shape and other components. The relationship between the presence of game species, feeding grounds and browsing grounds were explored by statistical analysis. The results confirm a relationship between them. Consequently, if we make suitable living conditions for game species, they will be able to survive in the violated

countryside. Suggestions were made on how to improve present living conditions for game species in the hunting districts.

744. IMPACT OF AGRICULTURAL PRACTICE ON SOIL BIOTA OF FLOODPLAIN MEADOWS IN MATSALU NATIONAL PARK

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The contemporary floodplain meadows have developed in conditions where agriculture was dominant activity in the region. Characteristic features of floodplain meadows include periodical flooding, continuous accumulation of organic and mineral sediments and extensive agricultural management. Both preservation and damaging of semi-natural landscapes are associated with the impact of human activity. The aim of the study is to analyze the impact of extensive management of grasslands on communities of soil biota using pitfall-traps (epigeic invertebrates) and hand sorting or using mustard solution as vermifuge (earthworms). There are many factors that influence the abundance and diversity of soil epigeal fauna of wet meadows wherefrom moisture, nitrogen and organic matter had negative effect to species of epigeic abundance. The dominant families were *Thomisidae* (*Ozyptila trux*), *Carabidae* (*Pterostichus vulgaris, Dyschirius thoracicus*), *Formicidae* and ordo Collembola. Total abundance of earthworms (*Lumbricidae*) and number of species are low and mostly depends on flooding conditions. The most abundant earthworm species on flooded grasslands are semi-aquatic *Octalasium lacteum* and *Eiseniella tetraedra*. *Aporrectodea caliginosa* which is tolerant of unfavorable ecological conditions was found in years without flooding.

745. PERCEPTIONS AND ATTITUDES OF HUNTERS WITH RESPECT TO PROBLEMS IN GAME MANAGEMENT IN GREECE: A CASE STUDY FROM THE REGION OF EPIRUS

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Over the last decades, hunting in Greece has been criticized for its negative impacts on game populations and the natural environment. This paper summarizes the findings of a survey (500 hunters, 64 villages) that we conducted in 2006-2007 to investigate these impacts and the problems in game management as perceived by hunters in the Region of Epirus. Contrary to reality, the majority of participants (71%) considered that the number of hunters has been increasing over the last 10 years. They also found the abundance of most game populations moderate to low with decreasing tendencies. Poaching, such as hunting without a license or at night, was considered as the primary reason for game population decrease. The compilation of studies defining game harvesting per season, which currently do not exist in Greece, found high support (64%), while game management currently implemented by public authorities is considered as ineffective by the highest proportion of the participants (59%). These findings reveal the urgent need for integrated game management in the country, aiming at minimizing the impacts of hunting on game populations.

746. EFFECTS OF MANAGEMENT ON GROUND BEETLES (COLEOPTERA, *CARABIDAE*) IN URBAN MEADOWS

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Urban meadows are threatened environments, and ecological information is crucial in order to conserve and manage their rich biodiversity. The aims of our studies were to 1) assess the ground beetle assemblages in meadows of potentially high conservation value and 2) investigate the effects of meadow management and urbanization on the composition of carabid assemblages. Our studies were conducted during May – August of 2007 and 2008. We pitfall-trapped carabid beetles in 19 urban and suburban meadows in greater Helsinki area, Finland. We compared managed patches with unmanaged ones. Close to 60 species of ground beetles, including several rare species, were found during the studies. The species composition and richness differed significantly between the treatments. There was greater evenness in managed meadows than in unmanaged ones, where one species often dominated. The results suggest that the management of meadows has a bigger impact on carabid assemblages than urbanization. Some of the most species rich meadows were subjected to high levels of disturbance. What most seems to restrict ground beetle diversity instead of intense human use is isolation and vicinity of paved roads. Ecologically managed meadows can thus support high diversity and rare species even in urban areas.

747. BIODIVERSITY ASSESSMENT OF TEMPORARY PONDS IN THE CIUC BASIN, ROMANIA

László, Demeter, Sapientia Hungarian University of Transylvania, Romania; **Éva, György**, Sapientia Hungarian University of Transylvania, Romania; **Federico, Marrone**, Universita di Palermo, Italy; **Anna-Mária, Csergő**, Sapientia Hungarian University of Transylvania, Romania; **Dorottya, Bányász**, Babes Bolyai University, Romania

Temporary ponds have been a neglected habitat type for a long time, although they have a specialized and diverse biota. No data are available about the biodiversity patterns of temporary ponds in Romania. The goals of our study were: 1. to map some characteristic fauna and flora, 2. to quantify the alpha and beta diversity of temporary ponds and the contribution of temporary ponds to landscape level biodiversity and 3. to explore factors that influence species diversity of temporary ponds in the Ciuc basin, Romania. Our study showed that hydroperiod is an important factor that shapes between-pond diversity, revealed five new species of crustaceans for the fauna of Romania, and demonstrated that temporary ponds are precious habitats that should be protected.

748. AN ASSESMENT OF THE ATTITUDES OF THE LOCAL POPULATION IN TWO GREEK PROTECTED AREAS: TOWARDS A FRAMEWORK FOR SUSTAINABLE RESOURCE MANAGEMENT?

Latsiou, Anna, University of Ioannina, Greece; **Papageorgiou, Konstantinos**, Forest Directorate, Greece; **Papastergiadou, Eva**, University of Patras, Greece; **Kagalou, Ifigenia**, Tecnological Institute of Epirus, Greece;

The management of protected areas is an international obligation for member states of EU. The main strategy for nature conservation is the establishment of protected areas (in-situ conservation).This approach incorporates the actions of people to avoid damage to species and ecosystems. Local people's and policy makers perceptions were investigated towards management issues in two Natura 2000 protected areas (Lake of Kastoria, Lake Trichonida).The research was

carried out by means of a questionnaire, completed by personal interviews and distributed in two groups, (i.e. inhabitants of those areas and elected or not, policy makers).Analysis of data revealed that local people had limited knowledge about the clear conservation polices of those protected areas. The need of ecotourism development was supported by the majority of the respondents. Especially from the policy makers whereas the willingness of the people to participate in management schemes was also clear. One important finding is that, policy makers agreed with the inhabitants while some conflicts could be attributed to problematic communication between them. The present research could provide useful information about the decision-making process and also be taken into consideration in the future formulation of management guidelines for the sustainable development in environmentally sensitive areas.

749. PLANT BIODIVERSITY IS BACK IN OUR FIELDS: CASE OF AGRI-ENVIRONMENTAL MEASURES IN THE WALLOON REGION (BELGIUM)

Legast, Marie, Gembloux Agricultural University, Belgium; **Bodson, Bernard**, Gembloux Agricultural University, Belgium; **Mahy, Grégory**, Gembloux Agricultural University, Belgium

Taking biodiversity into account in agriculture management has become an important issue for the last decade. Agri-environmental measures are awareness tools available to highlight the role of farmers in nature conservation and management. Arable plant species have undergone important agricultural changes (use of weed–killer, fertilizer, underutilization of farm seeds…) in Belgium during the last century and have consequently seriously declined. Specific agro-environment schemes are designed to preserve remnant populations of arable plant species or to reintroduce them by the implementation of two types of extensive cereal culture strips: sowing or conservation strips. In the Walloon region (Belgium), two complementary approaches have been applied (monitoring and field experimentations) in order to highlight the best establishment conditions for the reintroduction of the arable plants in areas where they had disappeared. 20 farmers are currently involved in the monitoring program. In parallel, the effect of different agriculture management parameters (establishement date, seed density of wheat and arable plants, management techniques such as ploughing, harrowing and cereal and arable plant sowing) have been tested. After two years of monitoring/experiments, some management problems still need to be solved on farm but experimental trials have given promising results.

750. BIG PLANS FOR PRACTICAL FOREST CONSERVATION: CASE FINLAND

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We describe a practical approach for large-scale spatial conservation planning (prioritization), which we apply to a case study, to optimally select forest areas to extend the current protected areas on public land in South-Central Finland by further 10,000 ha. This study has been completed in collaboration between the researchers who are actively developing the methods and the responsible managers. The data include nation-wide high-resolution forest inventory data and an extensive GIS database describing biodiversity features within the current state-managed conservation areas. Ecologically, the key information includes forest age and the volume of growing stock for 20 forest habitat types. Importantly, our analysis employs four different connectivity components to identify areas that are (i) locally high-quality and internally well-connected forest areas, (ii) well connected to surrounding high-quality forests, (iii) well connected to existing conservation areas, and (iv) which occur in land parcels that are large enough to allow efficient implementation. The optimization problem is solved with the Zonation conservation planning software. Expert evaluation of the results suggests that the areas identified by the present quantitative analysis include areas of high conservation value. Our analysis techniques could easily be applied to other areas where similar planning and management needs exist.

751. THE EFFECTS OF STAND STRUCTURE ON EPIPHYTIC BRYOPHYTES IN MIXED DECIDUOUS-CONIFEROUS FORESTS OF WESTERN HUNGARY

Lengyel-Király, Ildikó, Eötvös University, Hungary; **Ódor, Péter**, Eötvös University, Hungary

The effect of stand structure and tree species composition was studied on epiphytic bryophyte assemblages in mixed deciduous forests of Western Hungary. Using multivariate methods and regression models species composition, species richness and cover of bryophytes were analyzed. On stand level the most prominent positive factor in species composition and the cover of epiphytes was the relative volume of oaks, while the species richness of epiphytes increased mainly with tree species diversity, sapling density and abundance of large trees. Tree level species richness was influenced mainly by tree species: oaks had the richest while pine had the poorest assemblages. Management influenced factors considerably determine the composition and biodiversity of epiphytic bryophytes.

752. HABITAT MODEL OF ARGALI IN SOUTH ALTAI

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The Altai argali (*Ovis ammon ammon*) is the largest wild sheep in the world. The species is severely threatened by poaching and conflicts with domestic livestock resulting in habitat loss. Ukok Plateau Reserve and Sailugem Range (Altai Republic, Russian Federation) represents the most important part of argali habitat in Russia, including winter pasture sites and lambing grounds. The area is now threatened by proposed construction of gas pipeline and road connection to China. The study aims to develop a model of potential distribution of the Altai argali in Plateau Ukok Reserve. Predictive habitat model based on environmental variables (topography, land cover, climatic parameters) was constructed. The topography includes the Altitude and Slope variables, both based on Digital elevation model (DEM) from SRTM dataset. The land cover/land use was obtained using Landsat TM satellite data classification and the climatic parameters (mean temperature, precipitation) were used from the World Climate database. Furthermore the anthropogenic variables (settlements, garrisons etc.) were considered for habitat modeling. The model shows that habitat of the Altai argali could be seriously affected by road and pipeline construction. Using habitat characteristics to identify areas utilized by argali has important implications for developing effective measures for conservation efforts.

753. STATE OF ART OF ESTONIAN EU DIRECTIVE NATURA 2000 BUTTERFLY SPECIES

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7 butterfly species protected by EU Directive Natura 2000 have been found In Estonia. The Natura 2000 species have high risk of extinction in most countries of their populations. They can be considered as specialist species characterizing ecosystem and habitat quality. We collected and uniformed all known findings and descriptions of Natura 2000 butterfly species in Estonia, the oldest records start from 18th century. The abundance and distribution change of these species was analysed through decades. In most European countries abundance and population areas of Natura butterfly species are decreasing; in Estonia in contrary many Natura 2000 species increase their distribution area and abundance that can be related to the land-use, socio-economic and climate changes. There has been very intensive expansion of population of Clouded *Apollo* (*Parnassius mnemosyne*), but also species like *Euphydryas maturna*, *Lopinga achine*, *Maculinea arion*. Other Natura 2000 species (*Lycaena dispar, Euphydryas aurinia, Coenonympha hero*) have relative stable populations trough decades. However, there is high risk to the populations of these butterflies due to the settlement development processes and overgrowing of valuable meadows and other habitats.

754. RENEWING IN THE 'NAGYERDŐ' OF DEBRECEN (HUNGARY): IS THE SEMINATURAL REHABILITATION MORE NATURAL?

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Different aged seminatural, artifical forestation and old parts of Nagyerdő, a (Convallario-Quercetum roboris) forest in Debrecen in Eastern Hungary were compared by the classical coenological methods and the inclination forest renewing of the old forest were observed with single methods. The Rényi diversity of the communities was compared as well. The data matrix comprised the relative frequency data and abundance-dominance data pertaining to the list of species. Young oak trees can not be found in the old parts of the forest, because the level of soil water is falling continuously. Diversity of the seminatural forestation is the highest, because the forest species and weed species of disturbed areas can also be found. We proved that the seminatural forestation method from a natural conservation viewpoint is really more beneficial: synthetic coenological indicators and the increase of the number of species indicate that favourable vegetation dynamic processes are going on. At present two threats can be observed: (1) low level of soil water and (2) widespread growth of weed species that are not native to the region, especially *Robinia pseudoacacia* and *Padus avium*. The changes can be observed continuously based on geo-coordinates of the squares.

755. EFFECT OF THE HEAVY METALS ON THE DEVELOPMENTAL STAGES OF OVULE AND SEED PROTEINS IN *CHENOPODIUM BOTRYS* L. (*CHENOPODIACEAE*)

Lorestani, Bahareh, Islamic Azad University - Hamedan Branch, Iran; **Yousefi, Nafiseh**, Islamic Azad University - Hamedan Branch, Iran; **Cheraghi, Mehrdad**, Islamic Azad University - Hamedan Branch, Iran;

Excessive amounts of heavy metals adversely affect plant growth and development. Also the presence of elevated levels of heavy metal ions triggers a wide range of cellular responses including changes in gene expression and synthesis of metal-detoxifying peptides. The overall objective of this research was to elucidate some microscopic effects of heavy metals on the formation, development and structure of ovule and seed storage proteins in *Chenopodium botrys* L.. To achieve this purpose, surrounding area of Hame-Kasi iron and copper mine (Hamedan, Iran) was chosen as a polluted area where the amount of some heavy metals was several times higher than the natural soils. Flowers and young pods were removed from non-polluted and polluted plants, fixed in FAA 70 and subjected to developmental studies. Our results showed that heavy metals can cause some abnormalities during the ovule developmental process. Decreasing of the size of embryo sac, quick growth of inner integument, quick degradation of embryonic sac cells, accumulation of dark particles, irregularity and even blockage of the nuclear envelope formation and increasing of embryonic sac cytoplasm concentration were the effects of heavy metals. Reduction of ovule number was also seen in the plants collected from polluted area.

757. BIOTIC MODULE OF THE HUNGARIAN NATURE CONSERVATION INFORMATION SYSTEM PRESENT AND FUTURE

Lőrincz, Tamás, Ministry of Environment and Water, Hungary; **Takács, Attila András**, Ministry of Environment and Water, Hungary; **Váczi, Olivér**, Ministry of Environment and Water, Hungary

The task of the Biotic module is to uniformly collect, store and provide access-query possibilities for data typical of the occurrence and other features of living organisms and biocoenoses (plant- and animal associations) emerging in conservation organizations. The aim of the Biotic module of the Nature Conservation Information System to preserve the plants, animals and natural communities that represent the diversity of life on Earth by protecting the lands and waters they need to survive, to preserve ecosystem services of our natural heritage and the harmony between the activities of man and nature and to manage the natural heritage on sustainable way to preserve it for the future generations. Biotic data recording and methods are possible on four levels of the system (web interface, offline interface, PDA interface, mobile phone interface). The aim of the poster is to summarize the functions of the module and demonstrate the workflow of the module from data collection to decision preparing.

758. DIVERSITY OF SWARD STRUCTURE UNDER DIFFERENT GRAZING INTENSITY

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Selectivity of grazing causes changes in a spatial heterogeneity of sward structure and its diversity. The aim of our study was to clarify how the intensity of cattle grazing affects the spatial heterogeneity and the diversity of plant species of the grazed vegetation. The study is a part of a long-term grazing experiment established in 1998 in Jizerské hory Mts. (Czech Republic). Data collection proceeded in following treatments: intensive (IG) and extensive grazing (EG) during five successive years. The abundance of plant species (%) and sward high (cm) were recorded. According to sward high 3 categories (int, mod, ext) of patches were compared. In the IG treatment predominated int patches there with the dominance of moss, Trifolium repens or Veronica serpyllifolia. On the contrary the quantity of int patches in EG treatment was very low and the quantity of mod and ext patches was almost

the same, with the dominance of Heracleum sphondylium or Galium album. The effect of grazing intensity on plant species diversity was not statistically decisive (p=0,067). The distribution of plant species was different in particular sward high categories.

759. GENETIC ANALYSIS OF *QUERCUS PETRAEA* POPULATIONS UNDER DIFFERENT RATE OF FOREST MANAGEMENT: CASE STUDY FROM THE KŘIVOKLÁTSKO PROTECTED LANDSCAPE AREA

Lukášová, Miroslava, Silva Tarouca Research Institute for Landscape and Ornamental Gardening, Průhonice, Czech Republic; **Dostálek, Jiří**, Silva Tarouca Research Institute for Landscape and Ornamental Gardening, Průhonice, Czech Republic; **Pospíšková, Markéta**, Silva Tarouca Research Institute for Landscape and Ornamental Gardening, Průhonice, Czech Republic

Forest management has been used for a long time throughout most forest stands in the Czech Republic and Europe. To help protect the diversity of populations of forest woody species, information on how this management influences the genetic structure of these populations should be collected. We can anticipate that a narrow selection of seed-producing trees will result in a weaker genetic variability of planted vegetation. Intensive forest management also represents a risk of disturbing the populations' initial genetic structure as a result of planting the same species. In the future, this can also result in an outbred depression. The existing work focused mainly on the assessment of the state of genetic diversity of natural populations. In our work, attention was paid to the relation between genetic diversity and management intensity, hence the level of the populations' autochthony. Using the example of three populations of *Quercus petraea* (Mattuschka) Liebl. in the Křivoklátsko Protected Landscape Area, we examined whether any genetic differences exist between the populations, depending on various management intensity. SSR (Simple Sequence Analysis) of DNA was used to assess the genetic diversity for a more detailed view of genetically conditioned variability of populations.

760. MANAGEMENT OF THE ENIGMATIC BIRCH MOUSE *SICISTA BETULINA* IN PRACTICE

Møller, Julie Dahl, Natural History Museum Aarhus, Denmark; **Baagøe, Hans J.**, Natural History Museum of Denmark; Zoological Museum, Denmark; **Jensen, Thomas Secher**, Natural History Museum Aarhus, Denmark

Practical implementation of conservation measures for the Northern Birch Mouse *Sicista betulina* is impeded by poor knowledge of occurrence and habitat use. This enigmatic species is reputedly trap shy, but previous Danish studies have shown that given an extensive trap effort, captures averaging 1 individual pr. 100 trap nights are possible. By using a new pitfall trap design, we made a great progress in trap efficiency, and during a 2 year project, birch mice we captured in 13 of 28 trap sites in Denmark. The captured birch mice were radio tracked, thus contributing with new information on home range size and habitat use. One of the most important findings was that birch mice use the uncultivated areas along streams as dispersal corridors. Individuals were trapped at several sites along connected stream systems, and these systems thus form an efficient way of suggesting where to trap in areas without previous birch mouse observations. Earth banks and hedges were important features in agricultural areas, and home ranges were often shaped by them.

761. DISTRIBUTION CHANGES AND CONSERVATION OF CARABID BEETLES IN NW EUROPE REVISITED: SWIMMING AGAINST THE TIDE?

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Twenty years after a first analysis of the changes in the distribution and composition of carabid beetles in NW Europe (Desender & Turin, 1989), we repeated the analysis with present-day data for Belgium. These data were collated for the new distribution atlas of carabid beetles in Belgium. By relating the changes in distribution area to ecological, conservational and geographical characteristics of the different species, we tried to explain which type of species showed the strongest changes in distribution. Comparing the period before 1950 with the period 1950-1985 showed that especially species from dry and wet biotopes and heathlands, (seriously) threatened species, spring breeding species, species with a Central- or Middle European distribution range and species that occur in the centre or near the margins of their distribution range declined significantly. The new analysis, in which the period 1986-2008 is compared with the reference period (before 1950), revealed that very big species, species from dry biotopes, seriously threatened species, poorly dispersing species, spring breeding species, Middle European species and species in the centre of their distribution range continued their decline. Management and conservation measures are suggested to preserve these species in a strongly industrialised and highly fragmented NW European landscape.

762. PRESERVATION OF PROTECTED PLANT SPECIES WITHOUT HUMAN INTERFERENCE IN ABANDONED GRAPE YARDS

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Parcels of one-time traditional grape management were observed in less typical wine areas of the Northern Hungarian Mountain Range. Wine-pest epidemic of the 1880's caused mass abandonment of the centuries-old small parcels and helped succession in parallel with a new expansion of grasslands. Soil erosion driven by century-old hoeing, exposure, great slope angle (affecting also water regime) and loessy parent material appeared on or near the surface, resulting in the appearance of protected plant taxa characteristic for loess grasslands of foothill and plain regions. These taxa are *Prunus fruticosa*, *Pulsatilla grandis*, Linum tenuifolium, *L. flavum*, *L. hirsutum*, *Polygala major*, *Aster amellus*, *Dianthus collinus*, *Orchis purpurea*, *O. tridentata*, *O. militaris*, *O. ustulata* subsp. *ustulata*, *Gymnadenia conopsea* etc. Phytosociological samples prepared in the secondary steppe-like dry grasslands refer to landscape

management history with different age of abandonment. Although, natural or induced burning of grasslands in some years may play an important role in avoiding a thorough closing of vegetation cover and becoming shrubbier, it may be undesirable considering invertebrate fauna. The main factor in the preservation of protected plants, however, is henceforward the shallow fertile soil layer and its loessy characteristic.

763. DESICCATION TOLERANCE AND REGENERATION ABILITY OF FEN BRYOPHYTE SPECIES

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Many rich fen bryophyte species considerably decreased during last 50 years. Two experiments were realized to learn more about their biology under the stress conditions. Desiccation tolerance of 8 fen bryophyte species (*Aulacomnium palustre*, *Bryum pseudotriquetrum*, *Calliergonella cuspidata*, *Campylium stellatum*, *Climacium dendroides*, *Hamatocaulis vernicosus*, *Plagiomnium elatum* and *Tomentypnum nitens*) was studied in a common garden experiment. Most of the studied species were able to restore their growth after weeks, some of them even after several months of desiccation. The second experiment compared the regeneration of the rare and vulnerable moss *Hamatocaulis vernicosus* and the widespread *Calliergonella cuspidata* from different gametophyte fragments: apical, green middle stem part, brown middle stem part, green and brown branch and leaves. Both species were able to establish their growth from all types of stems parts. However, regeneration of brown *H. vernicosus* stem fragments was very weak and no regeneration from the leaves was observed. *C. cuspidata* regenerated better and was able to produce new shoots even from its leaves.

764. CONSERVATION ACTION PLAN FOR THE CROATIAN DACE (*TELESTES POLYLEPIS*)

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Croatian dace (*Telestes polylepis*) is a critically endangered stenoendemic fish species that inhabits the Danube basin. It is protected by Croatian law as a strictly protected species. Constant reduction of populations in its range, the quality of its habitat and the increasing anthropogenic impacts on the subterranean karst habitats where it resides for part of the year have been stated as the main reasons of its endangerment. The aims of preparing a conservation action plan were conducted and species distribution and habitat quality were assessed. The species was recorded at five sites around Velika and Mala Kapela mountains. During the investigation a large population fluctuation was detected at one site, but it is not known whether that is a natural cyclic process. In the historic range of Croatian dace, rainbow trout (*Oncorhynchus mykiss*) and brown trout (*Salmo trutta*) were found. Presence of those species excluded the presence of the Croatian dace on historically present sites so we can conclude that the introduction of salmonid species is a major threat to the Croatian dace. In the proposed conservation action plan the general goals are mitigation measures for actual populations and eventual reintroduction of the Croatian dace in historic areas of distribution.

765. INFLUENCE OF FOREST CHARACTERISTICS ON BIRD FOCAL SPECIES ABUNDANCE IN LOMBARDY, ITALY

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Focal species are groups of species used in landscape management for their narrow ecological requirements. In order to set up management plans adequate to conserve animal communities, the relationships between environmental characteristics and the abundance of each species should be known quantitatively. We used regression trees on data from the Italian National Forest Inventory and various bird census projects carried out in Lombardy, Italy, to assess the influence of forest type, management and connectivity on the abundance of nine broadleaf forest nesters previously identified as focal species. The results confirmed the sensitivity of resident cavity-nesting focal species to forest type and connectivity. Management at provincial scale was also selected in most models, but at local scale it seemed less significant. The use of two databases coming from different projects allowed us to take advantage of existing data, collected for different purposes, even though only a small part of all original sampling units were close enough to be paired. In some cases variables known as important were removed during the cross validation phase, possibly because of the small sample size. The execution of ad hoc bird surveys in or near forest inventory points might allow the inclusion of more significant variables.

766. SEED BANK FORMATION THROUGH A SUCCESSIONAL SERIES IN AN INLAND SANDY REGION

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Soil seed banks of 90 permanent plots from 18 stands, representing various successional stages in an East-Hungarian sandy region, were studied. The seedling emergence method combined with bulk reduction procedure was used. To reveal specific strategies, seed bank composition, abundance and vertical distribution were compared to full-season vegetation data recorded in 5-12 years. Dry acidic grasslands (Festuco vaginatae-Corynephoretum), intact and degraded stands of sandy pastures (Potentillo-Festucetum pseudovinae), steppe meadows (Salvio-Festucetum rupicolae) as well as differently aged plantations and spontaneously established stands of *Robinia pseudoacacia* were sampled. Most species present aboveground also possessed detectably dense seed banks. This finding questions the generally accepted idea on low similarities between seed banks and vegetation. Xerophyte annuals and short-lived perennials occurred in most soil samples usually with high seed densities. In contrast, seed bank formation of most xerophyte perennial grasses and sedges varied greatly among stands, suggesting their flexible specific strategies. No persistent seed banks were recorded in most wind-dispersed perennial forbs and in bulbous monocots, suggesting transient or short-term persistent seed banks. This strategy also holds for a few annuals and for some

perennial grasses, typical of open grasslands. Hygrophytes from neighbouring wetlands were present in all studied stand indicating frequent dispersal events.

767. EFFECT OF GRAZING ON VEGETATION OF DRY GRASSLANDS IN THE CZECH KARST PROTECTED LANDSCAPE AREA

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The aim of this project is to describe the effect of grazing on communities of dry grasslands, which are endangered by expansion of mesophilous grass species and shrubs. Grazing management has been implemented in 2005 and 2006 at three sites. To understand the influence of grazing regime on vegetation, we observe the changes in vegetation composition on grazed and ungrazed plots over time. We perform vegetation surveys on permanent plots each spring before the grazing period. First significant effects of grazing were detected just in 2008, i.e. 4 years after introduction of the grazing regime. Grazing seems to be enhancing characteristic steppe species such as *Alyssum montanum*. Its effect on expanding species as *Arrhenatherum elatius* differs on different sites. This is caused by different timing of grazing. We conclude that it is essential to graze the sites before the blooming of the expanding grasses but after the blooming of endangered species. We also demonstrate that species with different response to grazing differ in their traits.

768. TEMPORAL FLORAL SEX ALLOCATION IN *PROTOGYNOUS ADONIS VERNALIS* L.

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In hermaphroditic plants, floral allocation to female and male functions may vary temporally within individuals. Several studies have investigated the causes, such as resource competition, architectural effects and the mating environment. To study this phenomenon, we examined floral allocation in sequentially blooming flowers of the protogynous hermaphroditic herb *Adonis vernalis* L. The number of sepals and petals did not show any change, but the width of them decreased significantly. Pollen and ovule allocation varied temporally. Pollen number per anther, and particularly anther number and pollen number per flower decreased significantly from early flowers to late flowers, but ovule number did not show any significant change. The pollen to ovule ratio per flower exhibited a significant decline. Maturity order of anthers in the androecium had a significant effect on pollen number per anther: it is lower in the inner anthers than in the outer ones. Pollen viability did not show any consequent differences in sequentially blooming flowers, but unlike the pollen production, it increased significantly going from the outer part of the androecium to the inner part. Our observations give further support to the mating environment hypothesis of Brunet and Charlesworth (1995). This study was funded by OTKA T049503.

769. ARE URBAN WASTELANDS POTENTIAL BREEDING GROUNDS FOR ENDENGARED BIRD SPECIES?

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Urban agglomerations involve wastelands or brownfields. These unused patches in urban areas are known to be hot spots of biodiversity. In every day practice, however, city planners often ignore the ecological value wastelands could have for a sustainable urban development. This study tries to analyse the role brownfields have for the urban avifauna. On about 50 sites all present bird species were mapped for two years. Presence of bird species was analysed with respect to the degree of human disturbance, vegetation structure, area size, and location within the city. For Northern Wheatears (*Oenanthe oenanthe*), wich are massively declining in agricultural areas, nests were located and breeding success was recorded in order to determine if populations on those areas are self-sustaining. The results show, that urban wastelands in an early successional stage are appropriate habitats for a number of open-landscape bird species. The breeding success of Wheaters was high, compared to non-urban areas. Thus, the management of urban wastelands has to consider aspects of protection of species, even if those areas provide only temporary habitats and may not be especially protected.

770. NEW FINDINGS CONCERNING OCCURRENCE AND TAXONOMY OF GUDGEONS FROM THE GENERA GOBIO AND ROMANOGOBIO IN THE EURASIAN CONTEXT

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Taxonomy and systematics of species from the genera *Gobio* and *Romanogobio* continues to be a topical international subject, bringing many questions and few answers. Its importance is given by the fact that endemites of various degrees of endangering are often concerned. Molecular study brings new views of some aspects from the territories of various countries. Genetic research of gudgeons from Polish populations from three main river basins – the Odra, Varta and Visla rivers – was made and the taxonomic status of *G. gobio* sensu lato was evaluated. Furthermore, morphologic and genetic description of a new species *Gobio* sp. (species-in-waiting) from the Slovak river Topla was made. Sympatric zones in some species of both the genera were identified. New distribution areas of *R. albipinnatus* were found, moving the frontier of its occurrence to the Fore-Caucasus. It also becomes a newly identified species of Turkish ichthyofauna. Suitability of the diagnostic method “S7indel diagnostics” as a promising molecular identification key was assessed. Within the international Fish Barcode of Life Initiative (FISH-BOL), global standards (DNA barcodes; COI) for three species of genus *Gobio* and three species of genus *Romanogobio* living in the territory of the Czech Republic were gained and archived.The study was carried out within the framework of the research project no. 206/09/P608 supported by the Grant Agency of the Czech Republic.

771. FOREST STRUCTURE AND MICROCLIMATE PATTERNS AS POTENTIAL SURROGATE INDICATORS OF ECOSYSTEM RESILIENCE: IMPLICATIONS FOR ENVIRONMENTAL FORESTRY PRACTICE

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Scientific evidence that points to a relationship between disturbances manifest in silvicultural practices and the microclimatic regime of forests is compelling. However, rather less is understood about the effects of vegetation architecture on local temperature conditions and ultimately ecosystem resilience in contrasting near-natural and modified forest landscapes. This three year study examines this phenomenon by comparing examples of near-natural forests with those under management both in boreal and north temperate deciduous biomes. An analysis of the results suggests that aspects of vegetation structure including the biomass of green wood and the volume of coarse woody debris appears to affect both the average and range of temperature values at different scales. More specifically, depressed and 'dampened' local temperature conditions evident in near-natural forest appear to correspond to increasing complexity and abundance of structural features. More widely fluctuating temperatures occur in areas recently affected by natural disturbance whilst the most extreme conditions are to be found in forests that are under management. Silvicultural practices that encourage the retention of environmental legacies at a range of scales may increase heterogeneity, moderate temperature fluctuations and thus contribute to improved ecosystem resilience, an important consideration in the context of climate change.

772. AN INTERDISCIPLINARY INVESTIGATION OF IRELAND'S SEAFOOD INDUSTRY: TOWARDS THE GOAL OF SUSTAINABILITY

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For centuries, Irish waters have been subjected to increasing levels of fishing activity. Data records suggest that fishing pressure has played a major role in altering marine ecosystem structure, resulting in changes in the availability of seafood resources. Irish society is currently one of the most dynamic in Europe and this may be contributing to a changing composition of consumer profiles. These issues are likely to affect the diversity of products that will play a major role in the future of the seafood industry. Incorporating three studies, my research involves an interdisciplinary approach to investigating current trends and predicting future scenarios for the Irish seafood industry. One study employs genetic methods to investigate the incidence of mismatches between the declared origin of high-profile marketed seafood and actual biological provenance. Another utilizes past fisheries-independent data to identify potential changes in ecosystem structure within Irish marine areas over time. The third is an investigation of Irish consumer habits and attitudes towards seafood. Whilst each of these studies stands on its own a valuable task in fisheries sciences, major efforts will be made to integrate the work-packages and formulate novel ideas, towards a more holistic approach to the conservation of marine living resources.

773. THE PHYSIOGNOMICAL STRUCTURE CHANGES OF SHRUB LAYER IN THE SÍKFŐKÚT OAK-FOREST FROM 2002 TO 2007 – I.

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The structure of *Quercetum petraeae-cerris* oak forest ecosystem within the Síkfőkút research area („Síkfőkút Project") have been studied 35 years by Authors. On account of change of the global environmental factors started a large-scale decline of forest – similar any other oak-forest stocks of Hungary - from 1979 in the research area. We analyzed the shrub layer so that we splited into low and high shrub layer to realize more correct results. We registered the most important structural parameters of the forest's shrub layer in the „A" quadrat. We registered sixteen and seventeen species in the sample area. The *Euonymus verrucosus* dominated in the low shrub layer in every measuring. *Euonymus verrucosus* and *Acer campestre* come out at some half of the high shrubs. The biggest shrub species in the high shrub level were *Acer campestre* and *Cornus mas*. The significant part of the individuals of 3 species grew out of the high shrub level and they reach the tree-stratum. The shrubs grew bigger and bigger (the procession is taking at the moment) but the rate of the high shrubs was decreasing compared to 2002. The data processing of the foliage cover and the diversity proceed at present too.

774. A DEMOGRAPHIC STUDY OF THE ARRAU TURTLE (*PODOCNEMIS EXPANSA*) IN MIDDLE ORINOCO RIVER, VENEZUELA

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Podocnemis expansa (Arrau Turtle) is a freshwater turtle in critical risk of extinction. In Venezuela, a management program is in progress since 1989, in the Arrau Turtle Wildlife Refuge at Orinoco River. This program involves protection of nesting beaches and headstarting of hatchlings. The purpose of our study was to evaluate the population dynamics of the species in the zone. We used a data base (1989- 2004) available in the Venezuelan Ministry of Environment, and data collected by us in 2004. First, a body growth curve was constructed, and used to estimate age of sexual maturity in females, and to transform size structure in age structure. Age-specific fecundity and survivorship were calculated. Finally we constructed a stage-dependent matrix model, and used it to determine population status and to assess the effectiveness of alternative management options. According to our analyses the population size has stabilized and the manipulation of the survivorship of juveniles and small adults is the conservation action that could best reverse a population decline. Additional efforts focused on protecting juveniles and small adults of Arrau Turtle, such as reinforcement of illegal hunting controls, must be implemented in order to ensure the success of the conservation program.

775. WETLAND MANAGEMENT TECHNIQUES AND AQUATIC BEETLES – THE EFFECTS OF PLANTING, MOWING AND GRAZING

Molnar, Akos, Lorand Eötvös University, Hungary

Aquatic beetle responses to wetland plant management techniques were investigated in case studies and experiments. Effect of planting aquatic plants was tested in a wetland restoration area and in mesocosm experiment, where aquatic beetle assemblages of planted water bodies were compared with non-planted ones. The effect of mowing was investigated in a *Typha* spp. dominated freshwater marsh, in which mowed and control plots were compared. Aquatic beetle response to livestock grazing was also tested in a wetland restoration area. The results suggested that planting affected positively the abundance and diversity of aquatic beetles, due to the increased habitat diversity. Mowing of *Typha*-stands had also positive effects on aquatic beetles, because its former dense monotypic stands excluded a lot of species. On the other hand, there were also species preferring non-mowed plots. Livestock grazing seemed to be a less suitable management method, because it resulted in decreased beetle diversity. However, some species showed strong preferences to grazed, and others to non-grazed waters. In general, planting of aquatic plants is advisable in newly constructed wetlands, but grazing and mowing should be applied with care, because they can affect aquatic beetles both positively and negatively, depending on beetle species and treatment intensity.

776. WILD POLLINATOR COMMUNITIES ARE NEGATIVELY AFFECTED BY INVASION OF ALIEN GOLDENRODS IN GRASSLAND LANDSCAPES

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The increasing spread of invasive alien plants has changed biodiversity throughout the world. To date research in this area has focused on how invasive plant species affect pollinator behaviour, but there is a lack of data on the impact that alien plant species have on wild pollinator populations. Since their introduction in the 19th century, alien goldenrods (*Solidago canadensis*, *S. gigantea*) have been among the most successful invasive plant species in Europe. We studied the effects of goldenrods on wild pollinator communities in SE Poland. The abundance, species richness and diversity of wild bees, hoverflies and butterflies were compared between wet meadows invaded by goldenrod and non-invaded controls. Furthermore, we compared the plant diversity and average cover between the two groups of sites. Invasion of goldenrods had a very strong negative effect on wild pollinator diversity as well as abundance. Plant diversity and average cover were also negatively affected by goldenrod invasion. Wild pollinators were grouped according to their nesting and food specialisation, but none were resistant to the invasion, indicating that introduced goldenrod may affect the entire wild pollinator community. Our study emphasises the urgent need to develop specific protection plans for wild pollinators in habitats threatened by goldenrod.

777. INVASION FROM AERIAL PHOTOGRAPHS, SCALING UP: *HERACLEUM MANTEGAZZIANUM* IN SLAVKOVSKÝ LES, CZECH REPUBLIC

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It has been suggested that landscape structure and changes in land-use are among the main determinants of invasibility. Aerial photographs (1947 to 2006) of a protected landscape area, Czech Republic, enabled to detect first dispersal foci of *Heracleum mantegazzianum*, quantify its spatial spread, and study the role of landscape structure on invasion at local and regional scales. The invasion was characterized by location of dispersal foci, rate of spread, maximum infestation, population dynamics and spatial structure; landscape characteristics included land-cover, land-use, fragmentation, connectivity, disturbance, and invasible habitat availability. Population dynamics in 60-ha localities was scaled up to the landscape level (500 km^2). Pastes and fields were most invaded (84.7%). The year when invasion started had similar effect on the total area invaded as the rate of invasion. As invasion proceeded, the populations spread further from linear landscape features. Mean rate of spread (areal 1,261±1,052 $m^2.yr–1$; linear 10.8±7.2 m.yr–1) was comparable to most aggressive invaders in other parts of the world. The knowledge of historical dynamics and landscape patterns of invasion gained from aerial photographs can serve to identify areas at highest invasion risk and choose appropriate control management (identify dispersal foci and concentrate on linear landscape structures).

778. THE PAST AND PRESENT HISTORY OF AN ALPINE ENDANGERED PLANT, *ERYNGIUM ALPINUM* (*APIACEAE*): INSIGHTS FROM PHYLOGEOGRAPHY AND POPULATION GENETICS

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Eryngium alpinum is an *Apiaceae* found at the sub-alpine stage of the European Alps (1000-2500 m) where it grows on calcareous substrates, most often in mown meadows and avalanche corridors. It is a long-lived plant with limited primary dispersal abilities but possible secondary dispersal mediated by animals or birds. The phylogeography of *Eryngium alpinum* over its range was studied using two intergenic chloroplast spacers, trnH-psbA and trnS-trnG (1322 bp). Population dynamics and inbreeding occurrence was estimated on Swiss and French populations using 7 nuclear microsatellite markers on sampled leaves. A higher diversity was found in France when compared with Switzerland for both types of markers. This is first in agreement with the French populations being more numerous and larger than the Swiss ones, and second with the fact that France have been colonized by four different chloroplast lineages after the last glaciations, whereas Switzerland was only colonized by two lineages. No inbreeding was found in all populations but one, whatever their actual size. It is suggested that this picture might correspond to the one prevailing 40 or 50 years ago, since *E. alpinum* is thought to last up to a hundred years.

779. CONSERVATION MEASURES ENHANCE THE NATURALNESS OF PROTECTED FORESTS IN THE KŐSZEG MTS., HUNGARY

Nemeth, Csaba, Orseg National Park Directorate, Hungary

In Hungary the Nature Conservation Act allows authorities to regulate forest management through several forms of restrictions since 1997. This study investigates whether and how conservations measures implemented in the Kőszeg Mountains, Hungary between 1997 and 2007 influenced forest naturalness. Kőszeg Mountains is part of the East Alps and it is situated at the western edge of the Carpathian Basin. Its average altitude is 500-700 m and it is dominated by *Cyclamini-Fagetum*, *Castaneo-Quercetum*, *Castaneo-Querco-Carpinetum* and *Carici brizoidis-Alnetum* associations. Implemented conservation measures included creating small gaps in old-growth stands, keeping remnant trees during final cuts, tolerating standing and lying dead wood, maintaining unmanaged stands along streams and rocky areas and tolerating pioneer tree species. My results reveal that the structure of forests subjected to these conservation measures became more natural. Plant species diversity increased and more age classes appeared in the stands. Furthermore, the amount of dead wood increased and its size became more variable. The higher spatial diversity of forests managed for conservation enhanced the stability of animal communities as well. As an example, the previously scattered populations of the critically endangered red-breasted flycatcher (*Ficedula prava*) have been attracted and concentrated to these forests.

780. DATA ON THE HABITAT REQUIREMENTS OF THE THREATENED TRANSYLVANIAN MOLE RAT (*NANNOSPALAX* (*LEUCODON*) *TRANSSYLVANICUS*) - NOT ALL HABITATS ARE GOOD ENOUGH

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There are numerous chromosomal forms of the Lesser blind mole rat (*Nannospalax* (superspecies *leucodon*)) that we know of but on whose ecological needs and behaviour there is hardly any information. To date, only the *Nannospalax* (*leucodon*) *hungaricus*' habitat requirements were examined in some details, but recent observations suggest that the behaviour and feeding strategies of different forms might not be the same. We ran investigations in the known habitats in Hungary of the Transylvanian mole rat, where 3 habitats (1 smaller and 2 larger in area) were compared based on botanical and pedological criteria (altogether 10 variables were compared). We also recorded the features of habitat patches preferred by individuals within habitats. Based on these investigations the features of the smaller habitat largely differ from the other two. Based on historical landscape investigations the former locality is presumable a suboptimal habitat for the mole rats and only human activity forced the animals to live there. On all of the individuals caught in the Debrecen-Józsa locality asymmetric albinotic patches, different from the regular colouring of the fur, were found. We presume that these are results of increased environmental stress caused by non-ideal habitat conditions. We plan to study this phenomenon by quantifying the fluctuating asymmetry.

781. STUDIES ON TEMPORAL CHANGES IN SEVERAL REPRODUCTIVE TRAITS IN AN EX SITU POPULATION OF *DIANTHUS DIUTINUS* KIT.

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Ex situ population of the Pannon endemic *Dianthus diutinus* Kit. was established in the Botanic Garden of the University of Szeged in Hungary. The temporal changes in flower number, fruit number, fruit set, ovule number, seed set, pollen number per flower, pollen viability and pollen:ovule ratio were monitored during the 5-month-long generative period. 30 individuals were involved in the studies. Flowers in one inflorescence per individual were marked in the order of blooming. One anther per flower was removed for pollen number determination, ovule and seed numbers were counted in the same flowers. All traits exhibited the same trend of change during the generative period (decrease), only the flower-and capsule numbers followed an optimum curve. It seems that the traits change in almost all cases independently of each other. Another common feature was the high variance of the traits especially in the first half of the vegetation period. The aim of this study was to add novel data to our existing knowledge for a better understanding of the reproductive characters of *D. diutinus* and to determine the optimal timing of seed collection for ex situ multiplication. This study was funded by the Hungarian Scientific Research Fund T049523

782. COMPASS ORIENTATION MECHANISMS IN MIGRATORY BUTTERFLIES

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Range shifts towards higher latitudes have been documented in many species including butterflies; however migrant and resident species will differ in their ability to alter their distributions in response to climate change. The two most common migrant butterflies in Britain are *Vanessa cardui* and *V. atalanta*, both obligate migrants from the Mediterranean Basin. We performed controlled flight-simulator experiments to test the ability of migrant *V. cardui* to orientate in a seasonally-advantageous direction, and to investigate their orientation mechanism. We show that *V. cardui* orientate in a common compass direction, and provide evidence that they use a sun compass to maintain this migratory orientation. Using data from two vertical-looking entomological radars we show that free-flying butterflies, likely to be *V. cardui* and *V. atalanta*, are able to maintain seasonally-adaptive compass directions while migrating at high altitude. We provide evidence that butterflies take advantage of high-altitude favourable winds to aid their migration, and adjust their heading to compensate for crosswind drift. The sophisticated orientation mechanisms employed by these butterflies should enhance their ability to track resources in a changing climate.

783. PHYLOGEOGRAPHY OF *GRAELLSIA ISABELAE* (LEPIDOPTERA: *SATURNIIDAE*)

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Graellsia isabelae (Graells, 1849) is a European moth protected by the Habitats Directive and the Bern Convention. This montane species mainly occurs in Spain and France. Five subspecies have been described based on morphology. Each subspecies occurs in different geographic regions.

We examined the genetic diversity showed by *G. isabelae* in five French localities (subspecies *galliaegloria*) and ten Spanish populations (subspecies *isabelae* (Central Spain), *roncalensis* (W Pyrenees), *ceballosi* (Andalusia), and *paradisea* (Catalonia/E Pyrenees)). We sequenced 826 bp of mtDNA (cytochrome oxidase I) in up to 20 individuals per population and genotyped them with 10 microsatellite loci. The French populations showed no mitochondrial variation at all. Congruently, microsatellites showed less variability in France (L'Ange Gardien (n = 20), Haute Alps) than in Spanish populations (Els-Port-de-Beseit (n = 20), Catalonia). Mitochondrial results also showed two divergent lineages occurring in Spain. The first one is formed by individuals classified as subspecies *ceballosi* and *isabelae*, whereas the second one was composed by specimens determined as subspecies *paradisea* and *roncalensis*.

784. HOW DOES AN UNDERGRADUATE EDUCATION IN CONSERVATION SHAPE THE PRIORITIES OF YOUNG CONSERVATIONISTS?

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Inspired by recent publications and workshops identifying "Top 100" or "Top 10" issues in ecology, conservation and forestry, students on the undergraduate programmes in the University of Cumbria's Centre for Wildlife Conservation were asked to develop a priority list which represented the views of each year group. Student were asked to develop a personal "Top 10" list of the key issues in conservation and bring this to a workshop session; during workshop sessions students were placed into groups of two which were then merged into fours, eights, etc. with the outcome at each stage being a top 10 agreed by the group leading eventually to a final top 10 for their year group. While the emergence of some themes, for example climate change, is unremarkable, others, including a focus on funding, are noteworthy. A shift from conservation practice to policy and research as students progressed through their education reveals something of the influence of programme structure. In parallel to this process, a staff "Top 10" was produced revealing the influence of the priorities of the academic team on undergraduate thinking. This has impacts not only on programme design but also on strategies for building a balanced academic team.

785. HYDROLOGICAL PROCESSES AND SUCCESSION CHANGES IN A MOUNTAIN CATCHMENT AFFECTED BY THE ACID ATMOSPHERIC DEPOSITION

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Since 1982, plant succession and hydrological phenomena were studied in the Jizerka experimental catchment (1.0 km^2, the Jizera Mts. Czech Republic). *C. villosa* has been spreading widely with increased light incomes and soil moisture, particularly after the clear-cut of mature spruce stands. Ellenberg's indices (light, temperature, moisture, acidity and nitrogen) were compared with observed hydrological parameters (soil water content, water and sediment yields, stream-flow chemistry). Ellenberg's indicator of soil moisture and light describes well the plant succession related to climatology and hydrology of clear-cut sites. In the investigated basin, the potential annual loss of soil varies from 0.2 mm (mature spruce stands) to 1.2 mm (conversion to grass). However, negligible sheet erosion was observed at run-off plots covered by herbaceous layers. The increasing depth of rills is related to a drop in both vegetation cover and number of species. The number of species (species richness) found in recovering rills increases significantly with the time (age of rills). The rills deeper than 0.5 m require a human interventions by reclamation techniques (stabilisation of the slope by check-dams etc.).

786. RARITY OF *G. PALUSTRIS* CAUSED BY RARITY OF HABITAT? A COMPARISON BETWEEN *G. IMBRICATUS* AND *G. PALUSTRIS*

Novotna, Pavla, Charles University, Czech Republic; **Richter, Frank**, Charles University, Czech Republic; **Munzbergova, Zuzana**, Charles University, Czech Republic

The aim of the project is to understand the reasons for rarity of *G. palustris* in comparison to the more common *G. imbricatus*. *G. palustris* is protected by EU Habitats Directive (Annex I.) because of the rarity in its whole distribution range. A better understanding of the factors responsible for its rarity will allow the development of more effective conservation strategies. One of the possible explanations for species rarity is a rarity of their habitat. To explore this, we thus attempt to characterize habitat requirements of the species using data on vegetation of the habitats in the form of phytosociological relevés and direct field measurements of habitat conditions. We use these data to test differences in vegetation composition of sites occupied by the two species. We will also describe vegetation structure of the habitats (based on digital photographs and functional species groups). All the data will be linked to population growth rate of the species at the specific sites. The results indicate that there are only limited differences in habitats of *G. imbricatus* and *G. palustris* from the Czech Republic suggesting that the species rarity in the Czech Republic can not be explained by rarity of the habitat.

787. CONSERVATION ASSESSMENT OF RIPARIAN WOODLANDS AT THE KALAMAS RIVER, GREECE

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Riparian woodlands are poorly studied even within protected-areas in Greece. We present results of a riparian woodland assessment at 69 sites of the lower Kalamas River (NW Greece) where we surveyed the vegetation of representative stands and identified the most extensive riparian woodland stands. We employed the QBR index to evaluate riparian forest integrity. Results shown that eight extensive riparian stands need protection mainly from clear-felling and agricultural expansion. Nineteen sites (28%) exhibit excellent riparian condition, 16 (23%) good condition, 18 (26%) moderate and 14 (20%) poor condition. Only two sites were assessed as being in bad condition. Severe land-use conflicts are evident in the Kalamas Delta protected-area (NATURA 2000) and very sparse natural riparian woodland remains there. Therefore, protecting the last near-natural stands is an imperative and steps must be taken towards ecological restoration especially in the lowland reaches of the river corridor.

788. THE GENETIC IMPROVEMENT OF EUROPEAN BISON HERDS IN CARPATHIANS – PRELIMINARY RESULTS

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A future for free ranging herds of European bison could be the vast area of Eastern Carpathians, extending from Polish Bieszczady, through Slovak Poloniny to Bukowina in Romania. Between 1963 and 1980 first representatives of this species were reintroduced in Poland and Ukraine. The source for those reintroductions were animals maintained in Polish

reserves, belonging to Lowland-Caucasian line. Their genetic pool was different from those kept at that time in countries of Western Europe. In a consequence, the genetic diversity within the population, created some 30 years ago, was very low. In last eight years, the genetic enrichment as well as creation of new free ranging herds along the Carpathian range were performed in several countries. The aim of our study was to estimate how recent translocations of animals could improve the genetic structure of Carpathian herds. Using the pedigree data - the contribution of founders, and the value of inbreeding coefficient were calculated. Also, the microsatellite polymorphism was assessed within this population. Obtained results were compared to the same parameters known for herds before the translocation. The conclusion is, that however the genetic diversity of population slightly increased, a supplementation of genetically selected animals to augment this population is still necessary.

789. CHOROLOGICAL STUDIES OF VASCULAR PLANTS IN ROMANIA

Öllerer, Kinga, Romanian Academy - Institute of Biology, Romania; **Stefanut, Sorin**, Romanian Academy - Institute of Biology, Romania; **Sanda, Vasile**, Romanian Academy - Institute of Biology, Romania; **Vicol, Ioana**, Romanian Academy - Institute of Biology, Romania; **Ion, Roxana**, Romanian Academy - Institute of Biology, Romania

Species mapping requires sustained effort and collaboration of several researchers in order to provide the background information that is later simplified and transposed visually in the form of distribution maps. The advantage of such maps is the accessibility of the data for professionals involved in the different aspects of nature conservation and/or land use planning. For this reason, the Institute of Biology from Bucharest initiated in 1999 the Taxonomy and chorology of vascular plants from Romania project, as part of the mapping efforts of the Romanian Flora. Besides the maps, the outcomes of the project are also the ongoing assessment of literature and herbarium data that contain doubtful taxa, and of the exceptional specimens deposited in herbariums towards their inclusion in the Romanian National Heritage. These maps will be integrated in Atlas Florae Europaeae, a reference work on Europe's botanical heritage. In this contribution we aim to present the latest results of this project, namely the species from the *Medicago* genus: *Medicago arabica* (L.) Hudson, *Medicago falcata* (L.) Hudson, *Medicago lupulina* L., *Medicago marina* L., *Medicago minima* (L.) L., *Medicago orbicularis* Jacq., *Medicago polymorpha* L., *Medicago prostrata* Jacq., *Medicago rigidula* (L.) All., *Medicago* x varia *Martyn*.

790. THE MOST COST-EFFECTIVE CONSERVATION IS PREVENTING ALIEN SPECIES INTRODUCTIONS: AN EARLY WARNING NOTIFICATION OF INVASIVENESS OF *GALEGA ORIENTALIS*

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Preventing the introduction and spread of invasive species is more cost effective than controlling them after they have become established. The perennial leguminous oriental goat's rue (*Galega orientalis*) is starting to invade in temperate region. In Estonia, intensive studies of agricultural use appear since 1970s and the sown area (propagule pressure) of the promoted species is growing year by year. Unfortunately, Estonia is an important source of the species seed worldwide since 1990. We studied the wild distribution of the G. orientalis in Estonia, and compiled small scale distribution maps of the species in randomly selected pilot areas. We made an inventory and described the vegetation altogether on all 120 sites (both on cultivated and self spread locations). As a result, the poster shows rapidly increased wild distribution of the invasive alien species in Estonia. In small scale, the seed pool has preserved mostly in various edges, which are vectors of spreading to reach larger semi-natural areas. The oriental goat's rue is growing as a monoculture also in the natural areas and transforming communities. This note is especially important as an early warning for all countries, in which oriental goat's rue is under evaluation as a suitable biomass crop.

791. DISPERSAL PATTERN OF THE FALSE RINGLET (*COENONYMPHA OEDIPPUS*) BUTTERFLY IN A HABITAT COMPLEX

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Populations of the false ringlet, a strictly protected butterfly species, are declining in Europe. Wet meadows with purple moorgrass, which are the most important habitats of this species, are disappearing due to habitat deterioration. Landscapes occupied by this butterfly have become became fragmented, where strong dispersal ability is crucial for survival. This butterfly is considered as a very sedentary species. Our aim was to examine its dispersal ability in a habitat complex. Mark-release-recapture method was used in 16 habitat patches. 914 male and 582 female was individually marked during 2052 capture events. Altogether 48 dispersal events (37 males and 11 females) were detected among habitat patches. The migration rate for a one hectare patch was 0.042 for males and 0.090 for females, calculated with VM2 programme. The distance dependence was 0.775 for males and 3.019 for females. Our results show that male and female individuals have different dispersal ability; male dispersal is longer, while females mostly move among very close habitat patches. These results suggest that isolated, but viable populations can avoid inbreeding, due to the longer movements of males, but recolonisation of isolated habitat patches can be rare.

792. ENDANGERED SPECIES INDICATE THE PRESERVED CONSERVATION VALUE OF ABANDONED WOODED MEADOWS

Otsus, Merit, Estonian University of Life Sciences, Estonia

Being extremely diverse habitats the calcareous wooded meadows contribute significantly to Estonian floral diversity. Their high diversity persists only due to regular mowing. The main obstacle to their conservation is the failure to provide such management and relates to complicated socio-economic issues. This limited conserving capacity brings along the need for good understanding of the conservational contribution of preserving or restoring of a particular stand. We claim that identifying the endangered species and considering their status deserves more attention than dealing with the general species richness concept. We analysed distributions of vascular plants in 27 differently managed wooded meadows (managed, unmanaged, with restored management). More than 50% of species of managed meadows underwent either extensive or slight decrease in distribution in unmanaged stands. Out of these species we regarded those to be the most vulnerable which remained rare also in restored meadows. They make 25% out of all the decreasing species. Presence and richness of these species is an argument for preserving or restoring a meadow. In recently (<10 yrs ago) abandoned stands several vulnerable species evidently are already lost. However, their richness of vulnerable species was still high enough to point to the high restoration value.

793. LIMNOLOGY AND ECOLOGY OF THE TRANSBOUNDARY TURKISH SODA LAKE (LAKE AKTAS)

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Lake Aktaş is a small, shallow, soda lake located between Turkey and Georgia. During the limnological survey, conductivity, pH, dissolved oxygen, turbidity, NO3-N, NH4-N, TP, SRP, Silicate, major anions (Cl-, SO4--, HCO-3, CO-3) and cations (Ca++, Na+, Mg++,K+), total chlorophyll, phytoplankton, zooplankton and macrophytes were determined in the lake. Physico-chemical variables indicate that the lake is oligotrophic-hypereytrophic and alkaline. The phytoplankton composition of Lake Aktaş consists of Cyanophyta, Chlorophyta, Euglenophyta, Bacillariophyta, Cryptophyta, Dinophyta and Chrysophyta. On the other hand the zooplankton composition of the lake consists of Copepoda, Chladocera and Rotifera. In ecological study the effects of common carp (*Cyprinus carpio*) on water transparency, chlorophyll a, macrophyte, phytoplankton and zooplankton densities, and nutrients were examined during six weeks period using enclosures. Four fish-free and four fish enclosures were constructed in the lake. Fish enclosures contained approximately 1000 kg/ha-1 of common carp. Physico-chemical and biological variables of the lake were measured at the start and at the end of the experiment. Common carp caused significant increases in tubidity and chlorophyll a levels, decreases in macrophyte density. Carp had no effect on total phosphorus, nitrate, or ammonium.

794. DEMOGRAPHY AND HABITAT SELECTION OF ANATOLIAN MOUFLON IN KONYA BOZDAG PROTECTION AREA

Ozdirek, Lutfiye, Middle East Technical University, Turkey; **Ozut, Deniz**, Middle East Technical University, Turkey; **Durmus, Mustafa**, Middle East Technical University, Turkey; **Kence, Aykut**, Middle East Technical University, Turkey

Anatolian mouflon is endemic and one of the vulnerable status ungulate species of Turkey fauna, protected in Konya-Bozdag region located in Central Anatolia. One of the main concerns in wildlife studies is the assessment of the population structure which mainly consists of distribution and abundance of the wild ungulates. In this study, distance sampling techniques are used to estimate the population density, the population size and the rate of population change of Anatolian mouflon (*Ovis gmelinii anatolica*). The estimation techniques use sex, age and count data of the mouflon. The sex, age, and count data employed in this study is collected throughout random line transects from May 2007 to February 2009. The distance sampling method is preferred since it requires less effort with being less expensive when compared to the complicated techniques that need animal marking or radio tagging. In the full poster, the population structure and habitat use of Anatolian mouflon according to age and sex, the biogeographic structure of area, flora and vegetation, and seasonal information will be presented.

795. RECENT NUMBERS OF BLACK STORK IN UKRAINE

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Black Stork is a rare and threatened Red data book species in Ukraine. Its last census was conducted 17 years ago. The estimation of modern state of Ukrainian population of Black Stork as an indicator of human impact on ecological systems is very important. As a result of the 3rd all-Ukrainian census in 1990-91 the number of this bird can be estimated 300-350 pairs as minimum. In order to clarify the modern state of the population the 4th census was organized by Bird Conservation and Study Society of Ukraine in the country in 2008. The information on bird and their nests dislocation has been gathered with questionnaires mainly. The collected data were checked selectively. According to the preliminary data the increasing of Black Stork numbers and enlargement of its breeding area in the country in comparison with the previous census are recorded. In some regions, it increased in 2-4 times. The main reasons of such changes are the species adaptation to transformed environment and stork conservation. To our mind, the numbers of Black Stork is 400-500 pairs now. It means that Ukrainian population as well as all-European one is increasing slowly.

796. STUDIES OF MINUARTIA SMEJKALII – CONNECTION BETWEEN SCIENTIFIC APPROACH AND PRACTICAL CONSERVATION

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Many species are recently endangered due to human activity. In Europe, the most endangered species are protected within NATURA 2000. One of these species is *Minuartia smejkalii*. In the 1960's the localities of this endemic species were partly destroyed by motorway and water reservoir and the species has currently about 500 individuals only. In spite of the general interest about the species, we still know very little about its population biology and ecology and thus do not know what the best techniques for conservation of the species are. To study population dynamics we map individuals in permanent plots, measured their size, flowering and seed production. We also study seed bank and germination. The maps were analyzed in GIS and allow distinguishing between plants arising generatively, vegetative or from dormant plants. We used the data to construct transition matrices. On all localities we also measured amount of litter, shading and vegetation composition. Our results show high differences between growth rate and percentage of flowering stem between populations: plants occurring on shaded sites with high occurrence of mosses or grasses have lower fitness. Therefore we suggested removal some trees from these localities and turf removal as the best management actions.

797. POPULATION DYNAMICS OF THE THREATENED ENDEMIC TAXON OF CYPRUS FLORA *ASTRAGALUS MACROCARPUS* DC. SUBSP. *LEFKARENSIS* AGERER-KIRCHOFF & MEIKLE

Paraskeva-Hadjichambi, Demetra, University of Cyprus, Cyprus; **Arianoutsou, Margarita**, University of Athens, Greece; **Georghiou, Kyriakos**, University of Athens, Greece

Astragalus macrocarpus DC. subsp. *lefkarensis* Agerer-Kirchoff & Meikle is one of the 17 Cyprian plant species of Community priority. Population dynamics of this vulnerable endemic species, aiming to its conservation, was studied. Six populations were found, all in Mediterranean habitats. A detailed census was carried out in permanent plots in three populations covering 30% of the total population. In addition, a monitoring plan has been elaborated and applied in the field for three consecutive years. From the morphometric characteristics studied, the number of stems seems to describe more accurately the developmental stages of studied plants. Individuals were classified into four classes: Seedlings (class 1), representing an important percentage of the population. Among them, few pass in the next phase (class 2-small non reproductive plants) which also present low rate of survival in all regions. Individuals that survive until the next phase (class 3-young reproductive plants) have low rate of mortality and they pass easily to the fourth class (class 4-reproductive plants), showing the lowest mortality. Given the high mortality of seedlings and of the small–sized reproductive individuals as well as

the minimal increase recorded in the total number of individuals, a trend of ageing in populations can be postulated.

798. CHILDREN'S CONCEPTIONS FOR HUMAN IMPACTS UPON THREATENED PLANTS

Paraskeva-Hadjichambi, Demetra, University of Cyprus, Cyprus; **Korfiatis, Kostas**, University of Cyprus, Cyprus; **Ch. Hadjichambis, Andreas**, Cyprus Center for Environmental Research and Education, Cyprus; **Arianoutsou, Margarita**, University of Athens, Greece

Many plant species all over the world are being threatened by a variety of factors most of which are associated with anthropogenic factors. Research on student's ideas reveals that children are unable to realise that many anthropogenic pressures constitute threats for plants often leading them to extinction. This study explores children's conceptions about human impacts on threatened plants, their perception on the source of influence and its impact upon a threatened plant population. Structured, individual interviews of 60 students of upper elementary school were used. Anthropogenic influences were mostly reported, however in most cases children did not realize how human actions and decisions may affect natural systems, their interacting components and people. Many real threats were indicated as of neutral influence. When an influence was revealed as a threat, children tended to overcome the threat by giving positive dimensions to human presence by valuing human actions more important than plant conservation. Conservation of threatened plants is a complex issue and is inevitably underpinned by overlapping scientific concepts and values. It is important to be included in science curriculum, aiming to provide opportunities for students to identify and understand the sources and the consequences of human impacts upon threatened plants.

799. SPATIAL STABILITY AND SEASONAL DYNAMIC OF HIGHER PLANTS COLONIZING VERTICAL CLIFFS FROM HILLY ROMANIAN GORGES

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In the hilly area of Romanian Carpathians, Prahova and Doftana inner rivers form gorges (Breaza and Doftana) with massif vertical cliffs cut in Inferior Miocene conglomerate with important role in vegetation differentiation. Following the inventory of higher plant species from the areas, it have been analyzed the colonization of slopes with different expositions and the role of vegetation in substrate spatial stability. The diversity of plant species is higher on slopes with increased degree of degradation. Species seasonal dynamic is high due to substrate low stability and high dynamic of climatic factors in both areas. The plant species adapted to the saxicolous conditions can be met here, but also species from other areas that develop growth strategies for resisting on the cliffs. In Breaza gorges, the plant community is formed mainly from herbaceous species having higher species diversity than Doftana gorges where plant community is formed mainly by shrubs. The spatial stability of the substrate is higher in Doftana, the shrubs species developing special growth strategies stabilizing the substrate. Our studies bring an important contribution regarding plant diversity and dynamic, special areas conservation and practical management strategies.

800. CHALLENGES AND PATHWAYS OF SHRIMP AQUACULTURE IN BANGLADESH TOWARDS SUSTAINABILITY

Paul, Brojo Gopal, University of Natural Resources and Applied Life Sciences, Austria; **Waidbacher, Herwig**, University of Natural Resources and Applied Life Sciences, Austria; **Vogl, Christian Reinhard**, University of Natural Resources and Applied Life Sciences, Austria

The booming expansion of shrimp aquaculture in Bangladesh has been advanced due to suitable agro-climatic zone; vast water resources; involvement of multinational corporations and international donor agencies; and cheap labour forces. Undoubtedly, indeed shrimp aquaculture provides immediate economic benefit and generates employment across fry collectors to exporters which can effectively contribute to poverty reduction and food security. However, the fastest growing shrimp aquaculture has been facing significant socio-economic and environmental challenges that hinder the sustainable development of the thriving sector. The environmental impacts include mangrove degradation, ecological imbalance, pollution, displaced traditional livelihoods and outbreak of diseases. Management practices are confronting many obstacles regarding planning, seed supply, irrigation facility, water quality, capital mobilization and environmental protection. This review paper is addressing current issues of shrimp aquaculture in Bangladesh for well understanding and seeking careful consideration towards sustainability through surfing several research articles. The paper provides insight overview of shrimp aquaculture posing major challenges associated with risks through evaluating the environmental and socio-economic impacts. The review article indicates it can elevate people's mobilizations against shrimp industry because local land owners are forcibly evicted. It concludes with policy implications and pathways for shrimp aquaculture which can contribute to develop strategies towards sustainability.

801. IN VITRO CONSERVATION OF ROMANIAN ENDEMIC PLANT SPECIES *CAMPANULA ROMANICA* SAVUL.

Paunescu, Anca, Institute of Biology, Romanian Academy, Romania

The loss of plant genetic resources has made necessary the development of new ex-situ conservation methods. Among the tools of modern biotechnologies tissue culture is being increasingly applied to complement other in-situ or ex-situ methods. Within the Institute of Biology from Bucharest, several in vitro techniques have been developed, with recent establishment of endangered plant tissue culture collections. Techniques for efficient clonal multiplication and establishment of an in vitro collection of *Campanula romanica* germplasm were developed. Direct regeneration was obtained on Murashige and Skoog (MS) medium, supplemented with 0.1mg/l NAA (1-naphthylacetic acid) and 1mg/l BAP (6-benzylaminopurine). The established protocols offer a valuable alternative ex situ conservation method for this vulnerable endemic and could be useful also for conservation of other endangered *Campanula species*.

802. PHYLOGEOGRAPHY OF THE FIELD VOLE (*MICROTUS AGRESTIS*) IN THE IBERIAN PENINSULA

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Recent studies on the phylogeography of field voles in Eurasia, based on the analysis of mitochondrial DNA and X and Y chromosome, have documented the existence of two highly divergent lineages and suggest that these represent two species with southern and northern distributions in Europe. In addition, it has been demonstrated that within the Iberian Peninsula, the southern lineage has two mtDNA subphylogroups, suggesting that this species may have had two glacial refugia in Iberia. Available data suggests that one of these presents a limited distribution restricted to central Portugal. This work aims to study the distribution, genetic diversity and differentiation of the Portuguese sublineage of field voles. To accomplish this, tissue samples were collected in several locations in Iberia. Mitochondrial (1140bp, cytochrome b) and nuclear markers (two X, 653bp, and two Y, 1136bp, chromosome introns) were amplified and sequenced. All mitochondrial and nuclear genes analysed present concordant results and differentiate the two groups previously identified in Iberia. Additionally, the distribution of the subphylogroup that was thought to be restricted to Portugal is wider, going from central Portugal to Galicia in northern Spain. This seems to be a relict and cryptic population, not identified until now by morphology or karyotype.

803. EFFECT OF CESSATION OF CUTTING AND FERTILIZATION ON PLANT SPECIES COMPOSITION IN AN UPLAND MEADOW

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The effect of the management on dynamics of plant species composition was studied in an upland grassland in the Jizerské Mountains. Experimental management consisted of three (1993-96) or two (1997-99) cuts and four different rate of fertilizers: Co) control without fertilizers, PK) 30 kg P + 60 kg K.ha-1.year-1, N1PK) 90 kg N (1993-96) or 60 kg N (1997-99)+ 30 kg P + 60 kg K.ha-1.year-1, N2PK) 180 kg N (1993-96) or 120 kg N + 30 kg P + 60 kg K.ha-1.year-1. In 1999 the experiment was abandoned and all management (cutting with biomass removing and fertilisation) was finished. F. rubra the dominant grasses in all treatments at the beginning of the experiment was strongly suppressed by the highest dose of fertilizer (N2PK) during 1993-96. However after abandonment F. rubra increased cover up to 70% regardless treatment and dominated in all swards. Higher dose of fertilisers was favourable for *Alopecus pratensis*. Abundance of *Agrostis capillaris* reflected applied fertilization (Co>PK>N1PK>N2PK) and as well as defoliation management (3 cut>2 cut>0 cut). The RDA analyses revealed that after three years after cessation of fertilization and defoliation increased uniformity of grassland communities with previously differing species composition arising from different fertilization.

804. DETERMINATION OF SUITABLE MANAGEMENT FOR MOUNTAIN HAY MEADOW IN NATURE RESERVE IN THE JIZERSKÉ MTS

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The aim of this study was to identify changes in mountain hay meadow (union Polygono-Trisetion) when management ceases. Ten permanent paired plots were established in 1999 in nature reserve Bukovec in protected landscape area in the Jizerské Mts. Apart of plant species composition in mown plots and abandonment control plots there were studied changes of sward height and changes in proportion of vegetation functional traits. The mean height of vegetation and height of *Cirsium heterophyllum* as well as the number of flowering plants of *Cirsium heterophyllum* and *Hypericum maculatum* significantly decreased on mowing plots during the experiment. The proportion of grasses (both tall and short) significantly increased and overall herb cover decreased in mowing treatments. However, mowing significantly reduced abundance of tall herbs, whereas significantly promoted cover of short herbs. There was revealed different strategy type of presented herbs and grasses under applied treatments (mowing and abandonment). Proportion of C strategy type of grasses and CS and CSR strategy type of herbs significantly increased on abandonment plots whereas proportion of C strategy of herbs and CSR strategy of grasses significantly increased on mowing plots. Cover of CS strategy type of grasses did not change during the experiment.

805. FAVOURAVBLE CONSERVATION STATUS AS A BASE FOR NATURA 2000 SITES MANAGEMENT PLANNING IN POLAND

Pawlaczyk, Pawel, The State Council for Nature Conservation, Poland

After some years of experiments, management planning system for Natura 2000 sites was established in Poland. Management plans for Natura 2000 sites will be prepared using participatory approach, in a process of discussion and collaboration with all stakeholders. But the backbone of the planning process is the concept of Favourable Conservation Status of targeted habitats and species – used on the local level and defined as set of parameters and indicators, similar as parameters and indicators used on the level of state or biogeographcal region. The concept of FCS is used on the site level – the FCS for each habitat and species in particular Natura 2000 site will be defined in a measurable way. The plan objectives will be established as “adequate step to achieving FCV favouravble”. The parameters and indicators of FCS are crucial for that system. For some species and habitats, national propositions of lists of parameters was prepared during the pilot monitoring projects; for other species and habitats will be prepared soon. In a planning process, the “national” parameters may be adopted to local conditions. More than 300 management plans for Natura 2000 sites are expected to be prepared, using this model, in the next three years.

806. PAST, RECENT AND FUTURE THREATS OF EUROPEAN MUDMINNOW (*UMBRA KRAMERI*) IN SLOVAKIA

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European mudminnow (*Umbra krameri*) occurs in three regions in Slovakia. The smallest one is the Western Slovakia Lowland, covering mainly the populations from reintroduction project, and recently a very low population of native European mudminnow was rediscovered. The second region is situated to the former area of Danube inland delta, where the population status is the most favourable in Slovakia. Eastern Slovakian Lowland is the third region, where the European mudminnow distribution was limited between the Latorica, Bodrog and Tisza Rivers. Recently, only a few populations with low density are distributed here. Comparing with the past, water management modifications resulted in substantial changes in their distribution and population density. Moreober food and space competitions and predation risks of invasive *Perccottus glenii* and *Ameiurus melas* decrease their populations. The successful introduction of European mudminnow to Western Slovakia led to its introduction to the lower sections of Dyje River floodplain area in Czech Republic. We analysed the major environmental correlations for the European mudminnow occurrence in inland Danube delta for the purposes of European mudminnow biotopes rehabilitation. Environmental management of these sites can increase its population stability. In this case, the pilot project of European mudminnow rehabilitation was realised in Slovakia. The study was supported by the projects of Slovak Grant Agencies VEGA (no. 1/0352/08) and APVV (no. 0154-07).

807. THE DISTURBANCE EFFECT OF NEW SKI SLOPES ON THE NATURAL VEGETATION OF MÁTRA MOUNTAINS, HUNGARY

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Skiing is a popular sport also in Hungary although the highest mountain, Kékes is only 1015 m above sea level. The poster shows the effect of skiing on the habitats of Kékes. During the examination the list of plant species was recorded on 3 chosen ski slopes 3 times in a year. The conservational values of the species were determined and the percent distribution of the categories was calculated. The results of the observation give important data of the populations of rare and protected species in the area, like *Gentiana cruciata, Lycopodium clavatum* and *Botrychium lunaria*. The danger of the mistakes in treatment like using snow cannon is that the permanent snow cover keep the seeds of weed species in dormancy and protect sensitive seeds from frost and cold. The weed corridor has formed on the southern ski slope and the data of the two-year examination show the increase of weed and invasive species like *Erigeron canadensis, Calamagrostis canescens, Artemisia vulgaris*. On the basis of the collected data an offer will be given to the competent firm to prevent the Kékes area from degradation and from the invasion of weeds.

808. EURASIAN OTTER (*LUTRA LUTRA*) IN THE SLOVAK REPUBLIC (RESULTS OF NATIONAL MAPPING)

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In winter 2007/2008 was realized one-off otter mapping on the whole Slovak territory. The aim of this mapping was to obtain data for the Atlas of Slovak mammals, assessment of conservation status and activities of the otter and correction in favourable reference range. The mapping was carried out with modified standard IUCN methodology. The Databank of Slovak Fauna (DFS) grid was used as reference. Results were obtained from 275 DFS quadrates (64,1 % out of 429 DFS quadrates). Positive (with occurrence of otter) were 259 quadrates (94,2 % out of controlled quadrates; 60,4 out of all quadrates) and negative were 16 quadrates (5,8 %; 3,7%). The recent otter distribution covers whole river basins of the Hron, Ipeľ, Slaná, Hnilec, Hornád, Poprad and Dunajec rivers and upper streams of river Váh and rivers Nitra, Torysa, Cirocha. The survey was not realized in upper streams of the Topľa, Ondava and Laborec rivers and in the middle part of the Váh, Nitra, Morava and Malý Dunaj river basins. In this catchments the second one-off mapping was carried out in winter 2008/2009. Results were obtained from 54 DFS quadrates (61,1 % out of 429 quadrates). Positive were 33 quadrates (61,1 %; 7,7 %) and negative were 21 quadrates (4,9 %; 38,9 %). Results of this mapping were included in a preparing Management plan for the Otter in the Slovak Republic.

809. CONSERVATION EDUCATION AT THE FACULTY OF ENVIRONMENTAL SCIENCES, CULS, PRAGUE

Sklenička, Petr, Faculty of Environmental sciences, Czech University of Life Sciences, Prague, Czech Republic; **Zasadil, Petr,** Faculty of Environmental sciences, Czech University of Life Sciences, Prague, Czech Republic; **Bejček, Vladimír,** Faculty of Environmental sciences, Czech University of Life Sciences, Prague, Czech Republic

A new MSc. study discipline called “Nature Conservation” was prepared at the Czech University of Life Sciences, Faculty of Environmental Sciences in the year 2009. Teaching of this discipline will be commenced in October 2009 and it is planned simultaneously in Czech and English language. The study is for two years and it covers a broad range of subjects from Conservation Genetics, Animal and Plant Ecology and Conservation, over Ecosystems Management and Conservation, Protected Areas Management, Biomonitoring, EIA, right to Landscape Planning, River Restoration, Forest Management, etc. There are also included subjects focused on Conservation Economics, Conservation Policy, Legislation, Education and subjects explaining GIS, Statistics and Data Assessment or Science Methodology. Also the offer of optional subjects is large. This discipline represents a new direction in teaching at CULS. Successful graduates can find a wide fulfillment both at scientific field and practical protection of environment or they can continue with studies in one of several PhD. study disciplines, which are offered by the faculty. The study discipline is open even for foreign students, either for completing the whole study or for a study staying in duration of 1 or 2 semesters, which are offered within exchange student programmes, e.g. Erasmus.

810. PREDATION RISKS ON BIRD NESTS IN FRAGMENTED SUBURBAN LANDSCAPE

Suvorov, Petr, (1) Czech University of Life Sciences Praha, Faculty of Environmental Science. (2) Zoo Praha, Education Department, Czech Republic; **Pětníková, Monika,** Czech University of Life Sciences Praha, Faculty of Environmental Science, Czech Republic; **Šálek**, **Miroslav** Czech University of Life Sciences Praha, Faculty of Environmental Science, Czech Republic

The influence of landscape fragmentation on birds´ populations is frequently discussed ecological theme. Fragmentation divides the landscape to patches which can create isolated habitat islands. Fragmented landscape can provide higher resource supply for birds but also for nest predators. Nest predation in such areas then can increase. Higher nest predation at the boundary zones between the fragments and adjacent habitats is termed the edge effect. With decreasing fragment area the predators may penetrate deeper inside extending then the edge effect. The aim of this study was to examine whether the nest predation level increases with decreasing patch area and whether is influenced by the surrounding landscape heterogeneity. Artificial nests with two hen eggs were installed in couples in 53 chosen ruderal fragments at the border of Prague (exposed for two weeks). Nest predation achieved 65.1 %. Forty eggs indicated predation marks (65.1 % birds, 30.23 % mammals). We found no significant relationship between nest predation risk and either patch area or heterogeneity of the surrounding landscape. Edge effect was not confirmed but elevated interior nest predation inside the fragments in more homogeneous landscape was detected. Our results support other findings that are important to investigate studied factors in wider scale.

811. THE IMPACT OF UNGULATES VARIES ACROSS FOREST TYPES – EXPERIENCES FROM 16 YEARS OF MONITORING

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The large herbivores may influence biodiversity in both positive and negative ways depending on the forest type. The vegetation development in dependence on game impact was studied in three pairs of fenced and unfenced plots in oak-hornbeam, thermophilous oak and beech forests for 16 years. In all enclosures, there was significant tree and shrub rejuvenation contrary to the unfenced area, where this process was blocked due to the high game stocks. In all enclosures, the beta diversity of herbs significantly decreased. The most pronounced changes passed in the oak-hornbeam enclosure, where shrub layer strongly developed while cover of herb layer sharply decreased. In unfenced plots in thermophilous oak and beech forests, the development of invasive and other nitrophilous species were supported by game. However, the temporal changes in species composition in the beechwood were not significant. The game can maintain oak-hornbeam and thermophilous oak forest stands open and support light-demanding, often rare plant species. Thus, to control game density should be considered based both on the environment (e.g. feed supply for ungulates) and goals of nature conservation.

812. THE EFFECTS OF LANDSCAPE ENHANCEMENT AND LOCAL MANAGEMENT ON FARMLAND BIODIVERSITY

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The European Union has recognized the need to counteract the negative effects of modern agriculture on the environment, and has introduced agri-environment schemes for the benefit of particular habitats and species. England has adopted the Environmental Stewardship (ES) scheme which includes specific options targeted at a range of valued farmland taxa. However, the effects of these options have not been evaluated at the landscape and farm scale. This project compares the effects on biodiversity of conventional intensive arable farming under cross compliance with: (i) typical ES option uptake; and (ii) enhanced and targeted ES option uptake using a farm-scale (1000 ha) randomised block experiment. Our results show that over a three year period the effects on (i) habitat quality and food resources, and (ii) the abundance, diversity and population dynamics of key farmland taxa (breeding birds, small mammals, and key pollinators) were significantly enhanced by both targeted local management and enhancements at the landscape scale.

813. THE EUROPEAN HEDGEHOG (*ERINACEUS EUROPAEUS*): TICK INFESTATION AFFECTING CONSERVATION GOALS?

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In the last years parasite infections of wild animals have become of more and more concern for conservation biology. The European hedgehog (Erinaceus europaeus) is a common and popular component of the local fauna throughout Western Europe and southern Scandinavia where its protection is ensured by law. Hedgehog populations are in decline but the critical factors influencing their dynamics, including parasite infections, remain unclear. We compared the intensity of tick infestation on European hedgehogs with blood parameters potentially associated with host morbidity and mortality. Our study was conducted in 2007 and 2008 (March-October) on a experimental hedgehog population inhabiting a natural garden habitat in which they became naturally infected with ticks. Our results indicate that tick induced blood loss causes haemorrhagic regenerative anaemia. In cases of high infestation levels the effect is pathological and leads the hedgehog to divert resources away from normal maintenance activities and potential reproduction to produce new blood cells. Under certain circumstances, such as hibernation this may lead to mortality. Additionally, it is possible that synergistic effects between parasite species such as immunosuppression by ticks, may increase the pathogenic effect of the tick species under natural conditions.

814. THE NEW NATURE-EXPERIENCE AT THE ZOO VIENNA

Pfistermüller, Regina, Zoo Vienna, Austria; **Wampula, Thomas**, Zoo Vienna, Austria

Finding that zoo visitors often know more about "exotic" animals than they know about their local species lead to creating a new nature experience with a focus on endangered local species. Starting within the forest, a path high up within the treetops allows visitors to see local bird species up-close. From this perspective, one can also feel like a raptor trying to spot prey items on the forest ground. Moving forward, local amphibians, reptiles and insects are displayed within structures made to attract those animals naturally as well. The path ends in a series of large aquaria showing different Austrian aquatic ecosystems, such as the Alpine creek, the Danube, and its slow moving anabranches with its former typical species, such as Brown trout, Grayling, the Danube salmon, the Starry sturgeon, or the Beluga. Connected to this is a breeding program of the meadow viper and the European mudminnow. Together with the Environmental department of Vienna not only a series of local endangered species along this path are described, but also throughout the entire zoo, such as the green toad spawning within the pond of the tiger enclosure or the Aesculapian snake found throughout the zoo.

815. ANALYSIS OF SPATIAL BEHAVIOUR OF TRANSLOCATED BROWN BEARS (*URSUS ARCTOS*) IN PYRENEES

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In the framework of the conservation plan of the French State for brown bear, 5 adult brown bears, 4 females and 1 male, were captured in 2006 in Slovenia and released in the Pyrenees Mountains, France. Each bear was fitted with a GPS/GSM collar and monitored from release to den entrance. Firstly we describe the dynamic of spatial behaviour from the evolution of home range after release, the distance between successive locations and the analysis of trajectories with intensive monitoring (1 location/10 mn) during 24h periods. The successive home ranges computed with Kernel method show a strong increase after release and then stabilize, except for one individual who died 3 months after release. The mean distance and the mean speed computed between successive locations differ significantly for each bear between the explanatory period and after this period. In a second step a simple model of movement of bear according the principle of cellular automats is carried out to investigate the mechanisms underlying the spatial behaviour observed. The model is based on a memory and random process.

816. INFLUENCE OF THREE NON-INDIGENOUS SPECIES IN OTTER DIET IN A PORTUGUESE WETLAND

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The otter *Lutra lutra* (Carnivora: *Mustelidae*), presents a wide distribution in Portugal, making this country a major stronghold for its conservation. In this study we proceeded to temporal evaluation of otter feeding ecology in a Portuguese wetland, comparing its diet before and after the introduction of three exotic species: red swamp crawfish (*Procambarus clarkii*), pumpkinseed sunfish (*Lepomis gibbosus*) and largemouth bass (*Micropterus salmoides*). Spraints were collected during 13 months and analysed. The identification and quantification of food items, regarding prey Relative Frequency of Occurrence, show 71.8% of crustaceans, 27.5% of fish and 0.7% of amphibians, small mammals and passeriformes. Principal Component Analysis suggests otter preference for fish, particularly, the European eel (*Anguilla anguilla*), the pumpkinseed sunfish (*Lepomis gibbosus*) and the barbel (*Barbus bocagei*). Beside the fact that the introduced species became important prey items (mainly due to its high abundance), they practising a negative impact on the presence of amphibians and other native species, such as, the three-spine stickleback (*Gasterosteus gymnurus*), an endangered species in Portugal. The strong presence of the non-native species leads to a remarkable decrease of native species as shown by data from the comparison of otter diet before and after the exotic species introduction.

817. CHEMICAL ECOLOGY OF BURYING BEETLES (COLEOPTERA: *SILPHIDAE*)

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Our work is focused on the chemo-ecology of burying beetles (Coleoptera: *Silphidae*: *Nicrophorinae*) in agricultural landscape, important group of carrion beetles attracted by small vertebrate carrions. We have identified the following volatile organic compounds emitted from small carcasses: methanethiol, dimethylsulfide, dimethyldisulfide, dimethyltrisulfide and S-methyl thioacetate. We tested the response of burying beetles to the volatiles in a series of behavioral tests in the olfactometer and tested dose-antennal response relationships using electroantennograms. The laboratory observations have been tested in a series of field pitfall traps experiments. Our preliminary results of laboratory and field studies show different preferences for infochemicals among Nicrophorus vespillo and N. vespilloides, and also a sex-biased response to these volatile compounds. We focus ourselves on the ability of carrion beetles to detect the carcass in an early stage of decay, by installing pitfall traps with mice carcasses of different stage of decay. Our preliminary results support the theory of early carcass detection. However, older carcasses (3 days after death) have attracted significantly higher number of beetles. The details of chemical cues detection in carrion beetles needs further research.

818. MSC PROGRAMME "BIODIVERSITY MANAGEMENT AND RESEARCH"

Prof. Zeller, Ulrich, Chair of Systematic Zoology, Humboldt Universität zu Berlin, Germany; **Goettert, Thomas**, Leibnitz-Institute for Research on Evolution and Biodiversity at the Humboldt Universität zu Berlin, Germany

Since 2005 our interdisciplinary two year MSc programme on "Biodiversity Management and Research" has successfully and jointly been offered by the Humboldt University Berlin and the University of Namibia (UNAM). A high academic and organisational level was reached by this MSc programme that in this form is new to UNAM and which enables participation in PhD programmes anywhere in the world. The declared goals are to communicate the scientific principles of biodiversity research and to integrate these in applied projects that benefit the conservation efforts of the respective country. Numerous graduates of the MSc programme have by now obtained high ranking positions of government agencies and ministries

in several countries of the South African Development Countries (SADC) region. The MSc programme comprises the research fields of biological systematics, ecology and nature conservation. In the focus of the programme are topics regarding the measurability and assessment of biodiversity and the effect of the different forms of land use on complex ecosystem relations such as contrasts of land use, fringe effects, and comparisons of ecosystems that are relevant to the establishment and development of protected areas (buffer zones, wildlife corridors, transnational network).

819. INTROGRESSION FROM *LAGOPUS LAGOPUS* TO *LAGOPUS MUTUS*: A CONSEQUENCE OF NICHE EXPANSION?

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Willow grouse (*Lagopus lagopus*) and rock ptarmigan (*Lagopus mutus*) are galliform gamebirds inhabiting arctic tundra, boreal forests, and subalpine vegetation with circumpolar distribution. Although morphologically similar and to some extent sympatric, rock ptarmigan prefers higher elevations and more barren habitat. Willow grouse populations are bigger and have a continuous habitat whereas rock ptarmigan shows a patchy distribution restricted to higher altitudes. Both are extremely popular hunting species, what arises the need of knowledge about effective population size, genetic diversity or amount of inbreeding to perform an appropriate management of the populations. Individuals with intermediate morphological characteristics between both species were found in central Sweden in rock ptarmigan habitat. Genetic analyses using microsatellite markers and mtDNA confirmed the hybrid condition of those specimens. In addition, simulations performed with HYBRIDLAB 1.0 and further analysed through assignment tests hint that these individuals might be the result of a backcross between *L. mutus* and the F1 *mutus x lagopus*. This scenario of introgression from willow grouse into rock ptarmigan might imply a threaten to the genetic identity of the later one. The expansion of *L. lagopus* niche in the context of global warming could be advocated as one of the causes of this phenomenon.

820. PREPARATION OF NATURA 2000 PROPOSAL AND CONSULTATION PROCESS IN CROATIA

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Preparation of the NATURA 2000 proposal is responsibility of the State Institute for Nature Protection as a central institution for expertise work of nature conservation in Croatia. To date, 1099 of pSCIs have been identified, covering 25.67% and 38 SPAs covering 39.05% of Croatian territory. The NATURA 2000 proposal has been prepared through several phases, based on the best available scientific data and expert knowledge. The first phase comprised collecting and processing of relevant data from scientific institutions, individual experts and NGOs in the scope of LIFE III CRO-NEN project (2003-2005) and the EEA/Council of Europe "Emerald Network" project (2006). The second phase involved coordination of the new field researches financed through the state budget (2006-2008). The third phase, which is now undergoing in the scope of PHARE 2005 project "Implementation of NATURA 2000 in Croatia", encompasses the consultation process with all relevant stakeholder groups. The main purpose is to inform all those potentially interested in NATURA 2000, what it is and how it will work in practice, and to give people opportunity to comment on the selection of sites. After the consultation process is finished, the revised list of potential sites will be sent for government approval before being submitted to the European Commission.

821. NATURE CONSERVATION BY CONTRACT IN ROMANIA: POSSIBILITY TO PROTECT CULTURAL LANDSCAPES AND THEIR BIODIVERSITY

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Romania like other southeastern European countries still harbors many traditional rural regions characterized by diverse landscapes and species-rich open-land ecosystems. The preservation of these semi-natural habitats is a challenge for nature conservancy especially because of the recent land use changes, including both intensification and land use abandonment. One solution could be nature conservation by contract. Within this integrative conservation strategy farmers are paid for extensive land use, connecting protection of natural resources with economic benefits for rural regions. Our interdisciplinary project aims at the exemplary and participatory introduction of nature conservation by contract based on an analysis of vegetation, important faunistic groups and environmental factors. The study site named Hills of Cluj, a part of the Transylvanian highlands (North-West Romania), is characterized by a mosaic of steppic, mesophytic and wet grasslands, containing numerous Natura 2000 species and habitats (e. g. *Maculinea* spp., *Iris* spp, litter meadows, etc). We present preliminary results of the study site survey and possible integrative conservation measures.

822. THE CREATION OF NEW ARTIFICIAL LAKES AS A MITIGATION MEASURE FOR BATS

Ralf, Gyselings, Research Institute for Nature and Forest, Belgium; **Geert, Spanoghe**, Research Institute for Nature and Forest, Belgium; **Erika, Van den bergh**, Research Institute for Nature and Forest, Belgium

The border of the Antwerp harbour, lying in a Natura 2000 area, contains several artificial lakes that are important for many species protected under the habitat and birds directive, including birds, Natterjack toad and bats. A previous study indicated that the activity and the species diversity of foraging bats at these lakes are high compared to other regions in the neighbourhood. The harbour is in full expansion and some important lakes are planned to disappear. However, as a compensation for birds, new big lakes have been created recently. We examined the use of these new lakes by bats by counting bat passes with bat detectors. After two years all species of bats used the new lakes. Activity, however, depended on the landscape context. A new lake that was poorly connected to existing network of lakes, canals and tree rows showed lower activity than a well connected one. The activity over the well connected lake was comparable with the activity over an important old lake. We concluded that creation of new artificial lakes can effectively and fast act as a mitigation measure for bats, provided they are well embedded in the network of landscape elements that bats use for commuting.

823. POPULATION GENETIC STRUCTURE OF THE ENDANGERED TEHUANTEPEC JACKRABBIT (*LEPUS FLAVIGULARIS*) IMPLICATIONS FOR ITS CONSERVATION

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The Tehuantepec jackrabbit (*Lepus flavigularis*) is an endangered species restricted to a small area in the Isthmus of Tehuantepec in Oaxaca, Mexico. Despite its risk of extinction, little is known about genetic structure and diversity among its populations. To evaluate whether their populations are geographically genetic structured and show low levels of genetic diversity, we use a phylogeographical approach for 42 mitochondrial Control Region (CR-1) sequences representing the entire species range. Our results indicated two highly divergent lineages with an average nucleotide genetic distance of 3.7% (TrN) or 16 mutational steps. Clades A and B are geographically distributed in non-overlapping areas to the west and to the east of the Isthmus of Tehuantepec, respectively. Genetic diversity indices revealed reduced diversity in *L. flavigularis* when compared to other species of *Lepus* within main clades and within populations. This low genetic diversity coupled with the restricted distribution of the species to very small areas and the limited gene flow suggests that genetic drift has played an important role in the evolution of this species. Consequently, for conservation purposes populations included in clades A and B should be regarded as distinct evolutionary lineages.

824. CONSERVATION AND MANAGEMENT OF THE BROWN BEAR (*URSUS ARCTOS*) IN THE WESTERN CARPATHIANS

Rigg, Robin, Slovak Wildlife Society, Slovakia; **Adamec, Michal**, State Nature Conservancy of the Slovak Republic, Slovakia

The brown bear (*Ursus arctos*) in the Western Carpathians has recovered from the brink of extermination to c.800–900 individuals in a total area of 16,500 km2, mostly within Slovakia. Density averages c.5 inds./100 km2, reaching 11 inds./100 km2 in some core areas. Average annual growth rate since 1932 has been 4.5% per year. Numbers have continued to increase despite legal hunting of more than 1,300 individuals during the last 50 years. Restrictions on methods are very unpopular with hunters and are often blamed for a decline in harvest. We estimate the maximum sustainable yield at 8.5% p.a. (currently c.70 bears), whereas in 2000–2006 only 11–35 bears p.a. were shot. Damage to agriculture has been compensated since 1962 and seems to have decreased since the 1980s, probably due to reductions in livestock and beekeeping. However, conflicts can be locally significant and affect public opinion. We recommend improving prevention measures, including electric fences, livestock guarding dogs and bear-proof bins as well as raising awareness of bear safety. Slovakia has a substantial protected area network but degradation, fragmentation and loss of habitat could become important problems in the mid- to long-term due to road construction, increased traffic volume and development.

825. BREEDING AND PARENTAL CARE IN THE ENDANGERED TEHUANTEPEC JACKRABBIT (*LEPUS FLAVIGULARIS*): IMPLICATIONS FOR ITS RECOVERY

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For the first time we documented vital reproductive information of the Tehuantepec Jackrabbit (*Lepus flavigularis*), an endangered, endemic, and important economic species from Mexico. Between June 2006 and May 2008, 60 adult radio-collared jackrabbits were monitored in Santa Maria del Mar, Oaxaca. The breeding season lasted 250 days, with a high activity during the rainy season (May-October). Thirty-two days after copulation, females gave birth to 2±0.9 leverets, which were put in “beds” covered (99%) by grass (*Jouvea pilosa*). Females remained apart of their offspring, at distances of 20±9.1 m to 50±10.2 m. They returned for nursing and grooming once a day until weaning, 12±2.01d after birth. Females had an average of 2±0.5 litters per breeding season. Its breeding rate (4±1 leverets per female per breeding season) is low compared to other *Lepus* species, but the survival rate of these (50%) is bigger. The main predators of the leverets were the domestic dog (*Canis familiaris*) and the chirrionera snake (*Masticophis mentovarius*). The breeding temporality and parental care are similar to those of other *Lepus* species. Understanding the reproductive behavior of the Tehuantepec jackrabbit is critical for the success of captive breeding and reintroduction programs, and for it to achieve its recovery.

826. IN VITRO CONSERVATION UNDER SLOW GROWTH CONDITIONS OF *GYPSOPHILA PETRAEA* (BAUMG.) RCHB. AND *DIANTHUS CALLIZONUS* SCHOTT ET KOTSCHY

Rodica, Blindu, Institute of Biology, Romania; **Irina, Holobiuc**, Institute of Biology, Romania; **Monica, Mitoi**, Institute of Biology, Romania; **Florenta, Helepciuc**, Institute of Biology, Romania

In the last decade, a continue loss of plant diversity occurred, 22-47% taxa from World Flora being in serious decline. In this context, the ex situ conservation through biotechnology has an important role. The two species studied belonging to *Carryophillaceae* family were: *Gypsophila petraea* (Baumg.) Rchb., a subendemic species and *Dianthus callizonus* Schott et Kotschy, an endemic plant species in Romania. The aim of our study was to evaluate the behavior of the species in medium term preservation conditions (reduction of the carbon source, mineral concentration and low temperature). To establish efficient medium term conservation protocols is necessary to develop methods involving the reduction of phytohormons and to increase the subculture periods. The genetic stability of the in vitro preserved material being a pre-required condition. The evaluated parameters during 11 months were: the viability rate, lateral axillary and rhizogenesis rate. The biochemical analysis (spectra of SOD, POX, MDH, esterase, total proteins) did not show differences between the clones cultured on the same media variant. For the studied species, the slow growth conditions did not induced somaclonal variability. The physical factors changed the enzyme spectra. In vitro plant material can be maintained in medium-term collection and used anytime for repopulation programs.

827. INVASIVE SPECIES THREATENS THE ISLAND ENDEMIC GECKO *HEMIDACTYLUS NEWTONI*

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Hemidactylus newtoni is a nocturnal gecko endemic to the small (17km^2) Annobon Island, Gulf of Guinea. This oceanic island harbours several understudied vertebrate endemic species whose conservation status is virtually unknown. We studied the density, distribution and microhabitat selection of both *H. newtoni* and the invasive gecko *Hemidactylus mabouia*. We also estimated the distribution and intensity of rat predation on the endemic gecko. *H. newtoni's* tiny area of occupancy, coupled with its observed habitat loss to invasive gecko advance and with the high intensity of rat predation put this endemic species at high risk of extinction in the near future.

828. SYNERGIES BETWEEN AGRICULTURAL INTENSIFICATION AND COMMUNITY CHANGE

Rocha, Ricardo, Imperial College London, United Kingdom

The main aim of this work was to assess how the replacement of agroforestry systems, by more open agricultural practices affects bird São Tomé's birds abundance, diversity and distribution. Within the study landscape four different land-use types were selected: primary forest, shade coffee, shade polyculture and annual agriculture representing a gradient of agricultural intensity. Data on bird species was collected from May-July 2008 using different day repeated point counts. Species composition among different sites was explored using non-metric multidimensional scaling and linear models were used to assess the relationship between community composition, diversity, similarity to forest and abundance of different bird groups to landscape and local habitat variables. Species abundance and diversity change varied according to land use, with shade polyculture being the most species rich land-use type whereas the rainforest had the lower number of species. Abundance of most guilds also varied according to land-use type and the same was true for endemic and recently arrived species. Bird community composition of annual agriculture was found to be more distinct from native forest than any of the shade plantations and edge effects, local variables and landscape variables were found to impact upon bird distribution and abundance across the landscape.

829. PRELIMINARY ANALYSIS OF DISTRIBUTION AND FORAGING BEHAVIOUR OF LOGGERHEAD SEA TURTLE (*CARETTA CARETTA*) IN THE SHALLOW WATER OF FILICUDI ISLAND

Roscioni, Federica, Soc. coop. Monitoring Natural Resources, Italy; **Blasi, Monica Francesca**, Soc. coop. Monitoring Natural Resources, Italy

Few studies had been performed to assess fine-scale distribution and foraging behaviour of the Mediterranean loggerhead sea turtle (*Caretta caretta*). Since 2007 we implemented a project in the shallow water of Filicudi Island (Sicily, Italy). We analysed the data gathered in two summer section of field study (2007-2008) to evaluate the distribution of the species in relation to marine sub-optimal conditions in Filicudi Island. We used direct surveys combined with global positioning system (GPS) to track distribution of individuals. We divided the study area in a grid with a cell resolution of 1 km^2. The occurrence (presence/absence) was related to depth, standard deviation of depth, slope and distance to shore. Positive correlation (t test, $p<0,001$) was pointed out in relation to depth and slope. Individuals showed a microhabitat selection, with residing in patches of coastal waters corresponding to the shallow water of the "Banco" area, an area located 3 miles from the north-west shore, rich of feeding resources, because of the submarine characteristics, but also object of massive fishing activities. These results evidence how important is to develop a conservation programme in the "Banco" area of Filicudi Island.

830. CAN THE DECLINE IN THE ESTONIAN BLACK STORK POPULATION BE CAUSED BY FOREST DRAINAGE? A GPS-TRACKING STUDY

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The Estonian black stork population has recently declined more than twofold, along with a depressed productivity. To understand whether this might be caused by a degradation of foraging habitat as a long-term effect of artificial forest drainage, we collected daily GPS-tracking data from three adult storks in the breeding seasons of 2007–2008 (on average, 156 potential feeding events per a stork per year). The average distance of foraging sites was 10.5 km from the nest; the distance tended to increase during the season. Most feeding sites were strongly human-influenced (straightened streams, ditches, fishponds); only 16% were wild streams and ponds. However, in the dry year 2007, wild streams appeared significantly more important than ditches and straightened streams; such a pattern was absent in the rainy year 2008. These preliminary results support the hypothesis that ditches and straightened streams are an ecological trap for storks: their dense network is attractive during nest-site selection in spring or years with high water-levels, while their quality is poor during dry summers, forcing the storks to search for other habitats (often far away). Reconstruction of ditches to avoid their drying would improve habitat quality for this threatened species.

831. POST-FIRE FOREST MANAGEMENT AND BIRDS OF CONSERVATION CONCERN

Rost, Josep, Universitat de Girona, Spain; **Pons, Pere**, Universitat de Girona, Spain

Fire is one of the most important disturbances affecting Mediterranean landscapes and its biodiversity. In the short term after fire, the management of burned forests means an additional disturbance that may have strong ecological effects. In Catalonia (NE Iberian Peninsula) logging of dead trees (snags) for commercial purposes is the commonest practice. We studied the effect of post-fire management on the breeding bird community in two recently burned areas, focusing on species with an unfavourable conservation status in Europe. We found that logging has a positive effect on the majority of the species with conservation concern that occur in the area, since they are mostly typical open-habitat species which are favoured by the disappearance of the snag cover. Nevertheless, some species are also linked to a significant snag presence (which are used as perches and nesting sites), and logging affects them negatively. A post-fire management which would have into account bird conservation should therefore involve a partial, 'mosaic' logging, leaving patches of unlogged snags among logged areas. This could make compatible wood harvesting activities and the conservation of bird species with an unfavourable status.

832. COMPARISON OF DIVERSITY OF MACROFUNGI AND PLANT COMMUNITIES IN BELSŐ-CSEREHÁT, HUNGARY

Rudolf, Kinga, University of Pécs, Hungary; **Morschhauser, Tamás**, University of Pécs, Hungary; **Pál-Fám, Ferenc**, University of Kaposvár, Hungary

Macrofungi drawing back caused by habitat degradation (by man) became an increasing problem in Hungary. The investigated area is the excessive cultivated Cserehát Hill, situated in North-East Hungary. The original forest vegetation has been changed significantly in consequence of excessive forestry management. We have investigated stands transformed by man in different ways of climate zonal Turkey oak forests and extrazonal Hornbeam-oak forests as well as a Scots pine plantation. We have made comparison of diversity of macrofungi communities and vegetation types. Phyto-and mycocoenological releves were made with ZM quadrate method within 25x25m in each sample site, between 1995 and 2005. Comparison of diversity of macrofungi communities and vegetation types were made by means Rényi's function. In Hornbeam-oak forest diversity of macrofungi is higher than diversity values of Turkey oak forests because of wood inhabiting species. In contrary the diversity of woody plants is higher in Turkey forests then in the much degraded Hornbeam-oak forest. The lowest diversity values were found in the less natural Scots pine plantation. In conclusion the habitat conditions (e.g. forestry management, degradation) play an important role in diversity of both vegetation and macrofungi (mainly terricolous communities).

833. THE INVASION OF *RUMEX ALPINUS* IN THE GIANT MOUNTAINS

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Project deals with the spread of invasive *Rumex alpinus* in the Giant Mountains National Park, Czech Republic. The main goals are to get field data on long-distance dispersal that should become part of landscape level model of spread of the species. The work is based upon a combination of field studies exploring dispersal of *R. alpinus* by wind and water and microsatellite analysis. Studies are carried out at several localities in the Giant Mountains. The microsatellite analysis should help us to identify genetic relationships between plants within single populations and also between populations and thus identify the rate of clone growth of the species and possibility of spread by clone fragments. The first results show that dispersal by water is very effective and seed can disperse more than 100 m from maternal population along water streams. By a synthesis of previous knowledge with knowledge gained by this project, we plan to predict future spread of *Rumex alpinus*. The model should help find places and populations crucial for further spreading of *Rumex alpinus* and thus contribute to the eradication of the invasion in regional level.

834. SOCIOECOLOGICAL ANALYSIS OF LAND USE AND LAND COVER CHANGE. IMPLICATIONS OF AFFORESTATION IN HYDROLOGICAL RESOURCES IN MONTSENY NATURAL PARK, NE SPAIN

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The evolution of the productive sectors, accentuated by the tertiarization process in Santa Fe valley (Montseny Natural Park and Biosphere Reserve), has leaded to a change on landscape with implications on ecological and socioeconomic systems. The main effects of the abandonment of primary sector are reduction of both agricultural surface and traditional forest extractive activities. As a consequence, an important increase of the forestland has occurred. The main goal of this research is the evaluation of the afforestation process in Santa Fe headwater catchment as a response to the socioecological change, and its impact on discharge. We have used a methodology based on socioecology as land cover and land use change are main components of global change, which responses to a multidimensional process. Changes in land use and land cover at headwater streams imply changes in the relationships between precipitation and runoff due to greater water consume by forest. In this context, the use of the experimental model GOTILWA+ is proposed in order to detect the implications of land use and land cover change in the hydrological resources.

835. VARIATION DIVERSITY OF POLLEN GRAINS OF *VICIA* L. SPECIES IN IRAN

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The genus *Vicia* is one of the forage legume in *Fabaceae* Family . *V. sativa* , *V. cordata* , *V. angustifolia* and *V. michauxii* , *V. peregrina* and *V. sojakii* , *V. ciceroidea* have similarities specially in leaves and flower morphology so there distinguished are difficult. In order to study of efficiency of morphology characteres of pollen grains in distinction the taxonomical relations in vicia, 21 species were gathered from varinus Parts and studied by using SEM. Pollen shape in all species is oblong, tricolporate and ornamentation of pollen surface is reticulate to rugulate. Polar view (P), Faroow sculpture (FS), muri and swollen of mesocolpium (Sm) have an important role to distinction them. The species identification key was prepared accordingly.

836. MACROINVERTEBRATE COMMUNITIES IN A MEDITERRANEAN TRANSBOUNDARY LAKE

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Macroinvertebrate communities in the Greek part of the transboundary Lake Doirani were investigated according to the Water Framework Directive 2000/60/EC requirements. The project was funded by the Hellenic Aid and was implemented by the Greek Biotope Wetland Centre. Sampling was conducted by Ekman grab, seasonally (autumn 2007- summer 2008), at two stations (depths ~3 m and ~5 m respectively). A total of 16 taxa were recorded, most encountered in the shallower station. Mean total abundance was 6,725 ind/m^2. Nematoda was the most abundant taxon (52% of total abundance), followed by Diptera (28%), Oligochaeta (17%) and Ostracoda (3%). Diptera were represented mostly by *Chironomidae* (88.5%). *Chironominae* was the most abundant subfamily in *Chironomidae* family. Four C*hironomidae* species, tolerant to polluted and eutrophic waters, were found. Shannon-Wiener diversity index (H') ranged between 1.6 and 2.75, while Pielou's eveness index (J') ranged from 0.48 to 0.77. Cluster analysis based on taxa abundances per station per season discriminated samples locally, with depth being the most important variable controlling benthic community synthesis and abundance. No seasonal pattern was evident. The present results contribute to the better assessment of the lake's ecological quality and highlight the importance of Mediterranean systems as biodiversity hot spots.

837. CUMULATIVE FITNESS REDUCTION IN OPEN-POLLINATED PROGENIES FROM ISOLATED POPULATIONS OF SWISS STONE PINE

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Spatial isolation may promote inbreeding and, thus, reduce genetic variation and adaptive potential in natural populations. We elucidate this link between genetic diversity, relatedness and cumulative fitness by combining common garden experiments with molecular genetic analyses. We collected 543 open-pollinated cones of Swiss stone pine (*Pinus cembra*) in seven populations differing in size and connectivity. We determined seed set and seed mass and assessed germination, first-year growth and winter mortality of 11000 planted seeds in a common garden. Marked contrasts occurred at all hierarchical levels (cone/tree/population): Cones collected in small, isolated populations showed reduced seed set, higher percentage of small and aborted embryos, and lower germination success compared to those from large and continuous populations. These findings suggest that an increase in population isolation leads to a decrease in seedling performance in *P. cembra*. We will test this assumption by relating these experimental results to variation in mating patterns, i.e. the degree of inbreeding, inferred from nuclear and chloroplast microsatellite analyses of embryos from the same seed lots. We conclude that reduced genetic diversity of this long-lived tree species, in combination with a narrow ecological niche, might jeopardize colonization dynamics and long-term persistence of isolated populations under environmental change.

838. GENETIC ANALYSIS OF SARDINIAN HARE (*LEPUS CAPENSIS MEDITERRANEUS*) POPULATIONS USING MICROSATELLITES

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Sarda hare is the only free living hare species in Sardinia. Their number is drastically decreased due to hunting and habitat fragmentation and reintroductions were performed by hunters irrespective of genetic. The aim of this work was to genotype Sarda hare using microsatellites. 61 Sarda hares living in 5 different populations of Sardinia (Villanova, 40°30′0″N-8°28′0″E, n=13; Pozzomaggiore, 40°24′0″N-8°40′0″E, n=9; Villamassargia 39°17′0″N-8°38′0″E, n=12, Siniscola 40°35′0″N-9°42′0″E; n=13, Asinara island 41°04′N-8°16′E, n=14) were sampled and DNA was extracted. Seven microsatellite loci were analysed by PCR and products were analyzed with ABI PRISM 3100 sequencer. Allele frequency, gene diversity and HW equilibrium deviation were tested using Arlequin 2.1. Five primers were polymorphic (7.8±4.2 alleles/locus) without intrapopulation differences (Asinara: 4.17±1.94; Pozzomaggiore: 3.67±1.37; Siniscola: 5.33±1.63; Villanova 4.83±1.47; Villamassargia: 4.5±2.26; $p>0.05$). All polymorphic markers showed private alleles except for the Pozzomaggiore population. HW deviation was significant in 5 loci, showing heterozygote deficiency. Three markers are in HW disequilibrium in both Villamassargia, Pozzomaggiore and Asinara populations; two markers are in HW disequilibrium in Villanova population. Genetic differentiation (Fst) evidenced a high differentiation in all populations except for Pozzomaggiore and Villanova ones. Our data suggest that Sarda hares show genetic structuring probably caused by habitat fragmentation and genetic drift.

839. ARE YELLOW-LEGGED GULLS (*LARUS MICHAHELLIS*) REALLY A MATTER OF CONCERN IN THE CITY OF MARSEILLE?

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Until recently, yellow-legged gull was largely considered as a superabundant and invasive species in the Mediterranean area. Its demographic explosion since the sixties is mainly attributed to its protection and the increase of anthropogenic food resources. There have been numerous attempts to control gull numbers in the region but in Marseille city, the management of the species is reduced to the management of its nuisances. The objective of this study, crossing historical, ethnographical, and ecological approaches, is to identify the determinants of the humans-gulls relationships. We carried out observations of gulls' habits and ethnographical surveys in several districts to question the link between species' use of urban environment and inhabitants' perceptions. Our results suggest that inhabitants' perceptions are built from different sources of information, notably regional medias, but rarely from direct observation. Therefore, the historical analysis of medias' and managers' discourses from the twentieth-century allow us to draw a parallel between the evolution of species' problematization and the contemporary social concerns like waste management or intensive urbanization. This study shows the interest to question the various dimensions affecting the relation to a species in order to understand how the problem of such a modern commensal animal is partly socially constructed.

840. ENDANGERED SPECIES *PULSATILLA VERNALIS* (L.) AND POSSIBILITIES OF ITS CONSERVATION

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Pulsatilla vernalis var. *vernalis* (vernal pasqueflower) is one of the critically endangered species of flora in the Czech Republic. Its global distribution ranges from the Pyrenees and the Balkan peninsula through Central Europe to southern Scandinavia. This variety is very rare even outside the Czech Republic. The occurrence in the Czech Republic is concentrated into two isolated areas: South Bohemia (the Třeboň region) and North Bohemia. In southern Bohemia three last territories with several specimens exist. In the past there was an area with the biggest occurrence (about 40 localities) of *Pulsatilla vernalis* var. *vernalis* in the Czech Republic. The second area is situated in northern Bohemia. Rescue cultivation, pursued by VÚKOZ since 2001, has been focused upon the population in northern Bohemia, in the vicinity of Bělá pod Bezdězem, which is the only locality at present. We focused on elaboration of successful propagation protocol using the classical propagation method and in vitro technique. The aim of the work was new plantings of *Pulsatilla vernalis* into the nature or gene pool areas. This work was supported by the Ministry of the Environment of the Czech Republic (project MZP0002707301).

841. DETECTION OF IPM4 MARKER OF RX1 GENE RESISTANCE TO PVX IN COLLECTION OF EX SITU CONSERVED POTATO GENETIC RESOURCES

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Study of crop species relative's diversity and conservation and utilising of genetics resources in crop breeding is one of the most important priorities of research leading to sustainability of food production in the entire world. Presence of some putative PCR markers of Rx1 gene controlling resistance of potato against PVX were studied in a collection of selected potato genetics resources. Whereas the presence of marker GP34 corresponded to presumptive presence of Rx1 from 2.53%, marker IPM4 showed 83.3% association to the gene across the varieties collection. This potentially useful marker for MAS was found in varieties Atlantic, Cara, Gloria, Nicola etc. The resistance of these varieties to PVX in common growing conditions is evaluated as very high. Interesting knowledge resulted from study of all genotypes showing IPM4 marker pedigrees. These varieties have all in their pedigree *Solanum tuberosum* ssp. andigena putative donor of Rx1 gene in potato breeding programme. There is highly probable, that the marker IPM4 is integral part of donor's chromosomal segment repositioned to potato chromosome 5. Absence of IPM4 in some cultivars is probably consequential to backcrossing of early hybrids with other potato genotypes. Results were supported by project NAAR Czech Republic QF4107.

842. ANALYSIS OF CHLOROPLAST DNA INTERGENIC SPACER TRNL/TRNF IN GENUS SOLANUM BY DENATURING GEL ELECTROPHORESIS

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Phylogenic relations among populations of related plant species can be demonstrated at the level of chloroplast DNA polymorphisms. Interspecific variability of chloroplast DNA 418bp intergenic spacer trnL/trnF was detected in the evaluated collection of 16 species of genus *Solanum* by denaturing gradient gel electrophoresis (DGGE). Constant denaturing electrophoresis (CDGE) was applied for detection of polymorphisms in single species. There were detected three alleles of this spacer differing in electrophoretic mobility in denaturing conditions. Results were verified by individual allele's sequenation. Allele distribution, ploidity, endosperm balance number (EBN) and geographical region of species origin were processed by UPGMA bulk analyse resulting to dendrogram showing two significant clusters. One of groups obtained tetraploid species in selection (*Solanum tuberosum* ssp. *tuberosum*, *S. tuberosum* ssp. *andigena*, *S.* x *sucrense*, *S. stenotomum* ssp. *goniocalyx* and *S. polytrichon*) showing recently close phylogenic relations. Second group obtained only diploid species. Highest interspecific distinctness in group, confirmed also by other tests on molecular level, was observed in *Solanum mochiquense*. Results can be used in programmes of conservation of potato genetic resources as one of additional descriptive criterions. Results were supported by project of Programme of Research and Development of National Agency for Agricultural Research Czech Republic QF4107.

843. EFFECT OF THE SELECTIVE LOGGING AND THE WIDTH OF THE BUFFER STRIP ON SPECIES DIVERSITY IN THE VALUABLE RIPARIAN HABITATS

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A challenge for science is to find a resolution for the contradiction between the conservation of biodiversity and utilization of natural resources. In Finnish Forest Act, certain biotopes are defined as valuable habitats and set aside, yet some gentle forestry is allowed. To preserve these biotopes, buffer strips are essential. The focus of this study is on the functionality of the clear-cut adjacent buffers around valuable riparian habitats. Studies are conducted as a follow-up study on the boreal forests in Finland by studying plants and mosses in the vicinity of streams. The treatments include either a 15- or 30-metre buffer to the clear cut. Additionally, half of both widths were selectively logged. Two years after the logging, plants – but not mosses – show a response to clear-cutting the adjacent forest. The change was larger with the narrow buffer. The selective logging affected plant communities with both buffer widths. We conclude that 15-metre buffer is too narrow to protect the riparian sites against disturbances and the selective logging on the buffers should be prohibited since it makes buffers ineffective.

844. ORCHID DIVERSITY IN THE CHITWAN DISTRICT

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Orchids in the Himalayan region have been studied for a long time, but there is neither actual data, nor any other information on orchids in the lowlands of Nepal. In this study we aim to shed light on the general status and distribution of orchids in one important lowland region - the Chitwan district. Our study covered the areas of the Chitwan National Park (CNP), Barandabhar corridor forest (BCF) and the Mahabharat range (MR). We carried out 200 transect walks and direct observation of orchids in host trees, rocks or on the ground. We always sampled the first 50 trees within the distance of ten meters from the transect line. We found that there is almost no specificity between orchid species and the trees. In the BCF the orchids were mostly specialized to the trees, while in CNP they were more generalists. The largest average numbers of orchids per tree were observed on *Syzygium cumini* (3.17), *Maesa chisia* (2.78) and *Gmelina arborea* (2.67); on several trees no orchids were observed. Monte-Carlo permutation tests of the differences in orchid composition in types of the forest in the specific regions, type of the regions or type of the forests, were always significant.

845. EX SITU CONSERVATION, REINTRODUCTION AND ACTION PLANS FOR PRIORITY PLANT SPECIES IN SWITZERLAND

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With its activities the Swiss Commission for Wild Plant Conservation CPS/SKEW (www.cps-skew.ch) is actively contributing to the conservation of diversity. Endangered species make up a large proportion of the Swiss flora: a third of the 3'150 taxa is threatened or rare and listed on the Red List (categories IUCN). Since 1995, conservation plans were initiated in collaboration with several institutions: Botanical gardens provide ex situ conservation, university institutes analyse e.g. genetic variability and study ecological needs, public offices survey the re-enforcement and re-introductions and botanists provide their precious experience. In 1997, the CPS/SKEW has composed Recommendations for ex situ culture of threatened wild plants and their re-introduction in nature based on the Guidelines of the Council of Europe. Thanks to ex situ multiplication and appropriate habitat management, original populations have been successfully reinforced in ancient sites or in newly created habitats: *Myosotis rehsteineri* and *Viola elatior*, both on the verge of extinction, or *Gratiola officinalis*, being in regression, although Canton Tessin still has populations. Existing populations of *Typha minima* have also been reinforced but, due to the limited size of remaining habitats, the conservation is until now not guaranteed. In any case, regular field controls are necessary.

846. CHARACTERIZATION AND DISTRIBUTION IN ROMANIA OF THE PRIORITY NATURA 2000 HABITAT: PANNONIC AND PONTO-SARMATIC SALT-STEPPES AND SALT-MARSHES

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This paper presented the Romanian distribution of the priority habitat 1530* Pannonic salt-steppes and salt-marshes, included in the Habitats Directive 92/43/EEC. The analysis was conducted in Romania for all five bio-geographical region in part (Alpine, Continental, Pannonic, Pontic (Black Sea) and Steppe). The habitat interpretation included the characterization and inventory of habitat in relation with the protection inside the Sites of Community Importance (SCIs) as part of the European network of Natura 2000. The distribution map in Romania was done for the 1530* habitat for all five bio-geographical regions. Analysis of habitat includes arguments for the amendment of the habitat description presented in the Interpretation Manual of European Union Habitats (EUR27) as a result of integration of Romania and Bulgaria into the European Union. It is also included a proposal for the future revision of the denomination of habitats, for the increase of quality of scientific data we will propose that 1530* habitat to be split in to different types: one for the west part of Pannonic and another one for the Ponto-Sarmatic part. This paper contains also the proposals for new Natura 2000 sites in Romania in which the habitat 1530* can be protected at national and European level.

847. THE MADEIRAN LAURISILVA: WHERE ARE THE HOTSPOTS OF BRYOPHYTE DIVERSITY?

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Madeira Island, which is a part of Macaronesia, hosts a very diverse bryoflora. For bryophytes one of the most important habitat on Madeira is the relict laurel forest (Laurisilva). To get a better understanding of the distribution of bryophyte species richness in the Laurisilva we modeled the distribution of 39 species (by Maxent) for which we had at least 10 records. Out of the 39 species, 38 species had a cross-validated AUC (AUCcv) larger than 0.7. The mean AUCcv of these 38 species was 0.80 (range: 0.7 - 0.93). The preliminary hotspot map, built by summing up the grid values (=probabilities of occurrence) of these 38 species, showed some clearly defined areas of high species richness within the Laurisilva. The hotspots found indicated also areas favourable for Red List species. The mean value of the grid cells of the hotspot map occupied by the 29 records of 17 Red List species was significantly higher than that of 29 randomly selected grid cells. Thus, bryophyte species richness is not uniformly distributed within the Laurisilva and the modelled hotspots can be seen as a first approximation to the most valuable areas for bryophyte conservation.

848. PATCH SIZE AND HABITAT QUALITY AFFECT PRESENCE OF THE COMMON GULL *LARUS CANUS* AT WATER RESERVOIRS IN SOUTHERN POLAND

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Most of the studies on metapopulation theory were carried out on species occurring in landscapes that undergone substantial fragmentation. Unfortunately, it is hardly known what affects species populations occurring in habitat patches that are naturally fragmented. Understanding metapopulation dynamics in such species may be reference to studies that were done on species in landscapes fragmented due to human activity. Here, we studied patch occupancy in Common Gull, which is a species occurring at water reservoirs, that are naturally fragmented habitat patches. The study were carried out in southern Poland in the years 1999-2008. All potential habitat patches (water reservoirs) were visited three times during the breeding season and we noted presence or absence of breeding gulls. We found that the occupied patches were larger and had higher availability of suitable islets than empty ones. We did not find differences between occupied and empty habitat patches as far as isolation indices, presence of corridors, availability of food resources, landscape composition and human disturbance are concerned. Our results indicate that habitat quality is probably the most significant factor affecting presence of the Common Gull in habitat patches.

849. AGRICULTURAL FIELDS AS ECOLOGICAL BUFFER ZONES AND CORRIDORS: INVERTEBRATE COMMUNITIES IN HIGH-NATURE-VALUE AGRICULTURAL LANDSCAPES

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Many of the traditional, extensive agricultural systems in the Middle East are either in the process of intensifying, or are becoming increasingly marginalized and abandoned. The intensification of agriculture is leading to over-simplification of agro-ecosystems and consequently to loss of local biodiversity in rural areas. In high-nature-value (HNV) rural areas, low-input agricultural fields may serve as buffer zones around natural habitats that are important for conservation, by connecting core conservation habitats and by protecting them from the impacts of destructive land-uses. In order to characterize the types of agriculture that may act as ecological buffer zones and corridors, research is being conducted in different types of agricultural fields located between natural habitats in a HNV protected area. The beetle and the spider communities within various agricultural fields were characterized, and compared with the communities inhabiting nearby natural habitats. Results show that different types of agricultural management greatly affect invertebrate biodiversity and community composition within the fields. The study sheds light on types of agricultural cultivation that should be encouraged by agricultural policies in HNV rural areas in Mediterranean landscapes.

850. STRUCTURE OF KINSHIP IN POPULATION OF TENGMALM'S OWL *AEGOLIUS FUNERUS*

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The dispersion and mating system significantly affect the genetic structure of the population. Boreal owl (*Aegolius funereus*) nesting biology has been studied since 1999 in the Krušné Hory Mts where the birds nest in nesting boxes. To investigate the mating system and the population genetic structure of the boreal owl population, blood samples have been collected there since 2006. We collected 241 samples from family members in 3 years period from 3 different areas - Krušné hory Mts, Jizerské Hory Mts and Žďárské Vrchy Mts. These samples were genotyped at 7 microsatellite loci. We found no evidence of EPF in any of them; only two nestlings had genotypes that were incompatible with those of their parents. In both cases, however, the genotypes of the chicks were inconsistent at only one locus. The results indicate decrease in the genetic diversity of population from the Krušné Hory Mts, which is probably the effect of relatively high rate of resident individuals in the area of study, including females. The FST values and the output of the Structure program indicate genetic differentiation among all three localities. That could be caused by the limited gene flow between the mountain range or by the number of samples.

851. EMERALD NETWORK IMPLEMENTATION IN THE CENTRAL RUSSIAN PLAIN

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The main problem of the Emerald Network implementation in Russia consists of the fact that the Berne Convention priorities do not co-inside with the red lists being in force in Russia. For example, some species protected under the Convention are neither rare, nor endangered in Russia, and by contrary, some species red-listed in Russia are not protected under the Convention. The most important for solving this problem is that the Areas of Special Conservation Interest should contribute substantially to the objectives of the Convention. In order to reach the objectives of the Convention in the Central Russian plain, we must include into the Emerald Network the areas of a great ecological value for this region. So, these ones should not only fit one or several ASCI general conditions but being also in the best environmental state among similar areas in the region. We selected such areas by the simultaneous permanent presence of several regionally rare (red-listed) species having different environmental requirements within the geographically determined natural conditions of the Central Russian plain. The pilot assessment of Protected Areas in Moscow Oblast showed at least 18 natural sites that we consider as candidates for entering them into the Emerald Network.

852. WHAT'S ON THE MENU? DIET OF BOTTLENOSE DOLPHINS (*TURSIOPS TRUNCATUS*) IN THE NORTH-EASTERN ADRIATIC SEA

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Bottlenose dolphins (*Tursiops truncatus*) are among the most researched species of all cetaceans. They are opportunistic feeders, consuming benthic and pelagic fish, cephalopods and crustaceans depending on abundance and ability. Bottlenose dolphins are the only regular cetacean in the Adriatic Sea. Around the Cres-Lošinj archipelago there are estimated to be approximately 100 individuals. Stomach content of 20 stranded bottlenose dolphins, from the period 1998 – 2008, were analyzed and identification of the prey was based on the morphological differences of sagittal otholiths of teleost fish, and cephalopod lower beaks present inside the stomachs. Using this method, it was possible to identify prey to species level. Previous studies have shown that this population has fed mainly on benthic fish, particularly hake (*Merluccius merluccius*). Recent data, collected on behaviour and stomach contents, suggest that the feeding habit of these dolphins has shifted to pelagic stocks. Stomach content analysis of stranded animals has revealed a shift in most frequently predated fish species to the pelagic horse mackerel (*Trachurus* spp.) which has a growing commercial value in Croatia. With the planned growth of the pelagic fishery in Croatia, changes to prey species may increase possible competition leading to increasing conflict between these animals and humans.

853. PRESENT TRENDS IN BIODIVERSITY OF NON-FOREST HABITATS IN AGRICULTURAL LANDSCAPE

Spulerova, Jana, ILE SAS, Slovakia

The research was aimed at the study of biodiversity of non-forest habitats in agricultural landscape, their conservation and management and analyses of factors, which impact biodiversity changes of non-forest habitats. Based on assessment of the favourable conservation status of habitats, species richness and habitats vulnerability, the habitats have been divided into 4 categories: favourable condition – maintained (A), good or recovered (B), unfavourable condition – partially destroyed (C) or destroyed (D). As the most important non-forest habitats were identified peatlands, fens, wet and mesophilous meadows. Most of them are threaten by abandonment in one accord with succession or by changes of environmental condition as decrease of underground water level, etc. For the maintenance of natural values of these habitats it is important their appropriate management. One

of the challenges for management performance is support from agro-environmental scheme, focus on biodiversity conservation. Only some habitats as active raised bogs can be maintained without any management, if the ecological conditions are not disturbed. This work was supported by the Slovak Research and Development Agency under the contract No. LPP-0135-06 "Conservation and management of non-forest habitats in the agrarian landscape".

854. GRADIENTS OF EPIGEIC AND SOIL ARTHROPODS IN COSTAL DUNES TO BE MAINTAINED

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An aim of study was to investigate fauna of coastal dunes under natural and disturbed conditions. A study of invertebrates was performed in dunes at Akmensrags in the West part of Latvia. Epigeic and soil arthropods were collected along three transects crossing the dunes by use of pitfall traps and soil core. Microarthropods were extracted on Tullgen's funnels. Plant cover was described in accordance with Braun-Blanquet method. Population density of beetles, spiders, woodlice and Mesostigmata mites steadily increased inlands. Locusts and cicadas showed preference to grey dune. Springtails didn't show clear trend, moss mites had the lowest density in the grey dune. The cover of mosses had higher importance than cover of flowering plants for distribution of arthropods. Mosses serve as a shelter for epigeic and soil predatory arthropods. Soil inhabiting springtails and moss mites didn't show significant dependence of vegetation, because of their location deeper in the soil. The analysis of particular species showed their preference to the specific conditions in the dunes. Anthropogenic influences – disturbance of vegetation imitate early succession stages of fauna in the coastal dunes and reduce populations of grass-dwelling arthropods. It is important to conserve a fauna of all succession stages of dunes.

855. THE CAPERCAILLIE IN SWITZERLAND: HOW TO DEFINE GOALS, SET PRIORITIES AND EVALUATE THE EFFECTS OF CONSERVATION MEASURES IN A NATIONAL ACTION PLAN?

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The capercaillie (*Tetrao urogallus*) is the largest grouse species with a preference for old-growth conifer forests. In Switzerland, population numbers of capercaillie have declined seriously in recent decades. The Swiss Action Plan for Capercaillie describes the goals, strategy and instruments for the conservation of this endangered species in Switzerland. Conservation targets are (1) improving habitat quality by forestry measures and (2) protecting capercaillie core areas against negative impacts of human disturbance. Since financial resources are limited, setting spatial priorities is a key element of the Action Plan. Forests were selected based upon multi-scale habitat models that predicted the landscape's ecological potential for capercaillie. The evaluation concept for conservation measures includes (1) monitoring the distribution of the species with a network of volunteer observers, (2) surveying the habitat use of capercaillie at and in the vicinity of improved forest stands, and (3) estimating population numbers with mark-recapture statistics based upon microsatellite DNA genotyping of non-invasive samples of individual birds.

856. BAT MORTALITY AT WIND ENERGY SITES – A CHALLENGE FOR CONSERVATION

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In Germany, the importance of wind energy is increasing and data on bat fatalities at wind energy sites are controversially discussed. Since all bat species are protected by European and National Nature Conservation laws, it is important to develop conservation strategies. There are many unanswered questions about the impact of wind energy sites on bats and the causes of collision. Therefore, determining patterns of bat fatalities is essential to understand bat interactions with turbines. We present a study on bat collisions at wind energy sites in a region near the city of Berlin with an ongoing and fast development of wind industry. We searched for bat carcasses at 126 wind-turbines in the fall seasons in 2005 and 2007 and investigated parameters of turbines and wind-site locations which potentially influence bat fatalities. This survey showed for the first time that bats seem to be negatively affected by flashing strobe-lights. Also, the minimum rotor blade-to-surface distances and the proximity of turbines to wood-like structures have effects on fatality rates. As conservation aspects will become a fundamental part for official approval proceedings in the future planning of wind energy sites, these results may be of concern and can contribute to minimize negative impacts on bats.

857. ANALYSES OF FISH SCALE MORPHOMETRY: DISCRIMINATION OF PRUSSIAN CARP (*CARASSIUS GIBELIO*, BLOCH) POPULATIONS

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In fishes, population discrimination and species identification could be difficult. There are some general methods to solve the problem. One possibility is to use traditional morphometrics, when numerous length-parameters are compared. Other solution is the usage of genetic markers, which is an expensive and complicated method. The method we examined has been used by scientists from the early 80´s. It is based on geometric morphometrics (landmark-based), what we used to compare fish scales. This method has been used a few times, mostly for marine fish species. We examined a cyprinid species, Prussian carp (*Carassius gibelio* Bloch) to find out if their populations can be distinguished by their scales. Samples were collected from the Kis-Balaton Water Protection System, Nagyberek and Isaszeg lake-system in Hungary. With this method, we could discriminate 3 of 4 pre-determined populations. We would like to introduce a cheap, fast and a sparing method to discriminate local populations of fishes.

858. ISLANDS AND INVASIVES- CONSERVATION AND ECOLOGICAL ASPECTS ON A CARIBBEAN ISLAND

Stow, Sarah, Imperial College London, United Kingdom

Non-native invasive species are one of the main drivers of biodiversity loss. Understanding the factors driving the establishment and spread of invasives is a key quest of invasion ecology in order to inform conservation management and action. The previously unknown distribution of non-native plant species (NNS) on the island of Montserrat was recorded

to determine 1) the habitats most affected by NNS; 2) the most abundant and aggressive NNS; and 3) the factors driving their distribution. Maps of the current and predicted distribution of 26 NNS were created from GPS data recorded in the field. Relationships between habitats/disturbance and non-native species were investigated using non-metric multidimensional scaling (NMDS). Results showed that lowland forest currently suffers most from the presence of non-native species. Certain non-native species were found to be strongly associated with a habitat/ disturbance type and there were also associations between NNSs. The most important result is that of the presence of the most aggressive NNS in the island's most sensitive habitats. Results will help inform pre-emptive action to prevent ecological deterioration of certain habitats. Equally important, is the use of results to inform inhabitants of the risk posed by NNS.

859. *PASPALUM PASPALOIDES* EVAPOTRANSPIRATION EFFECT ON WATER CONTENT IN MEDITERRANEAN KASTIC POND – IMPLICATIONS FOR MANAGEMENT

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We aimed to determine the effect of bio-fouling of the pond with the plant *Paspalum paspaloides* on the water loss by evapotranspiration. The experiment was conducted in NATURA2000 area candidate. These ponds are the habitat of *Mauremys rivulata*, critically endangered in Croatia largely due to habitat loss. Water temperature, evaporation and evapotranspiration, were measured weighing water loss four times a day in August 2007 and 2008. Bio-fouling and free water surface were estimated in percents on site since year 2004. Average evaporation was 4,89 gmin-1m-2 and evapotranspiration 9,17 gmin-1m-2. The water loss due to bio-fouling was higher than loss due to evaporation, on every occasion. Total amount of water lost from the pond was the greatest in the year 2006 when bio-fouling was the most extensive, estimated to be 168,028 l. Decrease of estimated water lost during August 2007 can be explained by removing the grass from the pond and small total water content. In the August 2008 the pond was desiccated with all of the grass removed. Emigration and decrement of free-range farming in Croatian coastal outback leave the ponds to fast succession benefited by Mediterranean climate. To preserve them, water loss should be controlled by proper plant management.

860. HOW DO WE KNOW IF OUR PROTECTED AREAS WORK? EVALUATING THE STATE AND MANAGEMENT OF SMALL-SCALE PROTECTED AREAS IN THE CZECH REPUBLIC

Svatek, Martin, Mendel University of Agriculture and Forestry Brno, Czech Republic

In 2004, the seventh Conference of the Parties to the Convention on Biological Diversity endorsed a programme of work on protected areas (PAs) which included to develop and adopt, by 2006, appropriate methods for evaluating the effectiveness of PA management; and to implement management effectiveness evaluations of at least 30% of each Party's PAs by 2010. The backbone of the Czech territorial nature conservation is a network of 29 large-scale and 2201 small-scale PAs. While some up-to-date information on the state and management of large-scale PAs may be found in yearly issued reports on state of the environment, no data on small-scale PAs but number and area are given in the reports. In 2005–2009, we evaluated the state and management of more than 300 small-scale PAs. More than half of all PAs evaluated were found to be in a good state and well managed. However, quite a low number of sites in an excellent state reveals that most PAs has not yet reached their target state. One of the most valuable, albeit the least satisfying, results is identification of about 4% of PAs with a bad management, and of about 3% of sites being in a bad state.

861. LOSS OF GENETIC DIVERSITY IN NON-LEKKING POPULATIONS OF BLACK GROUSE

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Genetic variation is crucial for the survival of populations in changing environments. Small populations of lekking species with low natal dispersal are vulnerable to extinction because mating among relatives is highly probable in small leks. We compared genetic diversity of lekking and nonlekking populations of black grouse in the mountains bordering the Czech Republic. In total, 250 individuals from eight lekking and eight nonlekking populations were genotyped at 12 microsatellite loci. Nonlekking populations had significantly lower genetic diversity than lekking populations. Solitary display is probably a result of declining population density, which potentially could explain why non-lekking populations are genetically less diverse. However, genetic diversity was statistically more strongly associated with type of display than regional population. This suggest that type of display and population density may interact in more subtle ways to determine the genetic make up of endangered populations. Although no population exhibited significant loss of heterozygosity significant pair-wise FST: s within regions indicated low or no dispersal between localities. A shift from lekking to solitary displaying is an alarming signal for conservationists indicating decreasing effective population sizes and declining populations.

862. THE ROLE OF THE BROWN BEAR AS A SEED DISPERSER

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Carnivores, particularly bears, are among the most important mammalian dispersal agents. The role of the brown bear *Ursus arctos* as a seed disperser has been little investigated in Europe. We characterized frugivory and seed dispersal by brown bears in the Carpathian Mountains (SE Poland). Around 300 bear faeces were collected between March and December 2008- thus covering the whole year of bear activity. Diet analysis showed that in summer and fall fleshy fruits are extremely important for bears. Fruits of more than 15 plants were consumed by bears. Most important were apples *Malus sylvestris*, cherries *Prunus avium*, pears *Pyrus communis*, blackberry *Rubus* sp. and bilberry *Vaccinium myrtillus*. Effects of the digestive process on germinability and germination rate were measured in experiments. Fruits from 11 species were collected in the field during the ripening season, given to 3 captive bears and afterwards, the seeds recovered from the faeces. For each species, we planted 100 fruits (with the pulp), 500 seeds (control treatment) and 500 seeds from bear scats (bear treatment). We discuss the importance of fleshy fruits for brown bear conservation and how species like bears, with large home ranges, may play a key role as seed dispersers.

863. THE EFFECT OF ENVIRONMENTAL CONDITIONS ON HATCHING ASYNCHRONY IN THE COLLARED FLYCATHER

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In several bird species, nestlings hatch asynchronously. As a result, late-hatched young often experience competitive disadvantage. Many hypotheses have been proposed to explain why hatching asynchrony can still be adaptive. For example, the egg viability hypothesis suggests that females start to incubate before clutch completion because the viability of unincubated eggs exposed to high ambient temperature decreases with time. According to the hurry up hypothesis, in broods laid late in the season, at least the first nestlings can benefit from the peak food supply, if females start the incubation early. We tested the predictions of these two hypotheses. In an artificial nestbox plot in the Pilis Mountains (Hungary), we recorded the temperature inside and outside of the nest boxes, the timing of breeding and the degree of hatching asynchrony. We found that hatching asynchrony significantly correlated with ambient temperature and the timing of breeding relative to peak food supply. Hatching asynchrony was more pronounced in late broods and when the temperature was high. Our results suggest that climate change may influence many aspects of breeding phenology, including the hatching asynchrony, which may have long-term effects on nestling survival.

864. ASSESSING ANURAN BIODIVERSITY IN BARANJA REGION (CROATIA) USING LOCAL VOLUNTEERS TRAINED IN AMPHIBIAN AUDIO MONITORING AND ROAD KILL DETERMINATION

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We aimed to compare success in assessing frog diversity using trained volunteers, with the data from specimens conserved in Croatian Natural History Museum, and the data gathered for BSc thesis. Total of 20 transects, 5km and 10 sampling stops each, were examined audio-visually by 17 volunteers from March 2006 to September 2007. Each transect was examined trice. Volunteers used were the ones with best exam results in the group of 35 attending 12h of lectures and 6h of workshops. For the purpose of this data analysis, one finding is defined as recorded presence of the species on one sampling stop, regardless of the actual number of individuals encountered. Total of 10 species were noted. There were 353 findings recorded in 11 visited 10km UTM squares. The most diverse were CR26, CR27 and CR36. The most widespread species was *Hyla arborea*, while *Bufo bufo*, *Pelobates fuscus*, *Rana temporaria* were the least prevalent. Considering the fact that only 3 species are archived in CNH Museum, sampled in 1 UTM square, and only 7 species covering 2 UTM-s are recorded in the BSc thesis, the volunteers gained recent data useful for nature conservation planning, with minimal funds in a short period of time.

865. WHY DO LOW-TRAFFIC ROADS INCREASE DIVERSITY OF BIRDS IN PRODUCTION SPRUCE FORESTS?

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Negative effects on forest birds from highways dissecting forested areas are considered to result from forest fragmentation and chronic traffic noise. We compared species richness and similarity of canopy, cavity and shrub guilds of birds along low-traffic forest roads, in forest interiors and at forest edges in secondary forests of central Europe, where the forests have passed through extensive changes toward uniformly compact growths dominated by production conifers. In addition to a positive effect of tree diversity on bird richness across all habitats, we found bird richness along forest roads to be generally higher than in the forest interior but lower than along forest edges. In addition, the guilds were absent more often in forest interior than in the remaining habitats. We argue that low-traffic roads increase habitat heterogeneity in structurally poor and compact forests under study, attracting many forest birds due to additional habitat complements that are lacking in forest interior. Broader support for management practices leading to higher structural diversification of tree stands would benefit bird communities inhabiting production forests in central Europe.

866. *ACER PSEUDOPLATANUS* CV "ATROPURPUREUM" TRAITS PHENOTYPIC STABILITY AS BASIC POINT FOR FUTHER SPECIES CONSERVATION

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This research, aiming at the analysis of the expression and phenotype stability of characters of the *Acer pseudoplatanus* cv 'Atropurpureum' in the earliest stages of ontogenesis, was conducted on 9 half-sib lines representing the progeny of the test trees. The expression and stability of purple undersides in the progeny was monitored in the experiments established in the greenhouse, in the nursery and in the field. The leaf underside colour was analysed on the sample of 50 plants, at the ages of one, two and three years, at the beginning (immediately after leaf formation) and at the end of the growing season (right before leaf fall). The collected data showed the percentage of plants with purple undersides; plants with green undersides and plants with variegated undersides within the analysed half-sib lines. The study results show the constant presence of the analysed character in the progeny of all test trees in different percentages. The progeny of test trees 1, 3, 5 and 8 is characterised by a continuously high percentage (about 80%) of purple leaf undersides, so we can infer its genetic determination. In future, these trees should be used as the source of genetically good-quality seed material commercial and conservation purposes.

867. LIFE HISTORY TRAITS AND THREAT STATUS: A COMPARATIVE STUDY OF TWO ONOBRYCHIS-FEEDING LYCAENID BUTTERFLIES IN SE CZECH REPUBLIC

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Studies of related species depending on identical resources and differing in conservation status offer insights into causes of species declines. We studied two lycaenid butterflies, vulnerable *Polyommatus thersites* and critically endangered *Polyommatus damon*, sharing identical host plant, *Onobrychis spp*. Females of *P. thersites* oviposit on host plant stems and leaves in a relatively low height (≈ 20 cm). We found no difference between spring (May-June) and Summer (July-August) generations. Females of univoltine *P. damon* (July–September) oviposit to senescing inflorescences, in a significantly higher height (> 30). At a landscape scale, presence of both species is influenced by such habitat-availability factors as host plant abundance. Both species also require varying management of their sites. However, the best landscape predictor of the endangered *P. damon* was the proximity of other occupied sites, whereas *P. thersites* did not respond to connectivity of sites. While *P. damon* is extremely vulnerable to late-season mowing or grazing, if practised in a uniform manner; *P. thersites* is more tolerant. *P. damon* is surviving only in "pockets" of sites situated in close proximity. Both butterflies would benefit from restoring of *Onobrychis*-rich sites, but for *P. damon*, the restored sites must be situated closely (< 2 km) to occupied ones. Supported by CME (LC-06073, 6007665801, 6215648905).

868. DISTRIBUTION, ECOLOGY AND CONSERVATION OF HAMATOCAULIS VERNICOSUS (*CALLIERGONACEAE, BRYOPHYTA*) IN THE CZECH REPUBLIC

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Hamatocaulis vernicosus is an endangered and protected moss, which has been recommended to a special attention within the whole European Union. The moss has been revised in detail for its distribution, habitat preferences and conservation possibilities in the Czech Republic and its extant populations have been monitored regularly since 2005 for 2008. The species is widely but sparsely distributed over the whole Czech Republic and its occurrence has decreased dramatically during the last 50 years. Recently it grows at 46 localities. At all recent localities, phytosociological relationships and detailed chemical composition of groundwater (pH, conductivity, NH4+, NO3-, Ca2+ and Fe) were analysed. The species prefers mineral rich habitats with high groundwater table. Sometimes it occurs at fishpond margins, smaller populations occur in fen meadows and very small populations grow in more acid habitats (pH 5.5 – 6). Based on the obtained information, main causes of *Hamatocaulis vernicosus* retreat could be specified. Besides immediate destructions of its localities, the species is endangered by water table decrease, changes in competitive rates among the species as a result of nutrient increase, and by the absence of suitable management (regular or occasional mowing).

869. PROTECTION OF THREATENED WETLAND PLANT SPECIES AS A PART OF ACTUAL FISHPOND MANAGEMENT

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In the Czech Republic, the fishpond management plays an important role in landscape use. Majority of nature conservators consider it as an activity leading to the damage of commercially not-utilisable organisms. In 1998-2008 we investigated several hundreds of ponds, used for fish breeding (fish ponds) or short-term fish storage (fish storage ponds) in various regions of the Czech Republic. Data on flora and vegetation, use and management, seed bank, and propagule dispersal were recorded. New localities of plant species listed in the National Red List, e.g. *Coleanthus subtilis, Lindernia procumbens, Najas minor* and *Tillaea aquatica,* were found. The richest on such species were the fish storage ponds, fingerling fishponds and fishponds with alternating breeding of fingerling and marketable fish. Disinfection liming, manuring with dung, vegetation mowing, herbicide application and periodical summer drainage were widely used management practices. In many threatened aquatic macrophytes and wetland annuls we detected survival in seed bank and dispersal with equipment used in fishpond management. We conclude that actual fishpond management contributes to maintenance of some threatened plant species, especially the herbs with low competitive ability. Partial damage of their populations is common but it is compensated by high seed bank density and dispersal potential.

870. EFFECTS OF AGRICULTURAL INTENSIFICATION ON PLANT DIVERSITY

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Agricultural intensification through irrigation, mechanization and use of both chemical fertilizers and pesticides has allowed a huge food production in the last 40 years, feeding 6,000 million people on the Earth. However, this process severely threatens worldwide biodiversity. Spain will increase agrarian intensification through irrigation in the next few years in up to 500,000 hectares. We evaluated the potential effect of this change in an agricultural landscape of 45,000 ha currently being converted into irrigation in the northwest of Spain. We compared plant biodiversity within crops under irrigation (maize and wheat) and dry cereal extensive cultivation (wheat and barley). Sixty-six linear transects of 75 meters located at 1 meter of crop edge were sampled. Average richness of plant species was higher in extensive dry crops (barley: 14.6±2.84 species/crop; wheat: 11.9±0.79 species/crop) than in irrigated wheat (10.1±1.55 species/crop) and maize (3.62±0.48 species/crop). We expect a general loss of plant diversity in this region as a result of agricultural intensification through irrigation, which is rapidly increasing the hectares devoted to maize crop.

871. THE EFFECT OF LIGHT ON FOREST UNDERSTORY IN DECIDUOUS-CONIFEROUS MIXED FORESTS IN WESTERN HUNGARY

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Through the stand structure and tree species composition human management strongly determines forest understory light, which is one of the most relevant environmental variables influencing the different plant groups. Relationships between light and herbs, ground floor and trunk dwelling bryophytes and seedlings were studied in 34 forests in Western Hungary. Redundancy analysis and correlations at different spatial scales were calculated to determine the effect of light on the community characteristics and on the cover of individual species. Light explained a relatively high proportion of the variance in all cases, and it had a considerable effect on species richness and total cover of the groups. Species within each plant group could be classified based on their response to light. Within herbs beside the “non-correlating species” “species of open areas” and “gap species” could be discriminated according to the spatial scale of their relationship to light. Epiphytic and epixylic bryophyte species were not related to light, but soil or mineral soil inhabiting bryophytes showed significant positive correlations with it. This study proved that different components of the forest understory respond to light in different ways, concerning the strength, direction and spatial scale of the relationships, which forest management should consider.

872. AN EFFICIENT METHODOLOGY TO IMPROVE THE ECOGEOGRAPHICAL REPRESENTATIVENESS OF EX SITU COLLECTIONS: THE *LUPINUS* CASE

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One of the main concerns of genebanks should be to conserve a representative sample of the genetic diversity of target species. A practical approach to achieve this goal is to plan a collection in which the accessions represent the ecological range of the species. However, for different reasons, this does not normally happen. An example of this situation is the *Lupinus* collection preserved at the CRF-INIA. Despite having over one thousand accessions from Spain, certain environments where the *Lupinus* species occur are not well represented in this genebank. In order to fill these gaps, the present work shows an efficient GIS-based methodology which employs gap analyses, ecogeographical maps, and species distribution models to identify priority sites for collecting *Lupinus* seeds. Using this methodology, 43 sites were selected to be visited, and 80 populations of four *Lupinus* species were located and collected. The new incorporated germplasm has provided a significant quantitative and qualitative improvement of this collection. For example, the number of *L. angustifolius* accessions increased over 6%, and the three environments previously not represented in the collection for this species were covered. These results show that the proposed methodology improves the ecological representativeness of genebanks while reducing the costs of collecting expeditions.

873. HUMAN ACTIVITIES AND THEIR ASSOCIATIONS WITH HABITAT AND SPECIES BIODIVERSITY IN THE GREEK NATURA 2000 NETWORK

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Human activities play an important role (negative or positive) in the conservation of biodiversity. Therefore, during the initial stage of planning the Greek Natura 2000 network, the scientists that recorded and mapped the habitat diversity of Greece also recorded the human activities they perceived as threats for biodiversity for each habitat and in each site of the network. In the present work, we analyzed this detailed data set of 1858 records of different human activities recorded at habitat type level, on 229 sites that have been included in the Greek Natura 2000 network of protected areas. We tried to identify the relationship between the recorded human activities and the sites biodiversity (estimated either at habitat or at plant species level). We found that groups of specific human activities could be associated with specific habitat types, indicating the possible existence of syndromes. However, these potential syndromes do not seem to be related in a clear cut way with plant species richness.

874. LICHEN COMMUNITIES ON THE ROOT-PLATES OF FALLEN TREES DEPEND MORE ON THE ROOT-PLATE CHARACTERISTICS THAN FOREST SITE TYPE AND MANAGEMENT

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Fallen trees are typical to old-growth forests, where they provide diverse and specific microsites for different organisms, including lichens. So far the multiple factors potentially affecting the lichen occurrence and communities on treefall root-plates have not been studied. We mapped and described treefalls in 24 forest stands (2 ha each) in a balanced design representing meso-eutrophic and drained swamp forests of two management treatments (old-growth, mature semi-natural forest) in hemiboreal Estonia. The occurrence of any lichens and of a treefall specialist-species, *Chaenotheca furfuracea*, was recorded for the 1207 root-plates found. According to a multi-level GLM, treefall characteristics were much more important determinants of these occurrences than stand variables, while forest site type and treatment had no influence. Communities on 84 spruce root-plates were described in detail: 47 lichen species were found (including 11 rare and/or protected species in Estonia). The community composition of small and large root-plates distinguished clearly on NMS ordination while there was a large overlap among stand categories. Our study shows that, for root-plate lichens, old-growth per se is not as significant as the availability of large, old (spruce) treefalls, i.e. managed forests could support these lichens in the presence of such treefalls.

875. ANTHROPOGENIC HABITAT ALTERATION INFLUENCES HOME-RANGE SIZE OF EUROPEAN GROUND SQUIRRELS (*SPERMOPHILUS CITELLUS*)

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Over the past decades, habitat loss and alteration have increasingly restricted European ground squirrel (*Spermophilus citellus*) aggregations in Austria to isolated fragments, and the species is listed as endangered. To investigate potential effects of habitat alteration on space use, we radio-collared ground squirrels at two different study sites; a secondary steppe with low anthropogenic influence and a highly altered, isolated alfalfa meadow. Home ranges were compared between the two study sites and sex and age differences were examined. In yearlings and older individuals, home ranges did not differ significantly between the two habitats and no sex-differences were found. However, juveniles covered larger areas at the secondary steppe than at the alfalfa meadow. Anthropogenic vegetation alteration provided nutritious food, probably resulting in smaller home ranges at the alfalfa meadow. Since juveniles have to complete growth and prehibernation fattening in a limited time period, quality and distribution of food resources can be crucial for overwinter survival. Hence, larger home ranges in the more limited steppe habitat are assumed to be due to selective foraging strategies. Although anthropogenic influence virtually has beneficial effects, increased attraction of predators due to high density and population isolation may lead to a higher vulnerability of these colonies.

876. TESTING THE SMALL ISLAND EFFECT ON HABITAT ISLANDS

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The species-area relationship, i.e. the increase of species number with area, is one of the oldest rules in ecology. Even though many studies have supported the accuracy of this relationship, a special pattern, the “Small Island Effect” (SIE), where species richness is independent of area has been neglected. For the detection of the SIE we used nonlinear regression (e.g. breakpoint regression, discontinuous breakpoint regression) and path analysis models (previously proposed in the literature) on 96 data sets from habitat islands (insular patches surrounded by a matrix of alternated land). The species-area relationship (SAR) was also investigated by applying, semi-logarithmic and logarithmic linear regression models. The SIE was detected nine out of the 96 data sets using the semi-log and log-log breakpoint regression models. According to the two traditional SAR models (semi-log and log-log model) the relationship between species number and area was statistically significant in 26 and 28 cases, respectively, with a significant number of cases where no significant correlation was observed. We conclude that a more comprehensive and complete model is needed for the study of the SIE and that other variables except area are needed for the study on a small spatial scale (fragmented landscapes).

877. INVESTIGATION OF WATER QUALITY AND PLANCTONIC CRUSTACEANS IN A RELICT WETLAND

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The Öregturján is a postglacial relict peat bog in Ócsa, Hungary. Despite being listed among the Ramsar Convention sites and a part of the Natura 2000 network, its aquatic habitats are still very poorly investigated. Its crustacean zooplankton is completely unknown. Nowadays, drying out and filling up seriously endanger its existence. I sampled 5 different ponds by three-week intervals for one year. Abiotic variables were measured with portable equipment and a spectrophotometer. Crustaceans were collected with plankton net and preserved in 70% ethanol and identified by stereo- and light microscopy. Data evaluation was made by using basic statistics and multivariate methods. The water bodies were remarkably different regarding their zooplankton assemblages which were basically influenced by vegetation and temperature. Despite some rare taxa also occurred (one of them being the second proven record of *Cyclops insignis* in Hungary), most species were typical of small eutrophic lakes. The high concentration of phosphate also indicated eutrophisation. Hopefully, my results will be considered when rehabilitation measures are planned. It should involve dredging the thick, muddy sediment and restoring large open water bodies by regular reed reaping.

878. POSSIBLE ROLE OF SOIL SEED BANKS IN RESTORATION OF HAY-MAKING MEADOWS

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Seed bank composition of dry-mesophilous Cirsio-Brachypodion grasslands and of Molinion fen-meadows was studied in the species-rich Gyertyánkút-meadows (NE-Hungary). In four stands of both type of vegetation species lists of vascular species were recorded (five 4m^2 sized permanent plots per stand) then soil seed banks were analyzed using the seedling emergence method combined with bulk reduction procedure on early spring samples. Dry-mesophilous grasslands had relatively sparse seed banks (4,800 – 7,000 seeds/m^2) with a low similarity to vegetation (Sørensen similarity: 0.17 – 0.20). Only a few species possessed persistent seed banks here. Contrary, fen-meadows had dense seed banks (65,000 – 94,000 seeds/m^2) with medium similarity to vegetation (Sørensen similarity: 0.27 – 0.40). Seed bank dominants of fen-meadows were *Juncus conglomeratus* and *J. effusus*. Further frequent species involved *Campanula patula, Carex pallescens, C. panicea, Luzula multiflora, Lychnis flos-cuculi* and *Potentilla erecta*. Contrary, no seeds of any of the frequent legally protected species (*Achillea ptarmica, Gentiana pneumonanthe, Gladiolus imbricatus*) were detected. The low seed densities in dry-mesophilous grasslands can be problematic when overgrown. Species loss of degraded sites can only be overcome by reintroduction of lost species. Similarly, lack of persistent seeds of some species and high densities of *Juncus* seeds could hamper restoration also in fen-meadows.

879. TRENDS OF ABANDONMENT IN AGRICULTURALLY UTILISED MOUNTAINOUS LANDSCAPE

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Nowadays, mountain and submountain agricultural land is facing distinct changes in the consequence of traditional management abandonment. Succession processes take over previously agriculturally-utilized landscape, and the slow comeback of forest communities can be observed mainly at the expanse of permanent grasslands. The cadastre areas of two neighbouring mountain villages - Nizna Boca (850 m n. m.) and Vysna Boca (950 m n. m.) in Low Tatras Mountain were analysed in ArcGIS programme in 2 time periods. The first period (until 1960’s) was characteristic by agricultural development, while the second represents current state characteristic by significant decline of husbandry

and transformation of both villages into recreational sites. Subsequently maps of land use changes were processed, and were further analysed. While in Nizna Boca cadastre an about 17 % of abandoned agricultural land was recorded from 22 % of total changed area, in Vysna Boca cadastre, which spreads in higher altitudes, land use changes and abandonment processes are more obvious. About 23 % of abandoned agricultural land was recorded here from 27 % of total changed area. Results show, that changes occurring in studied mountain villages were mostly related to abandonment of formerly utilized agricultural landscape. The meadows and pastures in hardly accessible areas were the most affected.

880. TRENDS OF ABANDONED AND USED WOODED PASTURES IN THE CARPATHIAN BASIN: HISTORY AND POSSIBILITIES FOR RESTORATION

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Understanding the traditional ecological knowledge and the vegetation of the woodpasturing-system is needed for the conservation of the wooded pastures. The wooded pastures are important elements of the traditional landscape. In the Carphatian basin cessation of the traditional land use system started fifty years ago. Nowadays in Hungary nearly all of the wooded pastures are abandoned, while in Transylvania they are still in use. Our aim was to understand the methods and the effects of the traditional pasturing and the regeneration dynamics of the abandoned wooded pastures. We studied the landscape history, the traditional ecological knowledge and analysed the vegetation dynamics of abandoned (Hungary:Bakony) and still used (Romania: Seklerland-Homoród) wooded pastures. Typical landscape has been formed by the management in both of the study sites, and. the grazing system was very similar as well. In both cases the grazing in forests was one of the basic components of a highly varied pasturing system; the whole activity was regulated by strict rules. In case of abandonment, mosaic of open and closed shrublands and forest patches filled by saplings have developed. Speed and process of regeneration dynamics, changes in forest structures and infilling by shrubs and saplings is studied.

881. BIODIVERZITY OF WILD HOPS ESTIMATED BY MOLECULAR MARKERS

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One of the most important part for preserving biodiversity of plant species are genebanks. However, it is necessary classify intraspecific diversity and differences between plants from various biogeographical areas by useful tools like molecular markers. Hop (*Humulus lupulus* L.) is dioecious, wind pollinated plant belongs to the family *Cannabaceae* and native widespread in the northern hemisphere. Variability of wild hops from genebank of the Hop Research Institute, Ltd. in Žatec was estimated, compared and also related by genomic SSRs and STS markers for identification of male plants. They were analysed wild hops from seven areas all around the world. Namely 23 French samples, 10 Swiss, 41 Canadian, 25 American, 32 Caucasian, 28 Spain and 15 Czech wild hops, respectively. The degree of expected and observed heterozygosity, the frequency of alleles and PIC (polymorphic information content) was evaluated statistically. They were compared relatedness of wild hops on basis of Dice's coefficient and the phylogenetic tree by UPGMA method was created. This research was supported by grant: Study of wild hops gene resources variability by SSR markers of GAFAPPZ-CULS in Prague 21360/13 12/31 34.

882. FRESHWATER AND WETLAND ECOLOGICAL STATE FROM GUADALQUIVIR BASIN (ANDALUSIA, SW SPAIN) BASED ON FISH AND AQUATIC INSECTS

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There is now a growing need for sensitive biological measures of aquatic ecosystem integrity as demonstrated in Europe with the implementation of the Water Framework Directive (WFD). The present status of European rivers must be based on four biotic elements, of which two are fish and aquatic insect. In this study we examined the relationships between ecological status and community conservation status of rivers to assess if tools derived from the WFD are adequate to guarantee the protection of aquatic biodiversity. Two hundred and forty sites were sampled throughout the Guadalquivir basin (SW Spain), from high mountain to river mouth. Data for fish were collected on spring 2008 using electric fishing, or fyke nets. The fish community conservation status in each site was assessed using and index inspired by the Conservation Value of Doadrio et al (1991). Aquatic insects were sampled twice (autumn 2007 and spring 2008) and an Iberian Biological Monitoring Working Party index (IBMWP') was calculated. This study shows that sites with a good ecological status based on WFD do not always display concordance with sites of high conservation value, which is important to rank priorities of sites with relevant features of biodiversity.

883. VARIABILITY OF GONOSOMAL SSR MARKERS IN TWO DOG BREEDS DERIVED FROM WOLF (*CANIS LUPUS LUPUS*): CZECHOSLOVAK WOLFDOG AND SAARLOOS WOLFDOG

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Part of eurasiatic wolves (*Canis lupus lupus* L.) genome is conserved in two dog breeds: Czechoslovak wolfdog and Saarloos wolfdog. Both dog breeds are based on designed crossbreedings between wolves and German shepherd dogs. Males and females of wolves were used in this breeding process. Main goal of this paper is molecular study of genetic variability of four SSR gonosomal loci. 119 individuals of Czechoslovak wolfdogs, 21 individuals of Saarloos wolfdogs and 56 individuals of German shepherd dogs were analysed. Loci FH2548 and FH2584 were used for X-gonosome variability estimation. Loci MS34A and MS34B were used for Y-gonosomes polymorphism detection. We disclosed that allele No. 1 of loci MS34A and allele No. 2 of loci MS34B have origin in wolf named Šarik, which was used in crossbreedings. Loci FH2548, FH2584, MS34A and MS34B of hemizygotic males were used for haplotypes description. Chi-sqare test was used for statistical evaluation alleles distribution differences among dog breeds. We discovered that distributions of SSR alleles of loci FH2548, FH2584, MS34A and MS34B were dependent on breeding classification. Presented results were supported by project of University of Life Science Prague

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884. TOOLS FOR ASSESSING POPULATIONS AND HABITATS FOR MARINE CONSERVATION AREAS AND SUSTAINABLE USE OF MARINE RESOURCES: FROM ALLOZYMES TO COMET ASSEYS

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Economically feasible and time efficient assessment and monitoring tools will increasingly be in demand for the conservation of stocks, species and habitats, especially if these are linked to Marine conservation areas and sustainable use requirements. Within future rates of environmental change scenarios due to climate change the assessment of the genetic diversity and integrity within populations, species and communities need urgent consideration to directly assess the potential exploited species and conservation areas have toward future preservation of fisheries world wide. Molecular genetic techniques provide essential tools to evaluate populations and habitats assisting the development of the best management and monitoring strategies. In the Maltese Islands, various coastal and marine species are being studied in order to assess and allow for monitoring local genetic diversity and integrity to improve management of natural resources. Studies using Enzyme Electrophoresis have assessed selected species of limpets, squids, fish, octupi, sea cucumbers and hermit crabs' populations around the islands and are presented here. The sea cucumber (*Holothuria poli*) and the sea-urchin (*Paracentrotus lividus*) were also used to assess habitat quality and its effects on the genetic integrity of its species, by using the Comet Assay technique with significant results.

885. FILLING GAPS IN THE KNOWLEDGE OF BIOLOGY AND ECOLOGY OF THE EURASIAN OTTER (*LUTRA LUTRA*): POPULATION MODELING FOR THE CZECH REPUBLIC (CR)

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The objective of this 3-year project is to create a population model which will allow for reliable evaluation of different future scenarios regarding the Eurasian otter population in the CR, especially when simulating anthropogenic influences. The project was divided into 5 research topics. The first two – Population status and Population dynamics – involve collection of basic data on otter population using methods such as snow tracking, genetic analysis of faeces, radio-tracking, or analyses of found carcasses. The remaining research topics are: Modeling, Proposal of suitable management plan, Proposal of additional measures, and involve statistical analyses of the collected data, population viability assessment, and subsequently drawing specific conclusions that can be applied in long-term conservation of the species. The research period is from 2008 to 2010, therefore our results are not yet complete. However, we already managed to get a population estimate for 2006 based on previous distribution data for the CR, and performed snow tracking in 2 areas of the country. During 2008, 25 carcasses were collected, 20 of them were already dissected and submitted to x-ray analysis of teeth and DNA isolation from tissue samples, together with some additional "older" specimens. A map with locations of found carcasses was prepared.

886. RESPONSES OF VERTEBRATE FEEDING GUILDS TO FOREST FRAGMENTATION IN THE NEOTROPICS – A REVIEW

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Fragmentation effects on tropical forest species still are poorly understood: Species' responses seem to be highly variable. In Neotropical birds, some feeding guilds seem to be especially vulnerable to forest fragmentation, whereas little is known about fragmentation sensitivity of mammals. We reviewed responses of terrestrial vertebrate groups to forest fragmentation in the Neotropics. We assumed that there is no difference in vulnerability across vertebrate groups but across feeding guilds. We conducted a literature search in the ISI Web of Science for international peer-reviewed articles on tropical forest fragmentation that use a spatial or temporal control. We extracted data on the studied vertebrate groups, feeding guilds, parameters, study designs and recorded fragmentation effects. We used Linear Mixed Models to assess the relationship between fragmentation effects on a species (response variable) and all other (random) variables. We obtained about 1000 species datasets of which more than 50% showed a negative response to fragmentation. The reported fragmentation effects were influenced by all variables. Those groups that were affected most (herpetofauna, insectivorous and carnivorous feeding guilds) might act as model species for conservation practice. Further, we recommend choosing study parameters and study design cautiously.

887. RESTORATION OF ALCALIC AND STEPPE GRASSLANDS IN ARABLE FILEDS WITH LOW DIVERSITY SEED MIXTURES

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We restored 496 ha grassland on former arable fields between 2005-2007. We aimed at to create a dense perennial cover by sowing seed mixtures of dominant alkali and loess grasses (*Festuca pseudovina, F. rupicola, Poa angustifolia, Bromus inermis*). We sowed the seed mixtures in density of 25kg/ha in 2005 and 2006, and 18kg/ha in 2007. From the first year we managed the sown fields onwards with mowing (once or twice a year) to prevent the regeneration of weed species. In the first spring after sowing the vegetation were dominated by herbaceous weeds (e.g. *Matricaria inodora, Capsella bursa-pastoris, Descurainia sophia, Cirsium arvense*). From the first year, to the second the perennial cover increased, and the species richness and the weed cover decreased significantly. We detected a slow spontaneous immigration of perennial herbaceous species in the restored fields (e.g. *Silene viscosa, Dianthus giganteiformis* ssp. *pontederae*, *Salvia nemorosa, Trifolium angulatum, T. striatum*). Our results suggest that the sowing of competitive grass seeds is an effective tool to restore alkali and loess grasslands,

but further management practices are needed to facilitate the colonisation of specialists and enhance the species richness of the restored grasslands (seeding, hay transport, grazing).

888. FACTORS FAVORING BUMBLEBEES IN ESTONIAN AGRICULTURAL LANDSCAPES

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The number and species-richness of bumblebees is declining rapidly. One of the reasons is claimed to be changes in land use and agricultural production. This study examines which factors in Estonian agricultural landscapes affect bumblebees the most in order to improve their life environment. The data was collected in 2006-2008 in the frame of evaluation of Agri-environment Scheme of the Estonian Rural Development Plan. Three regions were involved: West, Centre and South Estonia, 22 monitoring farms in each. Bumblebees were counted by using transect method (400m of transect covered field margins and 100m arable fields with entomofilous cultures). The number, species-richness and Shannon diversity index of bumblebees increased significantly with the increase of flower abundance. Thus, uncultivated field margins which offer food while the cultures are not flowering are very important. Growing leguminous in crop rotation is also increasing feeding options. In Centre Estonia, which has higher land use intensity and lower landscape diversity than in two other regions, the bumblebee indicators were decreasing significantly while the average field size was increasing. In South and West Estonia such significant correlation was not found – reason is probably higher proportion of compensation areas which offer enough alternative food resources and nesting sites.

889. POPULATION GENETICS OF THE IBERIAN THREE-SPINED STICKLEBACK (*GASTEROSTEUS ACULEATUS*)

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The three-spined stickleback *Gasterosteus aculeatus* Linnaeus, 1758 (Teleostei, *Gasterosteidae*) is a species included in several Red Lists in Portugal and Spain. Its distribution is quite localized in the Iberian Peninsula. We examined the genetic diversity and differentiation showed by *G. aculeatus* in 15 Iberian and one German population (external reference). For this, we genotyped 448 individuals using 18 nuclear microsatellite loci. There was significant differentiation between all surveyed populations, with Fst values ranging from 0.107 (rivers Asma-Rato, same hydrographic basin, Galicia, NW Spain) to 0.559 (Txingudi-Sado, Basque Country-Portugal). Principal component analysis showed two highly differentiated populations: Majorca and Mira (southernmost Portuguese locality), and the following clusters: Peñíscola (Valencia region, E Spain, extinct population), Tagus river (Portugal), Basques (n = 3)/Northern Portuguese (n = 2)/German populations, and Galician (n = 5)/Sado (Southern part of Portugal, between Tagus and Mira rivers). The most genetically diverse population was Vouga (N Portugal: unbiased He=0.6627,8.82 alleles/locus),whereas the Basque Txingudi and the Portuguese Sado were the localities with lowest variability values (unbiased He = 0.3997, 0.3548 and 2.78, 3.72 alleles/locus, respectively). We sequenced 1400 bp of mtDNA comprising part of the control region and the cytochrome b. Up to 20 individuals per population were surveyed using this technique. Undergoing analyses with the mtDNA haplotypes will complement the pattern provided by nuclear microsatellite loci.

890. INVESTIGATION OF TERRITORY AND MATE FIDELITY AMONG EASTERN IMPERIAL EAGLES (*AQUILA HELIACA*) OF THE CARPATHIAN BASIN, BASED ON INDIVIDUAL DNA-PROFILES

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In our study we determined the sex and the DNA-profiles of Eastern imperial eagles (*Aquila heliaca*) of the Carpathian basin for nature conservation and population dynamical purposes. Samples from 126 nests were collected and compared in order to determine: (i) fidelity to territory and mates, (ii) mortality rates, (iii) inbreeding. We extracted DNA from adult eagles' shed feathers (non-invasive), and chicks' blood drop samples taken during the ringing procedure (non-destructive). DNA extractions from 648 samples were followed by molecular sexing: 87.1% of the adult samples were from females and only 12.9% from males. This phenomenon can be explained by our sampling method, as most of the feathers were collected around the nests, where females spend significantly more time. Balanced (1:1) sex ratio was found among the chicks (binomial test, $p = 0.7893$). We used six fluorescently labelled primers designed for highly polymorphic loci to prepare individual DNA-profiles by using PCR and capillary electrophoresis. We determined so far the individual patterns of 224 eagles and arranged them into a database.

891. IMPORTANCE OF CROSS-TAXON APPROACH FOR THE BIODIVERSITY CONSERVATION: EXAMPLE OF DOLICHOPODID FLIES (DIPTERA) AND VASCULAR PLANTS IN LATVIA

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Cross-taxon approach has been increasingly shown as important for the biodiversity evaluation. However, it is still performed mainly in the context of vascular plants and vertebrates in Latvia. Purposes of present study were to assess cross-taxon congruence in the pattern of species richness and community composition of vascular plants and dolichopodid flies, to show specific ecological requirements of dolichopodid flies and to assess the importance of cross-taxon approach for overall biodiversity conservation. Fieldwork was carried out in the Lake Engure Nature Park. Vegetation was described in 1x1m plots, and dolichopodid flies were collected using water traps and soil emergence traps. Species richness of examined taxa did not correlated among investigated sites - coastal marshlands were dominated by only few plant species but had rich dolichopodid fauna. Although patterns of community composition among investigated sites were similar for both studied taxa, every community was influenced by different ecological factors. Thus, importance

of various habitats differs for studied taxa. Comparison of spatial distribution of adult flies and larvae demonstrated multi-habitat use of dolichopodids, which reveals specific small-scale ecological requirements of this invertebrate group. In conclusion, this study clearly shows that cross-taxon approach should be integrated for the overall biodiversity evaluation.

892. SUPERABSORBENT POLYMER INFLUENCE ON AFFORESTATION EFFECTIVENESS IN SERBIA

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During the eighties of the twentieth century, the American scientists, aiming at the intensified agricultural production based on polymers defined the substance called Super Absorbent Polymer. The functional principle of this substance is that each free monomer which is present in the superabsorbent absorbs the contacted water, retains it and releases it when it is not available in the environment. The establishment of the network of field experiments started in the spring 2008, in the aim of testing the effect of polymers in the re/afforestation of cinder dumps, burnt areas and degraded areas in climatically modified conditions. The analysis of polymer effect on seedling survival and development in the first year after transplanting, in the reforestation of burnt areas, was performed in a part of the Sands Deliblatska Peščara, where a pine plantation was destroyed by wildfire and on locality Ibarska Gorge. Experiments were established with Scots pine seedlings aged 2+0, produced in Nisula rolls and with Austrian pine container seedlings aged 2+0. The study results, taking into account the extreme climate conditions, degraded, sandy soil and the economic gain, point to the justification of mass application of organic powder polymers in the reforestation of difficult terrains degraded by wildfires.

893. IMPORTANCE OF SPATIAL ORGANIZATION AND INHERENT TEMPORAL DYNAMICS OF *BRACHYPODIUM* GRASSLAND IN EVALUATING THE EFFECTIVENESS OF ITS MANAGEMENT

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Within-stand spatial heterogeneity is expected to influence spatiotemporal dynamics, which was tested in 18 seminatural and 16 degraded *Brachypodium* stands in Hungary. After capturing fine-scale spatial pattern differences between seminatural and degraded stands and defining the natural variation range of seminatural stands as a reference, we performed burning experiments in 3 seminatural, slightly and heavily degraded stands. Presences of plant species were recorded along 52 m permanent circular belt transects of 1040 units of 25 cm2 contiguous microquadrats. We applied a multiscale methodological approach and coenostate-space representation. Diversity of species combinations (structural complexity) and the measures of multispecies spatial dependence (spatial organization) calculated for a range of spatial scales were used to describe the temporal processes of treated stands of different naturalness. There was no trend but fluctuation over 5 years, however, higher relative interannual variability (CV %) was detected at the degraded stands indicating weaker spatial organization and larger vulnerability relative to the seminatural stands. We found that within-stand spatial complexity significantly affected plant community responses to burning. Dynamic references (inherent control changes) and long-term monitoring are required for evaluating the effects of treatments and to decide whether the stands are capable of recovery or they undergo further degradation.

894. SURVIVAL OF ARTIFICIALLY REARED SEA TROUT (*SALMO TRUTTA TRUTTA* L.) JUVENILES IN NATURAL ENVIRONMENT

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The main target in salmonid restocking is to provide viable fish capable to quickly adopt in natural environmental. Correct selection of rivers and physiological state of artificially reared fish is of top importance. Assessment of adaptation capabilities of released fishes could be done through estimation of mortality in natural environmental. The aim of present study is to assess reared fish physiological status, estimate mortality in natural environmental and to determine stocking efficiency. Growth, physiological state and immune system of artificially reared sea trout were assessed using complex of biological methods. Stocking in a selected stream were undertaken in May with fry and in September with tagged juveniles. Prior to autumn stocking electrofishing survey was done to assess fish communities and impact of spring fish stocking. Autumn fish stocking and changes in fish communities were assessed with second electrofishing survey in the end of October. During autumn we assessed physiological state of specimens grown in 3 different environmental conditions: stocked in spring and grown in the stream (1), reared till autumn and released in stream (2) and specimens of natural spawning (3). Efficiency of spring and autumn stocking were estimated, as well as impact of stocking fish quality and survival in natural conditions.

895. A MULTI TAXA APPROACH TO STUDY MOUNTAIN ECOSYSTEMS: DEVELOPING AN EXPORTABLE LONG TERM BIODIVERSITY MONITORING PROGRAMME

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Mountain ecosystems, because of their altitudinal gradient, generally show high biodiversity levels and are characterised by species with particular adaptations to high altitude and low temperatures making them potentially more sensitive to climatic and environmental variation. The ongoing global loss of biodiversity urges the need to monitor and understand the factors that affect variations in biological diversity especially in protected areas. Therefore, three protected areas (Gran Paradiso National Park; Orsiera-Rocciavrè Natural Park and Alpe Veglia-Devero Natural Park) located in the North-western Italian Alps, started a joint monitoring programme to study animal biodiversity in fixed sampling plots (N=69) along an altitudinal gradient (range: 650-2700 m a.s.l.). In every plot we collected data on Aves, Lepidopterae, Staphilinidae, Carabidae and Araneae, censused by standardized, repeatable and cheap methods from 2006 to 2008. The first results allowed for finding biodiversity surrogates and identifying priority conservation areas. In addition we analysed the influence of environmental and climatic factors on biological diversity and community composition.

The importance of this project resides in the development of a biodiversity monitoring programme suitable for mountain environments which can be implemented on a long term and on large spatial scales.

896. COLONIZATION OF SPOIL BANKS BY AMPHIBIANS

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Measures for conservation of amphibians are needed due to the considerable sensitivity of this animal class to changes in environment and due to the worldwide decline in their abundance. This phenomenon is a result of landscape destruction and landscape changes, including open-cast mining. After the end of mining here, interesting habitats began to arise, which are gradually being colonized by many organisms, including amphibians. This paper synthesizes our own results and literature findings on problems of amphibian colonization of man-made habitats, particularly locations affected by open-cast mining in northwest Bohemia (Czech Republic). We found that post-mining areas, and particularly technically unreclaimed spoil banks, can provide a suitable environment for amphibians. Though spontaneous succession is generally a better and cheaper reclamation option, technical reclamation is widely used in the Czech Republic. For effective conservation of amphibian populations in post-mining areas, we must protect both water and the terrestrial environment, and also provide connectivity of these areas with their valuable surroundings.

897. AMPHIBIAN *CHYTRID FUNGUS* IN HUNGARY

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Batrachochytrium dendrobatidis is a recently emerged amphibian pathogen, causing the disease chytridiomycosis, which has been identified as a cause of mass amphibian mortality and a factor influencing world-wide amphibian declines. The disease has been considered responsible for amphibian declines in the Americas, Caribbean, Africa, Australia, New Zealand, and the range of the pathogen recently expanded into Europe. Within Europe the infection was detected already in 1/3 of Europe's amphibian fauna in 9 countries, including Hungary, which is the easternmost record in the continent. In the previous years we performed preliminary studies on the distribution of chytridiomycosis in Hungarian amphibians. We sampled 162 specimens of 7 species (*Salamandra salamandra*, *Bombina variegata*, *Bufo bufo*, *Rana dalmatina*, *R.temporaria*, *R.esculenta*, *R.ridibunda*) in four regions of Hungary (Őrség, Pilis, Bakony, Zemplén), and we screened the samples with quantitative real-time PCR of the ITS-1/5.8S ribosomal DNA region of *B. dendrobatidis*. The pathogen was detected in three of the four regions, and in two species (*B.variegata*, *R.temporaria*). No evidence for decline of either of the species has been observed in the regions where *B.dendrobatidis* was present. Additionally, we examined a laboratory *Xenopus laevis* colony, where the fungus was found on 17 of the 58 specimens.

898. AN INTEGRATED NETWORK OF HIGH BIODIVERSITY AND ACOUSTIC VALUE IN GREECE

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Our aim was to identify areas of conservation priority based on criteria of biodiversity and quietness. We overlaid the network of areas of high biodiversity, as those were identified in the "Natura 2000" network, with areas of high acoustic value, as those were introduced in the European Noise Policy. To define the latter, we constructed a noise map using GIS and a dynamic criteria system of human related activities, topography and land use. This resulted in a map depicting Quiet Areas in Greece. We then superimposed the two networks ("Natura 2000" and Quiet Areas network). The union revealed that agricultural areas possessed the highest percentage of the common network, followed by forests/semi-natural areas. In the intersection the network was quasi-equally covered by artificial surfaces, aquatic surfaces and forests/semi-natural areas. It is of vital importance to incorporate additional elements, i.e. noise maps, in the study of landscapes in order to comprehend cognitive landscapes. Landscape and its corresponding soundscape can contribute to this goal since they reflect uniquely the heterogeneity of the environment. The construction of a common network between quiet areas and areas protected under the "Natura 2000" network could become a useful tool for the conservation of high biodiversity regions.

899. THE CONSERVATION STATUS OF BARBARY MACAQUES IN THE DJEBELA REGION OF NORTHERN MOROCCO

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Little attention has been paid to the small Barbary macaque population in the Djebela region of northern Morocco which predominantly occurs outside protected areas. This study describes population survey work on the species in this area along with the results of a human wildlife conflict survey which took place in 2004. The species is now found in two separate populations in northern Morocco and is estimated to number 600 animals. A questionnaire survey found that the majority of farmers owned their land and goats were the most common livestock kept. The majority of respondents were subsistence farmers and respondents named the wild boar and the Barbary macaque as the most destructive crop raiders. In some areas macaques are trapped and then killed as a result of their crop raiding activities and they were also observed to be the focus of regular harassment by shepherds and their dogs in the mountains. This study found that Barbary macaques are still present in the Djebela region of northern Morocco but are declining due to anthropogenic pressures on their habitat.

900. POPULATION DYNAMICS OF ENDANGERED FISH IN STREAMS OF THE TAPOLCA BASIN

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Fish fauna of the streams in the Tapolca Basin was monitored between 2003 and 2008. The Tapolca Basin is located in the west part of the Balaton Highlands and belongs to the Balaton Uplands National Park. Fish fauna survey proved occurrence of 26 fish species with electric fishing in six habitats. According to the NATURA 2000 and IUCN categories, several endangered and rare fish species (*Gobio gobio*, *Rhodeus sericeus*, *Misgurnusfossilis*, *Cobitis elongatoides*, *Umbra krameri*) have self-sustaining populations in the Ederics stream, Lesence stream, Kétöles stream, Tapolca stream and Eger stream. Population dynamics analyses were used to study age structure, growth of the populations, patterns of habitat use in case of the five species. We provide new data about the population dynamics of protected and vulnerable fish species which is a particularly important for national protection organizations to create conservation action plans.

901. THE IMPACT OF HUMAN SETTLEMENTS ON PRIMATE PARASITE BURDEN: SADDLE-BACK AND MOUSTACHED TAMARINS IN PERU AND LONG-TAILED MACAQUES IN THAILAND

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There is a growing recognition that the transfer of pathogens between humans and primates can be of great significance for conservation biology. The transmission of human pathogens to wild primates can lead to major population crashes. In this study, two tamarin species (Saguinus fuscicollis nigrifrons and Saguinus mystax mystax) and a macaque species (Macaca fascicularis) were used as models to determine in transfer of helminth parasites between nearby human settlements and wild primates. We screened fecal samples of monkey groups differring in their proximity to humans and their facilities and analyzed stool samples of the villagers.The human population showed high prevalences on infestation with a number of helminth species including Ascaris, Trichuris, Strongyloides, Opisthorchis viverriniand hookworm. The monkey populations also contained a number of species of helminth eggs including those from Prosthenorchis elegans. Evaluation of the data suggests that transfer between humans and primates is limited. However, we show that significant differences between the parasite infections of human contact groups and sylvatic groups occur, indicating that the presence of humans has a significant negative impact on the parasite burdens of wild monkeys.

902. CONSERVATION GENETICS OF THE ENDANGERED RIPARIAN PLANT *MYRICARIA GERMANICA*

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The restoration of rivers to near-natural structures and flow regimes is an important measure for the conservation of riparian flora and fauna, and millions of dollars are used annually for such restoration projects. However, it remains unclear whether the characteristic species requiring a dynamic riverscape do actually profit from such restorations. *Myricaria germanica* is an important character plant of open gravel banks along rivers. This shrub pioneer species requires natural river dynamics and, due to river corrections leading to the destruction of its habitat, it has gone extinct along most rivers of Central Europe. Large populations of this species are mainly found in the headwaters of rivers, e.g. in the Swiss Alps. We analyze the hierarchical genetic structure of *M. germanica* using species-specific nuclear microsatellite markers to infer historical gene flow. Moreover, using Bayesian clustering methods, we define major biogeographic clusters. We use the results to evaluate the species' performance in restored rivers.

903. PHYLOGENETIC RELATIONSHIPS IN OWLS (*STRIGIFORMES*) BASED ON MITOCHONDRIAL AND NUCLEAR GENES

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For 97 owl taxa from 15 of the larger genera (some monotypic taxa are not represented) a molecular phylogeny was inferred from a combined dataset of nucleotide sequences of mitochondrial cytochrome b and nuclear RAG-1 genes. The molecular phylogeny can be used to create a taxonomic framework, which agrees with cladistics. Strigiformes are divided into two families: *Tytonidae* and *Strigidae*. The *Tytonidae* are subdivided into the subfamilies *Tytoninae* (with *Tyto*) and *Phodilinae* (with *Phodilus*). The *Strigidae* cluster in three subfamilies: *Striginae*, *Surniinae* and *Ninoxinae* (with the genera *Ninox*, and possibly the monotypic *Uroglaux* and *Sceloglaux*). The *Surniinae* are subdivided in three tribes *Surnini* (with *Surnia, Glaucidium* and *Taenioglaux*), *Athenini* (with *Athene*) and *Aegolini* (with *Aegolius*). The *Striginae* are subdivided into six tribes: *Bubonini* (with *Bubo* including the former *Nyctea, Ketupa* and *Scotopelia*), *Strigini* (with *Strix* and *Jubula*), *Pulsatrigini* (with *Pulsatrix* and *Lophostrix*), *Megascopini* (with *Megascops* and *Psiloscops*), *Otini* (with *Otus* and *Mimizuku*) and *Asionini* (with *Asio, Ptilopsis* and possibly the monotypic *Nesasio* and *Pseudoscops*).

904. THE STATUS OF SOME THREATENED PLANT POPULATIONS OF "VALEA LUI DAVID" NATURAL RESERVE, IASI (ROMANIA)

Zamfirescu, Oana, Alexandru Ioan Cuza University of Iasi, Romania; **Zamfirescu, Stefan Remus**, Alexandru Ioan Cuza University of Iasi, Romania

This study aims to present the actual situation of populations belonging to four species with special status of conservation according to the Red List of vascular plants of Romania. The study area, Valea lui David (David's Valley) natural reserve, is situated in the north-eastern Romania, it has 46.36ha and it is assimilated to the forth IUCN category of protected areas. Between 2006 and 2008, *Polygala sibirica* has not been found although the species had been recorded in the 60s. The other three species have been constantly recorded during our research. *Amygdalus nana* and *Iris brandzae* have a dispersion ability relatively reduced because of the asexual reproduction (stolons and rhizoms). *Crambe tataria* disperse more extensively because of the zoochory. New plants of this species appeared outside the original recorded groups during the study. Oppositely, the abundance increase in *Amygdalus nana* and *Iris brandzae* has been mainly achieved through an augmentation of the density in the initially recorded groups. These observations allow us to infer that in favourable ecological conditions *Amygdalus nana* and *Iris brandzae* will persist and extend in the proper habits through vegetative reproduction, whereas *Crambe tataria* may colonise unoccupied patches shifting from a contagious to a uniform dispersion.

905. IMPORTANT HERPETOLOGICAL AREAS FROM IASI COUNTY (ROMANIA)

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Our study aims to present the herpetofauna of Iasi County emphasising on the species value from the perspective of the European regulations on the conservation of nature. The study area (5476 km²) lies in the northeast of Romania. The landscape comprises mainly steppic habitats, agricultural fields, and numerous streams, rivers, ponds and lakes. The hills (400-500m a.s.l.) along the western and southern borders are covered with deciduous forests. We recorded 14 species of amphibians and 9 species of reptiles from 62 sampling sites. At least one species of community interest was recorded in all the sampling sites. In 54 sites we recorded at least one species of community interest whose conservation requires the designation of special areas of conservation. One of the most important species is *Vipera ursinii moldavica* represented by two populations which live in steppic habitats of community interest whose conservation requires the designation of special areas of conservation. The two populations are similar with regard to fitness and heterozygosity, although one lives in an unprotected area and the other one, in a natural reserve. All these observations imply that the 54 sites should be monitored in the future and, eventually, should be put under legal protection.

906. BIRD COMMUNITIES OF FORESTS WITH DIFFERENT TYPES OF MANAGEMENT

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This contribution is a part of a project which has to compare the particular silvicultural systems from different points of view: productional, economical, ecological as well as environmental. It aims the complex evaluation of the close-to-nature silviculture. The research will take place in particular conditions of the Central Bohemia, in site conditions representing large areas. The effect will be studied of particular silvicultural systems on the forest ecosystem biodiversity. Bird communities were studied by using the point-counting method during the nesting seasons 2007-2008. The results shows us considerably that the close-to-nature forests, where the selected harvest and natural reproduction is used, have a higher number of species, diversity and more rare species opposite to forest plantations with clear-cutting harvest. The results offer suitable conclusions for the silviculture strategy as well as for the silvicultural system selection and support.

907. LANDSCAPE PATTERN AND SPECIES RICHNESS DISTRIBUTION WITHIN LAND UNITS

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Landscape modification and habitat fragmentation are threats to biodiversity. Therefore, the landscape represents an appropriate level to address conservation actions. The aim of this work is to identify the relation between landscape pattern and distribution of species richness for different taxa within land homogeneous units. The study area is the province of Rome, where millennia of human impact increased the natural heterogeneity. Through the land ecological classification we defined the land units and for each unit we evaluated the landscape pattern with indexes of structure, composition and conservation. The multi-taxon data is represented by a group of species belonging to different taxonomic groups (vascular plants, mammals, amphibians, reptiles and birds), selected according to official red lists, Natura 2000 and regional laws. Redundancy Analysis was used to analyse the relationships between species richness, abiotic features (climate, lito-morphology) and landscape indexes. The results show that higher species richness of mammals and vascular plants occur in temperate calcareous and sandstone land units characterised by a mosaic of natural and seminatural land use types; while birds, amphibians and reptiles persist mainly in the mediterranean climatic region with high abiotic and land use heterogeneity. Our results allow shift from "islands" to whole landscape conservation.

908. SPATIAL USE OF THE RED FOX AS A POSSIBLE PREDATOR OF GROUND-BREEDING BIRDS IN THE NATURE RESERVE HAVELLÄNDISCHES LUCH IN BRANDENBURG, GERMANY

Zeller, Ulrich, Humboldt-University, Germany; **Wicke, Marcus**, Humboldt-University, Germany;

The aim of the doctoral thesis is the development and recommendation of new management strategies for the agricultural use of the habitats of ground-breeding birds, especially the critically endangered great bustard (*Otis tarda*). In this cooperation project of the working group Prof. Dr. Ulrich Zeller from the Museum of Natural History in Berlin with the nature conservation station Buckow in Brandenburg the spatial use of the red fox (*Vulpes vulpes*) that is supposed to be the main loss cause of ground-breeding birds in the nature reserve Havelländisches Luch should be examined to influence them by the support of certain spatial structures. For this purpose, the first of about 15 foxes are currently equipped with GPS-transceiver collars to analyse the habitat uses and homeranges as a function of the scenery structures for a period of two years in pinpoint accuracy. At the moment the first tracking data is evaluated by means of the accomplished habitat mapping. With the results the work complements the research needed to the complex of predation and contributes with it to the protection and preservation of the ground-breeding birds and the rise of the structural variety in their habitats.

909. ANALYSIS OF SNOW TRACKING DATA WITH DIFFERENT OBSERVATION INTENSITY – A COMPARISON OF TWO MODELLING APPROACHES

Zeppenfeld, Thorsten, Bavarian Forest National Park, Research and Documentation, Germany; **Reineking, Björn**, University of Bayreuth, Biogeographical Modelling, Germany; **Heurich, Marco**, Bavarian Forest National Park, Research and Documentation, Germany

Snow tracking is a common technique to derive abundance indices of large mammals. One typical challenge in the analysis of such data is inhomogeneous observation intensity (restriction to hiking trails, limited available man power). Here, we compared two statistical approaches that account for the different observation intensities with respect to their robustness and accuracy. We analysed data of snow tracking surveys conducted in the years between 1997 and 2006 in the Bavarian Forest National Park, Germany. The first statistical approach consisted of a non-parametric modelling with an isotropic Gaussian kernel. It was performed on the tracking point data and afterwards corrected by a similar kernel of equidistant waypoints (100 m) along the surveyed trails. The second approach was a generalised additive model (GAM). Here the number of animal tracks per unit path-length was predicted by a smoothing spline of the geographical coordinates. The performance of the two approaches was assessed by 10-fold crossvalidation of the snow-tracking data. Both methods produced similar results

on the snow tracking data. In comparison, the GAM approach has the advantage of an easy integration of environmental information (e.g. elevation, vegetation cover) in the modelling of snow track intensities.

910. HOW INVADING SPECIES AVOID INFECTION: PARASITES AND IMMUNOCOMPETENCE IN THE GREEN *CRAB CARCINUS MAENAS*

Zetlmeisl, Claudia, University of Karlsruhe, Germany; **Petney, Trevor**, University of Karlsruhe, Germany; **Taraschewski, Horst**, University of Karlsruhe, Germany

Invasive species are a major factor in today's conservation biology. The underlying mechanics that lead to the success of certain alien species, however, are often not well understood. Gaining more knowledge in this field is crucial for the development of management strategies. The European shore crab *Carcinus maenas* invaded five continents, with substantial negative impacts on the local fauna. Its exceptional invasion success has been attributed in part to the loss of parasites during colonization (parasite release hypothesis), and parasites are under consideration for biological control. However, the effect of most parasites on crab fitness in the native range is largely unknown. We investigated *C. maenas* populations in Europe for parasites and their impact on hemocyte concentration in the hemolymph as an indicator for immunocompetence. Results indicate that helminth parasites can have a significant impact on total hemocyte counts (THC). We found increased THC-levels in crabs parasitized by microphallid trematodes and an acanthocephalan in one population. Our findings suggest that parasite infestation can alter host immunocompetence and hence its ability to deal with bacterial infections and injuries. Detailed knowledge on the factors enabling invasion success are a prerequisite for the management and control of invaders.

911. CONSERVATION AND RESTORATION OF THE "BARRANCA DEL METLAC" (VERACRUZ, MEXICO) FOR A LOCAL SUSTAINABLE DEVELOPMENT

Zilli Debernardi, Emilio, Universidad Veracruzana -- Vecinos y Amigos del Ambiente y del Patrimonio Cultural - Vecinos y Amigos del Metlac, Mexico; **Machorro Rodríguez, Maria Alicia**, Vecinos y Amigos del Ambiente y del Patrimonio Cultural - Vecinos y Amigos del Metlac, Mexico; **González Machorro, Maili Alicia**, Universidad Internacional de Andalucia -- Vecinos y Amigos del Ambiente y del Patrimonio Cultural -- Vecinos y Amigos del Metlac, Spain

The "Barranca del Metlac" is a picturesque valley located in the State of Veracruz (Mexico). Although the area has great potential being an important tourist attraction, it is severely affected due to population growth, industrial pollution and sewages. In order to stop the degradation of this site, the civic association called "Neighbors and Friends of Metlac", member of the network "Neighbors and Friends of the Environment and Cultural Heritage", acting according in agreement with the principles "Strengthening Citizen Participation, Inducing Community Management, Promoting the Construction of Social Capital" proposes an integration project designed for the conservation and restoration of the ecosystem and for a sustainable development. The project also addresses to the rescue and reassessment of pre-hispanic expressions (like "Xochitlalli" - "Flowering Land", cosmic vision of indigenous values), rehabilitation and conservation of the Fortín - Ixtaczoquitlán railway and adjacent buildings as cultural sites. The "Green Road Route of Popular Knowledge" connects the local communities with the Ixtac Campus of the Veracruz State University. It is also intended to create "virtuous circles" in order to establish programs for local development and implement projects involving governmental bodies, public and researchers, having as ultimate goal the declaration of this area as Ramsar Site.

912. EFFECT OF WINDTHROW AND ITS MANAGEMENT ON BREEDING BIRDS' COMMUNITIES IN A MANAGED FOREST

Żmihorski, Michał, Museum and Institute of Zoology, Polish Academy of Sciences, Poland

This study aimed at evaluating the impact of windthrow and two types of its management on the bird community of a managed, pine-dominated forest (NE Poland), where a windstorm event occurred. In 2007, the bird species composition was assessed, by the point counts method, in three types of habitat: windthrow left for natural regeneration, cleared windthrow (all fallen trees removed), and managed forest (undisturbed by the windstorm). In total, 2365 bird individuals belonging to 70 species were recorded in the three analyzed habitats. The mean number of specimens per point and species per point was significantly higher in the left windthrow than in the two other habitats. The diversity of bird community was higher in the left and cleared windthrow, as compared to the undisturbed forest. The mean number of rare or threatened bird species per point was significantly higher at both disturbed habitats as compared to closed canopy forest. The bird community of the undisturbed forest was significantly more similar to that in the left windthrow than to that in the cleared windthrow. These results lead to a conclusion that bird community was affected more by windthrow followed by clearing and artificial replanting than by the windthrow itself.

913. ARE RED-LISTED BUTTERFLIES GOOD INDICATORS FOR BUTTERFLIES AND GRASSHOPPERS? A CASE STUDY IN A MEDITERRANEAN MOUNTAINOUS RESERVE, GREECE

Zografou, Konstantina, Department of Environmental & Natural Resources Management, University of Ioannina, Seferi 2, 30100 Agrinio, Greece; **Sfenthourakis, Spyros**, Section of Animal Biology, Department of Biology, University of Patras, 26500 Patra, Greece; **Pullin, Andrew**, School of the Environment and Natural Resources, Bangor, Gwynedd LL57 2UW, United Kingdom; **Kati, Vassilki**, Department of Environmental & Natural Resources Management, University of Ioannina, Seferi 2, 30100 Agrinio, Greece

The indicator value of red-listed butterflies, butterflies and grasshoppers has been tested for each other in terms of diversity patterns congruence and complementarity. We sampled 22 sites representing the main habitat types of Grammos Mountain, a site in the NATURA 2000 network, in NW Greece. Grammos is proposed as new Prime Butterfly Area for Greece, because it includes two species of Prime Butterflies Area Project, 24 species of European conservation concern (SPEC), and 112 butterfly species overall. We also recorded 56 grasshopper species. The covariance of the species richness patterns of SPEC butterflies, butterflies and grasshoppers was strong. This is attributed merely to the three common ecological factors that influenced their diversity patterns: number of flower heads, altitude, and cover of low trees or bushes (Redundancy Analysis, CANOCO). The complementary network of each group maintained well the species richness of the other two target groups (18% average species loss). We found that SPEC butterflies were the best indicator group among the three, in reflecting the patterns of the others. The future monitoring scheme and management plan of Grammos protected site should definitely include SPEC butterflies as a target group for conservation management.

914. COULD INCREASED INTERSPECIFIC COMPETITION DUE TO CLIMATE CHANGE PRESENT A THREAT TO ENDEMIC HORVATH'S ROCK LIZARD (*IBEROLACERTA HORVATHI*)?

Žagar, Anamarija, Societas herpetologica slovenica, Večna pot 111, SI-1000 Ljubljana, Slovenia; **Krofel, Miha**, Biotechnical Faculty, Večna pot 111, SI-1000 Ljubljana, Slovenia; **Vrezec, Al**, National Institute of Biology, Večna pot 111, SI-Ljubljana, Slovenia

The impact of climate change on biodiversity can result in alternations of interspecific relations between sympatric species, which are responsible for changes in natural communities, and even for endemic species extinctions. As an example the Horvath's Rock Lizard (*Iberolacerta horvathi*), an endemic reptile of Dinaric Mountains and Eastern Alps, is taken into consideration. During preliminary study of reptile community in Northern Dinaric Mts. we observed that the species is locally occurring sympatric to Common Wall Lizard (*Podarcis muralis*). The species' abundance is significantly negatively correlated with *I. horvathi* being most abundant at higher, and *P. muralis* at lower altitudes. According to known distribution patterns of both species we argue that this competition is asymmetric with competitively superior *P. muralis* displacing *I. horvathi* from lower elevations. Considering global warming trends the more termophilic *P. muralis* could be able to expand its range to higher elevations, and thereby exclude relict *I. horvathi* from its high elevated refugia. To test this hypothesis, it would be important to evaluate expansion potential of *P. muralis* under changed climate conditions, and to establish competitive strength of each species by comparing ecological characteristics of allopatric and sympatric populations in the future studies.

915. THE URBANIZATION OF THE HOODED CROW (*CORVUS CORNIX* L.) IN DEBRECEN (HUNGARY)

Juhász, Lajos, University of Debrecen, Hungary; **Kövér, László**, University of Debrecen, Hungary; **Gyüre, Péter**, University of Debrecen, Hungary

The urbanization of Hooded Crow (*Corvus cornix* L.) in Debrecen was observed in 1959 and since that it has accelerated, especially at the last years. In our research we discovered the main reasons of the Hooded Crow's urbanisation by literature and weekly observations. Due to our examinations we found 11, 12 and 24 occupied nests, at 2006, 2007 and 2008. The nests were built in 11 different tree species at 14 to 19 meters high, in all cases hidden at the top of tree. We concluded that the urbanised individuals of the crows prefer the characteristics of the tree instead of the tree species. In Debrecen the crows divided up the area among each other. In 2007 and in 2008 we could reach many nests with a crane basket and we marked 21 nestling with colour rings. This number of individuals causes enormous harms to the bird fauna of the city as they became preys of eggs and nestlings. Nowadays the increasing of the Hooded Crow's number is unsolved. Principally has to be more intensive population control by game management associations outside the city, and preventive steps inside the town by traps would be mean solution.

AUTHOR INDEX

Caprimulgus europaeus
Graphics by Václav Bartuška

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ERRATUM

2nd EUROPEAN CONGRESS OF CONSERVATION BIOLOGY, PRAGUE 2009

PART I. - Improved abstracts or changed lists of authors

ORAL PRESENTATIONS:

223. HUMAN IMPACT ON STABILIZED POPULATIONS OF THE HYBRID NARCISSUS PEREZLARAE (AMARYLLIDACEAE) IN THE VALENCIA COMMUNITY (SPAIN)

Marques, Isabel, Museu Nacional de História Natural, Jardim Botânico da Universidade de Lisboa, Portugal; **Draper, David**, Departamento Biología Vegetal, Escuela Universitaria de Ingeniería Técnica Agrícola, Universidad Politécnica de Madrid, Spain

Plant hybridization is one of the most controversial aspects in plant conservation. Several kinds of habitat change can increase the probability and rate of hybridization and therefore it has become a subject of recent attention. However, recognition of the historical role of hybridization as an evolutionary process can cause a re-evaluation of conservation policies. *Narcissus perezlarae* is a natural hybrid originated between *N. cavanillesii* and *N. obsoletus*, both narrow endemic in the Iberian Peninsula. Both species coexist in south Iberian where the hybrid is frequent in sympatric populations. However, recent studies supports that several isolated hybrid populations in Valencian Community are stabilized. *N. perezlarae* is isolated reproductively from the progenitors and can produce viable seeds either by autogamous or xenogamous fertilizations in these populations. However, a major concern to the survival of these populations is their occurrence in a highly touristic area. Based on a 6 –year monitoring study, we have evaluated the demographic status of these populations and its reproductive fitness. In addition, we have assessed the vulnerability of *N. perezlarae* populations based on their proximity to network roads. A predictive model was developed to identify available areas for *N. perezlarae* in Valencian Community if future translocation action is needed.

464. CONSERVING GRASSLAND BIODIVERSITY BY RESTORATION: LOW-DIVERSITY SEED MIXTURES, WEED CONTROL, RAPID CHANGES, AND LANDSCAPE EFFECTS

Péter, Tőrők; Vida, Enikő; Valkó, Orsolya; Deák, Balázs; Lengyel, Szabolcs; Tóthmérész, Béla

In a large-scale restoration project we studied the effect of sowing low diversity seed mixtures (containing 2-3 competitive grass species) on the vegetation regeneration on croplands previously used as alfalfa fi elds. In 10 restored fields (4 with alkali and 6 with loess seed mixture), in each fi eld in 4 permanent plots the species covers were recorded between 2006 and 2008. In every year 10 phytomass samples were also collected before mowing near to the plots. We asked four questions: (i) Will weedy species fl ourish in the early period of secondary succession? (ii) Can weeds be suppressed by sowing competitive native grasses? (iii) Can succession towards the target native grasslands be accelerated by sowing compared to set-aside old-fi eld succession? Our results suggest that sowing seeds of competitive grass species is an effective tool to eliminate weed domination. In a few years a perennial grasses dominated vegetation have developed, which prevent the establishment of weed species. The developed dense perennial grass cover and the accumulated litter both hamper the immigration of grassland specialists characteristic to reference grasslands. In restoration of species rich grasslands and also in the facilitation of immigration of specialist further management practices are needed (grazing, mowing and/or hay-transport).

POSTER PRESENTATIONS:

103. THE CONFORMITY OF IRAN'S PROTECTED AREAS WITH IUCN CATEGORIZATION SYSTEM

Cheraghi, M., Islamic Azad University - Hamedan Branch, Iran, **Lorestani, B.**, Islamic Azad University - Hamedan Branch, Iran, **Yoosefi, N.**, Islamic Azad University - Hamedan Branch, Iran, **Khorasani, N.**, Faculty of Natural Resources University of Tehran, Iran

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 while samples of the richest natural regions have been chosen to serve as the four groups of national park, natural monument, wildlife refuge and protected area. The categories of Iranian national park, natural monument and wildlife refuge all tend to conform with the II, III and IV IUCN categories of the international categorization system successively. Indeed, the real status of the IV category (the protected areas) in Iran is obscured compared with IUCN category system; therefore, the protected area of Maracan was selected as a case study. As soon as the ecological and socio-economical resources which led to the supplement of the resources base map (scale: 1.50000) were identified the mapping and zoning processes founded on an analytical system resulted in the grasp of the environmental unit. At the final stage, the zoning model was ascertained.

658. STRUCTURE AND SEASONAL DYNAMICS OF COLLEMBOLA COMMUNITIES INHABITING SOIL AND ROCKY "FLORAS" FROM PRAHOVA AND DOFTANA VALLEYS (ROMANIA)

Fiera, Cristina, Institute of Biology, Romanian Academy, Romania

Flora developed on rocks and stones represent a large range of habitats isolated from surrounding soil and differ in environmental conditions have their own humus horizon. Our research was conducted from May to October 2008 in three rocky habitats from hill areas of the Romanian Subcarpathians: Brebu Gorges (N45°12'31.1''lat.; E 25°44'23.5''lat.) and Breaza Gorges (N 45°10'38.5''; E 25°41'14.2''), situated on Doftana Valley are represented by shrublands with *Hippophäe rhamnoides*; the third area- a mixed beech forest on Posada Gorges (45°17'43.5''lat.; E 25°35'40.9'' lat.) from Prahova Valley contains species which are adapted to live on stones. The aims of the present study were: a) to study the structure and b) seasonal abundance dynamics of *Collembola* communities and c) to establish if there are some differences between springtails from true saxicolous mosses, which colonize exposed rock habitats and group of soil *Collembola* inhabits vegetation developed primarily on the soil surface, which also colonize mineral and organic deposits on rocks. Seasonal abundance dynamics of springtails fauna seemed to be regulated by moisture, the highest values of numerical abundance was noted on October in Breaza Gorges (35 600 ind./m^2). The results showed that springtails communities structure differed distinctly between the above mentioned two groups.

674. VOLUNTEERS FOR NATURE CONSERVATION: "WILDWATCHER" ON-LINE BIODIVERSITY MONITORING PROGRAM

Váczi, Olivér, State Secretariat for Nature and Environment Protection, Ministry of Environment and Water, Hungary; **Bakó, Botond,** Ministry of Environment and Water, Hungary; **Vozár, Kinga,** Ministry of Environment and Water, Hungary; **Varga, Ildikó,** Ministry of Environment and Water, Hungary; **Bata, Ágnes,** Ministry of Environment and Water, Hungary; **Szekeres, Rozália Érdiné**

They live around us but which areas are colonized? Spreading or even collapsing? In danger or endanger? We are searching for answers to questions like these in case of common plant and animal species by the help of a program called 'WildWatcher'. WildWatcher – a new program of the Hungarian Biodiversity Monitoring System (HBMS) – is an interactive online monitoring tool based on the work of volunteers. Components of the program are carefully selected for easy identifi ability and wide distribution. For example hedgehog (*Erinaceus concolor*), mole (*Talpa europea*), salamander (*Salamandra salamandra*) are perfect targets from this point of view. The aims of WildWatcher are not only the data collection for selected species but to involve people to a wildlife monitoring program. Home pages of this program containing user guide for identifi cation, photos and background information about targeted species. On-line data sheets are easy to use, GoogleMap based localization helps to fi nd observation points. Data management as the part of Nature Conservation Information System (NCIS) ensures clarifi ed data by expert validation procedure. As the fi rst experiences on squirrel monitoring show the methods applied are well suited for volunteer involvement. Feedback of results to data suppliers is extremely important to motivate volunteers.

757. RARE ROTIFER SPECIES OF THE NATURE CONSERVATION AREA IN THE KISKÖRE RESERVOIR SYSTEM

Toth, Adrienn, Hungarian Danube Research Station of the Institute of Ecology and Botany of the Hungarian Academy of Sciences, Hungary; **Lőrincz, Tamás**, Ministry of Environment and Water, Hungary; **Zsuga, Katalin,** Szent István University, Department of Tropical and Subtropical Agriculture, Hungary

During focused research in the nature conservation areas can be found several rare taxa between rotifers as well. Wetlands and lakes with the macrophyte assotiations can provide various habitat for the microscopic community so the diversity is high in the littoral region. Even so few studies have focused on the community structure in macrophyte dominated systems. The study was undertaken in tke Kisköre Reservoir System. During our study we have found more rare: *Cephalodella globata, C. obvia, C. remanei, C. tenuiseta, Cupelopagis vorax, Dicranophorus robustus, Encentrum orthodactylum, E. wisniewski, Metadiaschiza trigona, Sinantherina socialis, Testudinella caeca, Trichocerca cylindrica, Wolga spinifera* and new species to the hungarian fauna: *Beauchamia crucigera, Lecane kulchor, Testudinella emarginula*. Discovering these rare taxa from the sampling area appreciably increase the naure conservation's value of the Reservoir System. Accordingly, the protected area of Maracan matches the IV category of IUCN very well because of containing the protected zone, recovery zone, special utility and the zone of the other uses. At the end, the paper is suggestive of the IV category management to protected area of Maracan.

PART II. - New abstracts

SYMPOSIA:

EXPLORING FARMERS' CULTURAL RESISTANCE TO VOLUNTARY AGRI-ENVIRONMENTAL SCHEMES

Burton, Rob, Centre for the Study of Agriculture, Food and Environment, New Zealand

Studies throughout Europe over the last 15 years have suggested that voluntary agri-environmental programs often engender very little change in conventional farmers' attitudes towards agriculture. To investigate possible cultural reasons for this, this research employed a conceptual framework based on Bourdieu's theory of capital to explore how conventional farming activities and conservation activities generate cultural capital. Results from qualitative case studies in Hessen (Germany) and Aberdeenshire (Scotland) suggest that voluntary agri-environmental work returns little cultural capital to farmers as, by prescribing management practices and designating specific areas for agri-environmental work, such schemes fail to allow farmers to develop or demonstrate skills. Demonstration of 'skill' in farming is a cultural currency which helps farmers obtain recognition as a 'good farmer' and thereby social status, social capital, assistance from others, and so on. The results suggest that entrepreneurial production-target based agri-environmental schemes may be more effective in changing farmers' attitudes and behaviour in the long-term.

INVASIVE SPECIES DO NOT ASK FOR GREEN CARDS: HOW CAN BIOLOGICAL INVASIONS BE REGULATED BY EUROPEAN CONSERVATION LEGISLATION AND POLICY?

Klingenstein, Frank, German Federal Agency for Nature Conservation, Germany

Invasive alien species (IAS) are regarded as one of the major drivers of biodiversity loss. Figures of their impact e.g. on protected areas in Europe and Germany will be presented, major European legislation and ongoing political activities dealing with IAS will be analysed concerning their coverage of the problem and options for action (prevention, early detection & rapid measures, control) and their specific problems of implementation will be demonstrated by German experiences. It will be recommended to focus more on new arrivals than on already wide spread species and instruments needed will be highlighted.

THE RELENTLESS TIDE OF INTRODUCED ALIEN SPECIES INTO THE WADDEN SEA

Reise, Karsten, Alfred Wegener Institute for Polar and Marine Research, List, Germany

In contrast to most inland nature reserves, coastal waters are readily accessible to human vectors of species introductions, in particular transoceanic shipping and trade with life oysters for culturing. The Danish, German and Dutch Wadden Sea has been developed into a well managed trilateral conservation area, and the Dutch and German parts are on the Unesco list of World Heritage Sites since 2009. On the other hand, invasions of alien species continue to irreversibly change the coastal biota. Most successful are universal invaders which modify habitats and respond positively to a recent trend of climatic warming. Prospects of controlling or even eliminating such invaders are dim, and mechanical removal would violate targets of nature conservation. Minimizing the influx of ever more alien species would require the ratification of international conventions on ballast water treatment and on use of alien species in aquaculture. Implementation is not yet in sight, and the public awareness of the consequences of biological globalisation in coastal waters needs to be strongly improved.

ORAL PRESENTATIONS:

IS THE HISTORICAL WAR AGAINST WILDLIFE OVER IN SOUTHERN EUROPE?

Martínez-Abraín, Alejandro, Mediterranean Institute of Advanced Studies, Spanish Superior Council of Research, University of the Balearic Islands, Spain; **Crespo, Jorge,** Generalitat Valenciana, Spain; **Jiménez, Juan,** Generalitat Valenciana, Spain; **Gómez, Juan Antonio,** Generalitat Valenciana, Spain; **Oro, Daniel,** Spanish Superior Council of Research, Spain

Most southern European regions have experienced a rapid economical change during the last decades, moving from a historical economy based on agriculture to a society based on industry. We test whether causes of admission of birds admitted to a large southern European rehabilitation centre, during a 14 year period reflect these socio-economical changes. Specifically, we estimated the trends in the number of birds admitted to the centre by shooting over the number of birds admitted due to impacts caused by infrastructures. Trends were estimated by means of the slope of a linear regression of the log-transformed S/I ratio over time, which provided the finite population growth rate and its 95% CIs. We conclude that the overall trend in the S/I ratio, as well as the trends for all 3 bird groups considered, were negative, and indicated a ca. 10% annual reduction in the number of birds admitted by shooting in relation to those admitted by infrastructure-related injuries. Importantly we show that despite the direct historical war against wildlife seems to be coming to an end in southern Europe, impact to wildlife continues in an indirect way, as collateral damages caused by our post-industrial way of life.

BARRIER EFFECT OF THE EGNATIA HIGHWAY UPON BROWN BEAR (*URSUS ARCTOS*) SUB-POPULATION IN NE PINDOS RANGE – GREECE

Giannakopoulos, Alexios, University of Aegean, Mytilini, Greece; **Akriotis, Triantafyllos,** University of Aegean, Mytilini, Greece; **Mertzanhs, Yorgos,** N.G.O "CALLISTO", Thessaloniki, Greece; **Riegler Susanne,** N.G.O "CALLISTO", Thessaloniki, Greece; **Riegler, Armin,** N.G.O "CALLISTO", Thessaloniki, Greece; **Godes Constantinos,** Tragos, Athannasios, N.G.O "CALLISTO", Thessaloniki, Greece; **Tsaknakhs, Iannis,** N.G.O "CALLISTO", Thessaloniki, Greece; **Pilidis, Charilaos,** N.G.O "CALLISTO", Thessaloniki, Greece & University of Bristol, United Kingdom; **Iliopoulos, Yorgos,** N.G.O "CALLISTO", Thessaloniki, Greece

Telemetry is used to investigate brown bear spatial behaviour versus permeability of the 37km (under construction) Egnatia highway stretch of which ~44% is mitigated by 8.85 km of tunnels, 11 viaducts, 8 wildlife underpasses and one green bridge. The highway cuts through the NE Pindos brown bear sub-population estimated at 45 ind.(min). From spring 2007 to autumn 2008, monitoring of spatial behaviour of (18) radio-tagged bears (fixes ranging from 370 to 6,674 - total=20,900), points out correlations between brown bears movements versus highway mitigation structures location and disturbance impact related to construction noise levels and traffic load of the already operational part. Data show avoidance of sectors adjacent to highway by 3 out of 5 female bears, whereas on a 24h basis, males show higher levels of nocturnal activity (average 55.4% of total radiolocations). Total distances covered within the overall individual MCP home ranges (n=9), show that in (6) cases they are significantly lower (from 0% to 38.6% of total) along the immediate vicinity of the highway.

Bears seem to become more inactive when construction noise levels exceed 47dB. Highway crossings ranging from 0 to 100 appear to focus over more natural overpasses (tunnels). High risk plain crossings, dictate severe improvement of low standards fencing for minimization of traffic accident risks.

SPEED PRESENTATIONS:

BIODIVERSITY AND CONSERVATION OF AMPHIBIANS AND REPTILES IN CROATIA

Jelić, Dušan, State Institute for Nature Protection, Croatia; **Kuljerić, Marija,** Croatian Herpetological Society HYLA, Croatia; **Janev-Hutinec, Biljana,** Public Institution »Maksimir«, Croatia; **Mekinić ,Stjepan,** Croatian Herpetological Society HYLA, Croatia; **Treer, Dag,** Croatian Herpetological Society HYLA, Croatia; **Basta, Jelena,** Croatian Herpetological Society HYLA, Croatia; **Koren, Toni,** Croatian Herpetological Society HYLA, Croatia; **Burić, Ivona,** Croatian Herpetological Society HYLA, Croatia

Among 61 species of Amphibians and Reptiles inhabiting Croatia, all species accept introduced *Trachemys scripta*, are protected by the Nature protection Act of the Republic of Croatia. In the Red book of Amphibians and Reptiles of Croatia there are 19 species and 8 subspecies in categories: CR (3), EN (3), VU (2), NT (11) and DD (8). The most threatened areas with high biodiversity and rates of endemism "hotspots" are Adriatic islands and Dalmatia. In this work we present new data and critical review of IUCN regional category for *Natrix tesselata*, *Ablepharus kitaibelii* and *Dolichophis caspius* that are currently in the data deficient category. *Salamandra atra* was previously not in Red book of Amphibians and Reptiles of Croatia but due to the new data we suggest it should be given data deficient category. Also for the first time the threatened species richness and areas or occurrence are calculated and presented.

POSTER PRESENTATIONS:

FIRST ACTION PLAN FOR TRANSPORTATION INFRASTRUCTURE AND HABITAT FRAGMENTATION IN GREECE.

Aravidis, Ilias, Development Society of Prefecture of Thessaloniki, Greece; **Giannakopolos, Alexios**, University of Aegean, Mytilini, Greece; **Iliopoulos, Yorgos**, N.G.O "CALLISTO", Thessaloniki, Greece; **Korakis, Yorgos**, Democritus University of Thrace, Greece; **Machairas, Yannis**, N.G.O "CALLISTO", Thessaloniki , Greece; **Mertzanis, Yorgos**, N.G.O "CALLISTO", Thessaloniki, Greece; **Nikolakaki, Pantoula**, Region of Central Macedonia, Thessaloniki, Greece; **Selinidis, Kyriakos**, N.G.O "CALLISTO", Thessaloniki, Greece; **Tsiokanos, Kostas**, N.G.O "CALLISTO", Thessaloniki, Greece; **Zisoupolou, Theodora**, N.G.O "CALLISTO", Thessaloniki, Greece

Over the last 15 years, planning and construction of new transportation infrastructure throughout Greece have increased markedly and so have the areas planned to be or already occupied by highways thus affecting natural habitats. For many fauna species, the main impact of roads is related to increased disturbance, mortality, habitat and population disruption. Avoidance of suitable habitats in close proximity to roads occur for brown bears *(Ursus arctos)* and wolves (*Canis lupus*) (McLellan and Shackleton 1988, Mace et al. 1996, Mech et al. 1988). For some mammal species, roads act also as a considerable barrier to dispersal (Mader 1984). Roads can have a significant effect in fragmenting wildlife habitats and populations and lead them to local extinction (Fahrig and Merriam 1994). In Greece, lack of global environmental policy urged the need for the elaboration of a comprehensive Action Plan focusing on the habitat fragmentation impact of (6) transportation axes and their associated network upon (6) mammal species, all IBA's, (1) amphibian species and reptiles taxa. This Action Plan is the first official attempt at a national scale for establishing a frame of concrete rules, guidelines, standards and practices in order to minimize habitat fragmentation impact associated to transportation infrastructure.

ASSESSING HABITAT CONNECTIVITY BETWEEN RIVER BASINS. WHICH PATCHES AND PATHS BETTER CONTRIBUTE TO OTTER MOVEMENTS?

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A graph theory approach for the assessment of connectivity between river basins is proposed and tested within the otters' (*Lutra lutra*) range in Italy. The otter is a semiaquatic species and one of the most endangered mammals in Italy. Recent local surveys indicate that the otter is recovering its original distribution range after the strong decline of the '90. Therefore identification of corridors throughout which the species could potentially expand constitutes a priority for its conservation. The proposed connectivity assessment approach summarizes the role of suitable areas (graph nodes) and minimum cost paths (graph links) for maintaining or improving landscape connectivity between river basins. In order to identify the graph nodes and links we used a two classes fine scale Habitat Suitability map and a multiple minimum cost paths scheme of the Italian catchments where the species actually occurs and where it is likely to expand in the short-medium term. We used the probability of connectivity index (PC) that integrates habitat suitability concept with dispersal probabilities between habitat patches. We identified those habitats and pathways that most contribute to the overall connectivity and evaluate the effectiveness and potential improvement of actual landscape for maintaining and expanding the distribution range of otters.

HOME-RANGE AND DIET OF THE BEE-EATER (*MEROPS APIASTER*) AS KEY FACTORS IN THE CONFLICT WITH THE BEEKEAPERS (APICULTURE) IN MEDITERRANEAN AREAS

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In Mediterranean areas of SW Spain, the apiculture (beekeeping) is an important economic and social resource for rural population. In this context, European Bee-eater (*Merops apiaster*), a common migrating species mainly feeding on insects, is considered as a pest due to the alleged damage to the beehives. In order to resolve the conflict and to determine the predation impact on honeybees *Apis mellifera* by bee-eaters, we studied both the size of foraging area (by radio-tracking of adults) and the diet (by pellets analysis) during the breeding and migration periods, from May to September. Bee-eater, a central place foraging species, search for food on relative small areas (mean: 500 has.; n=21 birds) and nearby distances (mean: 855 m.; n=258 locations) around the colony during the breeding cycle. Diet was based on *Hymenoptera* (bees, ants, wasps, etc.; 71% of items; n=10,572), mainly honey-bees (42%), and Coleoptera (beetles; 22%); the others insects preyed (*Odonata, Ortoptera, Dermaptera, Hemyptera*, etc.) resulted merely incidental. A strong seasonal variation in the diet was recorded, with a high predation pressure on bees (close to beehives) during the migration period and in dry years. Not easy solution appears to have the conflict due to both ecological and human factors.

CONSERVATION OF GOITERED GAZELLE (*GAZELLA SUBGUTTUROSA*) IN TURKEY

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Goitered gazelle (*Gazella subgutturosa*) is one of the threatened ungulates of Turkey. They had lived in large populations and had wider distribution before 1960s. Their size had started to decrease dramatically after 1960s mostly because of human-caused reasons. Hence, the first conservation efforts performed in 1977 by establishing a captive breeding station in Şanlıurfa-Ceylanpınar region. After successful breedings, the second phase of conservation was put into practice by a reintroduction program in 2005. Within this program, 86 gazelle was reintroduced into the 20000 ha. protection area in Şanlıurfa. In 2008, conservation efforts has been intensified and 30 more gazelle was reintroduced to the same area, 7 of which were GPS collared and the rest were tagged with individual identification collars. They are being monitored twice a month to get group composition and behavior data and a general count is started to be performed four times a year using distance sampling methods. We estimated the population size 245 ± 85 (mean ± SE) individuals based on Distance 5.0 analysis. At the end of the study, we expect to have information about home range size, resource selection, survival, population growth rate of goitered gazelle, and the success of conservation efforts.

MATERNALLY INVESTED CAROTENOIDS COMPENSATE COSTLY ECTOPARASITISM IN THE ENDANGERED HIHI

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Dietary ingested carotenoid biomolecules have been linked to both improved health and immunity in nestling birds. Here we test whether maternally invested egg carotenoids can offset the cost of parasitism in developing nestling hihi (Notiomystis cincta) from the blood-sucking mite (Ornithonyssus bursa). Our results reveal clear negative effects of parasitism on nestlings, and that maternally derived carotenoids compensate this cost, resulting in growth parameters and ultimate mass achieved being similar to non-parasitized young. Our results offer a first example of a direct positive relationship between enhanced maternal investment of carotenoids and an ability to cope with a specific and costly parasite in young birds. As O. bursa infestations reduce population viability in hihi, our findings also highlight the importance of key nutritional resources for endangered bird populations to better cope with common parasite infestations.

IMPORTANT FUNGUS AREAS IN MONTENEGRO – A PRELIMINARY STUDY

Gordana, Kasom, Institute for the Protection of Nature, Montenegro

It is difficult to know where the best sites for fungi are in Montenegro and also how many species of fungi there are and few sites are well recorded. Until now in Montenegro didn't conduct organised research with the aim of identification of Important Fungus Areas like for example to plants and animals. According to existing data relating to diversity and distribution of fungus in the territory of Montenegro it should be possible to make a preliminary assessment of site importance. Criteria for assessing importance were developed based on the presence of threatened or rare species, richness and the mycological importance of their habitat. These criteria were applied to the nominated sites. The resulting list of three sites will be used to support, inform and underpin existing protected area mechanisms designed to conserve biodiversity in Montenegro.

BETWEEN- AND WITHIN-POPULATION ABUNDANCE VARIATIONS OF THE RELICT ENDEMISM FERULA SADLERIANA (APIACEAE) AND IMPLICATIONS FOR THE SPECIES' CONSERVATION

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The relict endemism Ferula sadleriana (Ledeb.) survives at eight disjunct populations within the Carpathians, typically in mosaics of rock grasslands, slope steppes and xerothermic thickets and forests. In summer 2008 we surveyed all occurrences, and for the largest population (Pilis Hill, Hungary) analyzed a monitoring dataset spanning over twenty years. Although this polycarpic herbaceous perennial produces fruits at each locality, population size varies by two orders of magnitude (from <50 to >5000 plants) across sites. Within population (Pilis), the proportion of flowering individuals fluctuated between 8% and 45% through years, and strongly correlated with current-year spring precipitation. Grazing by ungulates (mostly the alien mouflon) on fruiting stalks, and occasional human trampling causes the greatest threat for the plant. Experimental clearing at one locality showed that the shade-sun vegetation mosaic is also essential for the species. At two sites, industrial limestone quarrying greatly decimated the population in the late 1900s. Today each locality is under protection. Given the species' small, disjunct populations and weather-sensitive reproduction, disturbance in its habitats should be minimized, particularly under the current changing climate. Subtle differences in fruit morphology suggest genetic differentiation between populations, that calls for the importance of preserving each of them.

GILL-NET CATCHES IN A MEDITERRANEAN RESERVOIR: FISH DIVERSITY AND ABUNDANCE

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We present data on fish species composition and abundance recorded in gill-net (multimesh nets, mesh sizes 8-70 mm knot to knot) catches in Kerkini dam-lake (catchment of the transboundary river Strymonas, Balkan Peninsula, Greece). Sampling took place seasonally (autumn 2007 - summer 2008). A total of 14 species representing four families were recorded, with Cyprinids being the most abundant (78.6 %). Five species (35.7 %) were endemic to Greece and the Balkan Peninsula and three species (21.4 %) introduced. Two species *Aspius aspius* and *Vimba melanops* are considered as "vulnerable" in Greece, while the most abundant species in the total catches (in terms of number and weight) was *Rutilus rutilus* (52.10 % and 32.88 % respectively). Numerical and weight catch species composition differed among seasons. Higher fish abundances (>80%) were recorded at the northern compared to the southern part of the reservoir during summer while the opposite was observed in winter. Catch species richness was lower then the previous known fish faunistic list for the system. *Anguilla anguilla* has almost extinct from the system after the dam construction, while the rest species are present in low populations due to high water fluctuation and destruction of their reproductive areas.

RECOLONISATION AND MICROHABITAT USE OF THE WHITE CLAWED CRAYFISH *AUSTROPOTAMOBIUS PALLIPES*

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British populations of the white-clawed crayfish, *Austropotamobius pallipes*, IUCN red listed as a threatened species, now represent one of the greatest concentrations of this species in Europe. In order to effectively conserve native crayfish and to plan reintroductions, information is needed on the patterns and processes of colonisation, as well as microhabitats used. In 2004, a point pollution event in the River Wansbeck, North East England, resulted in the complete mortality of crayfish for 1km downstream of the pollution site. Repeat surveying between 2004 and 2008 demonstrated that by 2008 the populations of crayfish in the area affected reached similar densities to those of control reaches. Changes in size-frequency distributions over time suggest that downstream colonisation by age 0+ and 1+ crayfish was the main component of the recolonisation process. Quantitative sampling of crayfish across a range of microhabitats showed that juveniles occupied a more restricted range of microhabitat types, being more common in habitats characterised by heterogenous substrate, bank-side vegetation and high levels of shade. This work highlights the destruction that small-scale pollution events can have on crayfish populations and the importance of habitat knowledge in efforts to restore populations following such disturbances.

PATTERN OF PATTERN OF ABUNDANCE AND BIODIVERSITY OF RAPTOR COMMUNITY IN RICE FIELDS OF MEDITERRANEAN AREAS (EXTREMADURA, SW SPAIN)

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In Mediterranean areas, natural wetlands have been high altered in the past, so the biotic communities associated to them are strongly declining. It is therefore essential to identify key and new "buffer areas" in the basis to develop conservation strategies for these species. Rice fields have been shown repeatedly as important suitable areas for Waterbirds but not for other avian communities. In this context, we analyse the role of this agro-ecosystems for the Raptor community in order to evaluate their importance in Conservation. Data basis result from monthly censuses of the study area (25,000 ha.; Extremadura, SW Spain) during a complete year, where all the species of diurnal birds of prey were recorded. Raptor community consisted of a total of 15 species and 1,329 individuals. Wintering (Dec.-Feb.) and autumn migration (Oct-Nov) periods accounted for the higher abundance of birds, whereas biodiversity not showed a clear seasonal variation. Common Buzzard, Marsh Harrier and Red Kite were the most common species using the rice fields as foraging and/or breeding area during the annual cycle. Our results show that in Mediterranean areas rice fields play a valuable role for the Conservation of Raptor community.

ARE SPECIAL PROTECTED AREAS PROPERLY DESIGNATED TO SECURE THE LONG TERM CONSERVATION OF ROMANIA'S FOREST BIRDS?

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The Birds Directive provides the protection, management and control of naturally occurring wild birds within the European Union (EU). Article 4. requires Member States to identify and classify the most suitable territories in size and number for rare or vulnerable species listed in Annex I. These sites are known throughout the Member States as special protection areas (SPAs). The Directive envisages that the designation of SPAs by all Member States will result in a European network of protected sites, providing secure future to species listed on it's Annex 1. Here we evaluate whether SPAs network in Romania is suitable enough to assure the long term conservation of forest specialist species. Our investigation is based on a thorough analysis of habitat preference compared with the existence of suitable forested habitats within the Romanian SPA network. Our results suggest that the Romanian system of SPAs is insufficient to assure long term protection for forest species. Given the trade-off between financial investment and the conservation of biodiversity, we propose to maximize the surface of potential habitat included in the protected network minimizing the surface of new country area that would be necessary to protect, thus avoiding expense and otherwise unrealistic results.

IBERIAN LYNX HABITAT CONSERVATION ON A TRADITIONAL HUMANIZED LANDSCAPE

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Iberian Lynx (*Lynx pardinus*) is currently the most threatened cat in the world being classified as Critically Endangered (IUCN). Its populations have steeply declined in the last decades, being nowadays highly dependent of intensive habitat management. In 2006, Liga para a Protecção da Natureza (Portuguese NGO) through a partnership with Fauna & Flora International, started the LIFE-Nature Project "Recovery of the Iberian Lynx Habitat in Moura/Barrancos Site" (Portugal), co-financed in 75% by the EC. This project aims to manage areas of Mediterranean habitat for the species in a landscape mainly composed by one of the oldest traditional humanized landscapes, oak woodland - „montado". The project has now 7700ha under management agreements with landowners/hunters. Main conservations measures applied include the recovery of habitat and rabbit populations (Iberian Lynx main prey). So far, 16ha of burnt area and about 6km of riparian corridor are being recovered, and more than 100 rabbit shelters, 200 food and water suppliers, and 30ha of pastures were already made. Wild rabbit (*Oryctolagus cunniculus*) is using shelters, food and water suppliers and pastures. We believe that this project can play a crucial role for Iberian Lynx conservation and for the maintenance of traditional agricultural landscapes in Portugal.

TAXONOMY, ECOLOGY, DISTRIBUTION, AND PROTECTION STATUS OF ACER INTERMEDIUM PANČIĆ IN BALKAN PENINSULA

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Acer intermedium was described as a new species by Josip Pančić (1871) from east Serbia (mountain Rtanj). According to taxonomical characteristics this tertiary relict and endemic species of Balkan Peninsula belongs to Acer hyrcanum Fisch.& Mey. sensu lato. The species prefer very specific ecological conditions and it is relatively rare in forest communities of Balkan Peninsula. Recently, the populations of the species are much endangered, especially, by human impact which needs very sophisticated protection measures of the species. Taxonomy, ecology, distribution and protection status of this species in the Balkan Peninsula are given in this paper. Also, the IUCN categorization for the territory of Montenegro is given in the paper.

LOCAL VERSUS GLOBAL PATTERNS: MATING BEHAVIOUR AND HABITAT CHANGES CONSTRAIN THE SPATIAL DISTRIBUTION OF AN ENDANGERED BIRD LEKKING-SPECIES

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While estimating the population dynamics and status of a given species, scientists have to accurately choose the spatial scales at which they assess population trends. Looking at a global scale without accounting for local effects would lead to misinterpreting results in the same way as looking at the same pattern in a much narrower window. The spatial dimension of population dynamics is thus essential to our understanding of biological processes. We illustrate this point with the case of the Little Bustard *Tetrax tetrax*, an endangered bird-lekking species whose last migrating population breeds in the agricultural plains of western France. Three complete censuses conducted in 2000, 2004 and 2008 on a 5000 km² area provided the number of displaying males, a good proxy of population size for this bird. The population decreased between 2000 and 2004, from 404 to 292 displaying males, but it now seems to have stabilized (280 males in 2008). However, the local dynamics showed much more contrast, with some leks completely disappearing while others increased. We investigate this complex pattern, assuming that males are highly mobile between years due to both a specific mating system and changes in availability of suitable habitats for females.

HAPLOTYPE DIVERSITY OF THE SEAGRASS *CYMODOCEA NODOSA* IN THE AEGEAN SEA, HELLAS

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Cymodocea nodosa is a dioecious seagrass widely distributed in the Mediterranean. Its vegetative growth habit renders an extensive morphological plasticity. *C. nodosa* is rated as of highly ecological importance; its gene pool should be considered under conservation schemes. Haplotypic variation was investigated among eight natural populations of *C. nodosa*, collected in the Aegean Sea. In total 80 specimens were characterised by a PCR-RFLP approach, using the restriction enzymes AluI, RsaI and EcoR1. Analysis of six genic loci corresponding to both nuclear rDNA operon and plastid region resulted in the revealing of 14 unique and distinct restriction profiles. The observed values of FST across all loci and populations revealed the existence of a previously unidentified, non-significant nevertheless, diversity in the Aegean Sea, implying a possible geographical and reproductive diversity pattern, although *C. nodosa* dispersal ability is recorded as relatively low. In all cases, PCA analysis of allele frequencies revealed a potential non-significant subgrouping of a northern to southern pattern overall differentiation. AMOVA indicated a more significant genetic variation within populations (59%) rather than among them (41%). The results obtained in this study showed that PCR-RFLP approach is a useful tool for the phylogeographic analysis of *C. nodosa* in the Aegean Sea.

THE MARSH FRITILLARY BUTTERFLY (*EUPHYDRYAS AURINIA*) IN THE CZECH REPUBLIC: EIGHT-YEARS OF MONITORING AND SUBSEQUENT STUDIES

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All known colonies of the HD-protected butterfly *Euphydryas aurinia* have been monitored in CR for eight years. The distribution is restricted to westernmost Bohemia, where the species occurs at humid seminatural meadows. Since 2001, when only five colonies were known, increased mapping effort resulted in discovery of 92 colon. Most local colonies are small, only eight regularly contains > larval nests. A massive marking campaign in 2007 detected an unusual number of long-range movements: 61 over 5 km (46 males, 15 females), 18 over 10 km (16 males, 2 females). Total estimate is 27 600 adults. Observations of 21 extinction and 11 local colonisation events corroborate that the system functions as a metapopulation, whose survival supported by phenological asynchrony among sites. Comparison with co-occurring species revealed that *E. aurinia* occurs in lower densities (108 ind./ ha) than *Argynnis aglaja* (264/ha), *Brenthis ino* (188/ha) and *Boloria selene* (386/ha), and higher densities than *Melitaea diamina* (128/ ha) and *M. athalia* (30/ha). Long-distance dispersal is lower than for *B. selene*, but higher than for *A. aglaja* and *B. ino*. The system remains viable and some colonies may remain undiscovered. However, long-term survival of the species will require more sensitive management of its sites, with such measures as mowing in mosaic-like manner. Financed by ME (LC-06073, MSM-6007665801, GAV-KJB 60070601) and Karlovarský regional government.

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