# 1st EUROPEAN CONGRESS OF CONSERVATION BIOLOGY

## 22-26 August, 2006
## Eger - Hungary

# BOOK OF ABSTRACTS

**PATRONS OF ECCB 2006**

**László SÓLYOM**
President of the Republic of Hungary

**Miklós PERSÁNYI**
Minister of Environment and Water Management of the Republic of Hungary

# ABSTRACTS

## Ordered by last name of first author

# ABSTRACTS OF PLENARY LECTURES

### 1. EUROPEAN BIODIVERSITY CONSERVATION: SCIENCE, POLICY AND PRACTICE

Professor Sir **LAWTON, JOHN**, Royal Commission on Environmental Pollution, United Kingdom

Europe is an extremely diverse continent, culturally, topographically, climatically and biologically. So there cannot be one solution to the conservation of our biodiversity. Nevertheless, the European Union is committed to halting the loss of biodiversity by 2010 – a bold aspiration! How might this be achieved, and what are the major biological, political and policy-related challenges (not least that not all European nations are in the EU)? Fundamentally, conservation is not about science. Many conservation biologists will react with hostility to this statement, but it is true. Rather, 'society' - policy makers, politicians and people generally - have to decide what it is they value about biodiversity on cultural, ethical, moral, economic and other grounds. Of course, conservation biologists have a say in this process, but we are one competing voice among many. Conservation science kicks in when we know what the goals are, and many of the means again have very little to do with biology. They lie in a maze of European and national legislation, EU Directives, economic instruments and so on. This lecture will explore these issues with examples of successes and failures for conservation across Europe, not least the huge challenges posed by climate change.

### 2. THE NATURA 2000 NETWORK – TIME FOR MOVING TO MANAGEMENT

**MIKO, LADISLAV**, Directorate General Environment, European Commission, Brussels, Belgium

Natura 2000, the ecological network of the European Union, now consists of over 25,000 sites. The nature and status of these sites vary considerably, partly reflecting geographic variation, but also differences in historical land use. The network is largely complete for the 15 older Member States, with the exception of the marine environment. It is advancing well in the new 10 Member States. Therefore attention should now increasingly focus on a structured approach to management of Natura 2000. This should recognise different management categories, ranging possibly from strictly protected areas through various degrees of control to heavily used and managed areas. Toolkits will need to be developed to assist site managers to achieve combined and sometimes conflicting goals of favourable conservation status for habitat types and species for which the sites were designated. A wider European approach to allowing natural processes to work in favour of biodiversity and ecosystem services, including e.g. the need for definition of wilderness areas in some habitats close to climax stage, will need to be addressed. The European Commission, following up its recent Communication on Biodiversity, aims to promote the necessary discussions with EU Member States and stakeholder groups on how to achieve this objective.

### 3. BIODIVERSITY LOSS; EUROPE IN A GLOBAL SETTING

**MACE, GEORGINA**, Institute of Zoology, Zoological Society of London, United Kingdom

In 2005 the Millennium Ecosystem Assessment (MA) reported on the state of the world's ecosystems and their ability to continue to meet the needs of people. As part of this work, a systematic review of the role of biodiversity, and its status and trends was completed at global and sub-global levels. This information is important in assessing the extent to which we can and will meet the 2010 goal for biodiversity loss to be halted in Europe. In this talk I will review what the science in the MA is telling us about the pressures affecting biodiversity, and what we know about it status in Europe compared to the rest of the world. I will assess the range of policy options and the evidence for their effectiveness at different geographical and political scales. Finally, I will try to draw together the critical science gaps that are limiting our ability to both detect and respond to the changes taking place in the natural world.

### 4. MOVING TARGETS: PLANNING TO MAINTAIN BIODIVERSITY PROCESSES IN THE CONTEXT OF ANTHROPOGENIC LANDSCAPE DYNAMICS

**PRESSEY**, **ROBERT**, University of Queensland, Australia; **Cabeza, Mar**, University of Helsinki, Finland; **Cowling, Richard**, Nelson Mandela Metropolitan University, South Africa; **Possingham, Hugh**, University of Queensland, Australia; **Wilson, Kerrie**, University of Queensland, Australia

Early methods for systematic conservation planning dealt with biodiversity pattern - relatively static, mappable features such as vegetation types and species locality records. They also implicitly assumed that landscapes were static and that areas selected for conservation would retain their values until protective management could be implemented. Recent advances in the field have begun to address two important areas. The first concerns the planning implications of biodiversity processes operating over a wide range of spatial and temporal scales. The second concerns ways of scheduling the implementation of conservation action so that losses of biodiversity caused by continued development and extractive activities can be minimized. We draw on case studies and recent reviews to summarize recent work in both these areas, illustrating requirements for data and optional methods for analysis. We also emphasise that the intersection of these two areas – planning for biodiversity processes in the context of anthropogenic landscape dynamics – defines the reality of conservation planning in many regions, but has been barely explored by scientists and planners. We discuss some recent progress in combining them and list the unresolved issues that need attention soon.

# ABSTRACTS OF SYMPOSIA AND CONTRIBUTED ORAL PRESENTATIONS

**5. THE HEIGHT OF THE STUMP MATTERS.. - AT LEAST FOR WOOD LIVING BEETLES**

**ABRAHAMSSON**, **MARKUS**, Swedish University of Agricultural Cciences, Sweden; **Lindbladh**, **Matts**, Swedish University of Agricultural Cciences, Sweden

The making of high-stumps (stumps cut at about 3 meters) is becoming more and more common in Scandinavian forestry in order to increase the amount of dead wood. Several studies of created high-stumps have shown their high conservation value for many wood living species, especially saproxylic beetles. However, on a clear-cut the amounts of dead wood and bark surface on high-stumps are small compared to the amount on the ordinary cut stumps. So far the beetle fauna of high-stumps and that of ordinary cut stumps have not been compared and that was the aim of the present study. A total of 10,984 saproxylic beetle individuals divided into 67 species, were collected by sieving bark from ordinary stumps and high -stumps (at ground and at breast height). The number of species found in high-stumps at ground level was significantly higher than the numbers found in high-stumps at breast height and low stumps. Many of the caught species showed preferences for one or two of the three substrate types and analysing beetle communities showed that they were different at the three substrate types. The study shows that even though the amount of bark and wood in high-stumps are small compared to the ordinary stumps they do provide important complementary habitats for many wood living beetles.

**6. INCORPORATING SPATIAL UNCERTAINTIES IN THREATENED SPECIES ASSESSMENTS WITH THE IUCN RED LIST CRITERIA**

**AKCAKAYA**, **H. RESIT**, Applied Biomathematics, United States

Measures of spatial distribution of threatened species (such as range area) are commonly used in assessments of species status, e.g., in the IUCN Red List Criteria. These measures are often known with large uncertainties. We developed data analysis methods that input uncertain monitoring data and output estimates of two spatial variables (area of occupancy and extent of occurrence). Several types of uncertainties are considered. Both spatial variables may be uncertain because observations may have different levels of reliability (e.g., some are old or unconfirmed), and because the location information is imprecise (coordinates of occurrences are measured with error). In addition, the extent of occurrence can be uncertain because of uncertainty about whether and to what extent to exclude discontinuities in the distribution; and the area of occupancy can be uncertain because of inconsistencies in the resolution and position of the measurement grid. Another uncertainty results from variation in the intensity of survey effort among species. The methods we developed are based on the alpha-hull and the scale-area curve, and are used to estimate these spatial measures as fuzzy numbers or intervals (ranges) of values. Preliminary results indicate that these uncertainties can have substantial effects on the assessed status of species.

**7. DESIGNING SPATIALLY-CONCERNED ECOLOGICAL RESERVE NETWORKS IN THE PRESENCE OF HOTSPOTS**

**ALAGADOR**, **DIOGO**, Instituto Superior de Agronomia, Universidade Técnica de Lisboa, Portugal; **Orestes Cerdeira**, **Jorge**, Instituto Superior de Agronomia, Universidade Técnica de Lisboa, Portugal

In the design of ecological reserve networks there are special sites whose ecologic, strategic or morphologic values dictate their inclusion. The existence of regional rare or confined-distribution species is one among other reasons that often determines the existence of such mandatory sites, referred as hotspots. Moreover, inter-relationships in the ecosystem structure quite often determine hotspots located far apart. The existing reserve design methods that seek efficiency and clustering of sites are not suitable to deal with the occurrence of hotspots. Those that incorporate target criteria to encourage aggregation of sites are not capable to avoid the fragmentation that the existence of distant hotspots creates. Methods that enforce strict contiguity act in the same way as the algorithms meant to establish wildlife corridors to connect fragmented landscapes, and give rise to long and thin reserves, where edge-effects and species avoidance are enhanced. Hence specific methods to design ecological reserves when hotspots exist are needed. We propose a 0/1 linear programming model to deal with this issue and report computational results with two datasets concerning the distribution of 118 species of breeding birds and 45 species of butterflies.

**8. THE NATTERJACK TOAD (BUFO CALAMITA) IN DENMARK - THE GENETIC CONSEQUENCES OF DECLINING AND ISOLATED POPULATIONS**

**ALLENTOFT**, **MORTEN E.**, University of Copenhagen, Denmark; **Andersen**, **Liselotte W.**, Danish National Environmental Research Institute, Denmark; **Siegismund**, **Hans R.**, University of Copenhagen, Denmark

Based upon 12 variable microsatellite-markers the genetic consequences of declining numbers and severe geographical isolation was investigated concerning 12 subpopulations of the endangered Natterjack Toad (Bufo calamita) in Denmark. B.calamita is listed on the EU-Habitat Directive, Annex IV, with a Unfavorable national conservation status. In Denmark it is estimated that about 50% of the populations disappear per decade primarily due to the lack of suitable breeding habitats. The remaining populations exist in a landscape fragmented by agricultural fields and a highly developed infrastructure, resulting in very limited potential dispersal and migration between populations. Tissue samples from tadpoles representing various geographic regions and covering a large spectrum of different demographic historylines were collected, followed by DNA-extraction, PCR and microsatellite-typing. The analysis revealed that several of the small populations exhibit low genetic variation, and it is clear that no or very limited geneflow exists between the populations. This is likely to affect the survialprobability of the few populations still left in Denmark. In the talk I will present the results, and emphasize the importance of considering genetic consequences, when trying to conserve an endangered species.

**9. MODELLING SPECIES DISTRIBUTIONS: WHAT DO WE NEED TO KNOW?**

**ANDERSON**, **BARBARA J.**, UKPOPNET, University of York, United Kingdom; **Collingham**, **Yvonne C.**, UKPopNet, University of Durham, United States; **Hodder**, **Kathy H.**, UKPopNet, CEH Dorset, United Kingdom; **Thomas**, **Chris D.**, UKPopNet, University of York,, United Kingdom

In modelling the distributions of a species, the choice of predictor variables, choice of model, and the resolution and extent of the data all partially determine the robustness of predictions. Can prior knowledge of the species biology (e.g. taxon, dispersal ability) and trajectory for change (expanding, declining) enhance our decision making and ultimately improve our ability to make useful predictions about future distribution changes? We compared predicted distributions of birds, butterflies, and plants with observed distributions over European, national (UK) and regional extents. Models incorporated different degrees of environmental realism through the choice of different groups of predictor variables (e.g. climate, topography, broad landcover, detailed habitat) and through comparison over different resolutions (50km, 10km, 1km and 200m). The relative importance of environmental realism, resolution and model was dependent on the species being modelled but some broad generalisations can be made. In modelling the distribution of species, the choice of predictor variables and the resolution of the data are at least as important as the type of model used.

Based on prior knowledge, we can provide useful guidelines for conservation on the level of biological detail and environmental realism that needs to be incorporated into the model in order to make robust predictions.

### 10. DO LARGE CARNIVORES COMPETE WITH HUNTERS FOR GAME?

**Andrén, Henrik**, Grimsö Wildlife Research Station, Department of Conservation Biology, Swedish University of Agricultural Sciences (SLU), Sweden; **Sand, Håkan**, Grimsö Wildlife Research Station, Department of Conservation Biology, Swedish University of Agricultural Sciences (SLU), Sweden; **Liberg, Olof,** Grimsö Wildlife Research Station, Department of Conservation Biology, Swedish University of Agricultural Sciences (SLU), Sweden

The effect of large carnivores on prey population dynamics is complex. Prey populations often exist at lower densities when exposed to large carnivores. On the other hand, predation rarely regulates prey populations. Predation rate is usually not density dependent. In Scandinavia (Sweden and Norway) the main cause of mortality for moose and partly for roe deer is human harvest. Therefore, it is most likely that predation from large carnivores is additive to other causes of mortality. The density of moose in Scandinavia (1-2/km$^2$) is far above the level where wolves show a numerical and functional response. Thus, predation rate will be inversely density dependent and the effect of wolves on moose harvest will decease as the density of moose increase. On the other hand, the Eurasian lynx shows clear numerical and functional responses to roe deer density and the growth rate for both lynx and roe deer population are dependent on one another. In some areas, lynx predation on roe deer is higher than the production of roe deer and therefore causes a decline in the roe deer population.
To conclude, the harvest of moose and roe deer in Scandinavia has to be adjusted to the presence of wolves and lynx.

### 11. FIGHTING AGAINST AILANTHUS: A CASE STUDY IN SOUTH TYRRHENIAN COASTAL LANDSCAPE

**APPIANI**, **MARIA**, Università della Calabria, Italy

The objective of the study is to improve landscape quality, considering that vegetation -both native and exotic- is one of the most important elements of the landscape. The case study was carried out in the Thyrrenian coastal landscape, where agricultural and forestry land uses are marginalized because of the relevant economic system, that is based on tourism. Ailanthus is assumed to raise the general attention on landscape quality. Ailanthus is gaining ground on Mediterranean maquis, very few know that it competitively excludes native species, worsens beneficial function of coastal ecosystems, changes the feature of coastal landscape. On the contrary, it is appreciated for its quick growth, its strength. Efforts are going on to find the way for an integrated approach to the problem, beginning from the survey of Ailanthus presence and impacts inside Nature 2000 sites. A consensus with stakeholders is arising from the efforts. The author has no illusions that the coast will soon be reclaimed from Ailanthus, but the above-mentioned effort proved to be a very important opportunity for advancing our understanding of the mechanisms that drive the complex interactions between human factors and exotic species invasion, and for building up and raising awareness on the problem.

### 12. IMPACT OF HUMAN DISTURBANCE ON ALPINE WILDLIFE IN WINTER: STRESS, ACTIVITY BUDGET AND ENERGETICS IN THE ENDANGERED BLACK GROUSE(TETRAO TETRIX)

**ARLETTAZ**, **RAPHAEL**, University of Bern, Zoological Institute, Switzerland; **Baltic**, **Marjana**, University of Bern, Zoological Institute, ; **Patthey**, **Patrick**, University of Bern, Zoological Institute, Switzerland; **Signorell**, **Natalina**, University of Bern, Zoological Institute, Switzerland; **Leu**, **Thomas**, University of Bern, Zoological Institute, Switzerland; **Vogel**, **Peter**, University of Lausanne, Switzerland; **Palme**, **Rupert**, Veterinärmedizinische Universität Wien, Austria; **Jenni-Eiermann**, **Susanne**, Station ornithologique suisse, Switzerland

Human disturbance upon widlife through continuously spreading outdoor recreational activities such as free-riding snow sports, is of growing conservation concern. We investigated stress, behavioural and energetic responses in free-living wintering Black grouse, a declining emblematic species of Alpine ecosystems. Radiomonitored birds with position-sensitive radiotags were experimentally flushed from their igloos and response to disturbance was measured from a hormonal, behavioural and energetic viewpoint. Stress hormone metabolites (FCM) were quantified from droppings collected from igloos. Energy budgets were modelled from activity budgets and ambient temperature data, and extra energetic costs induced by disturbance were estimated. Mean individual FCM concentrations increased significantlyafter disturbance. Birds significantly prolonged foraging duration in the mornings following disturbance, which also exposed them to greater predation risks. Conservative estimates of energetic costs caused by extra foraging duration were estimated to represent at least 2-4% of a whole daily energy budget. This estimate does not account for escape flight costs, however. Winter human disturbance, caused e.g. by off-piste skiing, elicits stress and behavioural compensation, which appear detrimental to wintering birds. It remains to establish how this translates into fitness costs and survival.

### 13. ENVIRONMENTAL SURROGATES IN CONSERVATION PLANNING

**ARPONEN**, **ANNI**, University of Helsinki, Finland; **Moilanen**, **Atte**, University of Helsinki, Finland

Data available for conservation planning is usually scarce. If designing reserve networks is based on known distributions of some focal species, there is no guarantee that other species will be adequately protected. People have suggested using environmental variables as biodiversity surrogates, but it is unclear whether or not this approach actually works. Even though environmental surrogates suffer from some fundamental problems, such as the difficulty of incorporating non-environmental factors that affect species' distributions (historical events, biotic interactions etc.), we believe that their performance can be improved from the present situation by addressing some technical issues. With simulated data we demonstrate that (1) attention should be paid to the effects of selecting a statistical ordination method, (2) in many cases the commonly used p-median selection of sites from the "environmental space" is not efficient, and (3) taking into account potential species richness gradients in the environmental space can have a considerable effect on the degree of complementarity captured by the reserve network. Following these guidelines should improve the performance of environmental surrogate strategies.

### 14. PREDICTING AMPHIBIAN ROAD-CROSSING HOTSPOTS: A CASE STUDY IN SOUTHERN PORTUGAL

**ASCENSÃO**, **FERNANDO**, Unidade de Biologia da Conservação, Portugal; **Baptista**, **Nuno**, Unidade de Biologia da Conservação, ; **Sá Sousa**, **Paulo,** Unidade, Portugal; **Mira**, **Antonio**, Unidade de Biologia da Conservação, Portugal

Roads promote high levels of amphibian mortality being an important factor driving to the decline of this group, particularly at local scale. In Portugal few ecological studies have focused on the road impacts on amphibian populations and the knowledge of the main factors driving to the emergence of mortality hotspots during mass migrations is still scarce. A road segment with 14.5 km long was sampled by car at low speed (10km/h), during 11 nights with favorable weather conditions for the occurrence of mass migrations. A database of 868 animals belonging to 13 species (two of which of conservation concern, Discoglossus galganoi and Pelodytes ibericus) was used to define road-crossing hotspot sections (HSS) by detecting clusters of animal locations, using the Poisson distribution. A logistic regression model was developed to explore the relationship between presence of HSS and habitat features. Original data collected in a different vicinity road was used to validate the model. The model is well fitted and has a high predictive power. More than 86% of the cases were correctly classified. “Distance to small water-reservoirs” and “soil type” were the main descriptors determining the presence of HSS. The results suggest that the relocation of water-reservoirs away from roads (>200m) might diminish significantly amphibian mortality.

### 15. BARN OWLS TYTO ALBA IN BRITAIN: HABITAT, CLIMATE AND CONSERVATION

**ASKEW**, **NICHOLAS**, University of York, Department of Biology, United Kingdom; **Moore**, **Niall**, Central Science Laboratory, United Kingdom; **Searle**, **Jeremy**, University of York, United Kingdom

The British Barn Owl (Tyto alba) population has declined by 70% over the past century resulting from changes in agricultural practises.
I will present the results of a four-year study which has focussed upon providing practical conservation advice to aid a population recovery for this popular species. Specifically we have studied:
• Foraging ecology of Barn Owls – home-ranges, hunting strategies etc…
• Habitat preferences of Barn Owls and their prey • Habitat creation – which agri-environmental scheme is best?
• The importance of climate for determining the species distribution • Production of a landscape suitability map to focus conservation efforts

### 16. GENETIC DIVERSITY, POPULATION STRUCTURE, EFFECTIVE POPULATION SIZE AND DEMOGRAPHIC HISTORY OF THE FINNISH WOLF POPULATION

**ASPI**, **JOUNI**, University of Oulu, Finland; **Roininen**, **Eeva**, University of Oulu, Finland; **Ruokonen**, **Minna**, University of Oulu, Finland; **Kojola**, **Ilpo**, Finnish Game and Fisheries Research Institute, Finland; **Vilà**, **Carles**, Uppsala University, Sweden.

The Finnish wolf population ( Canis lupus) was sampled during three different periods (1996–1998, 1999–2001 and 2002–2004), and 118 individuals were genotyped with 10 microsatellite markers. Large genetic variation was found in the population despite a recent demographic bottleneck. No spatial population subdivision was found even though a significant negative relationship between genetic relatedness and geographic distance suggested isolation by distance. Very few individuals did not belong to the local wolf population as determined by assignment analyses, suggesting a low level of immigration in the population. We used the temporal approach and several statistical methods to estimate the variance effective size of the population. All methods gave similar estimates of effective population size, approximately 40 wolves. These estimates were slightly larger than the estimated census size of breeding individuals. A Bayesian model based on Markov chain Monte Carlo simulations indicated strong evidence for a long-term population decline. These results suggest that the contemporary wolf population size is roughly 8% of its historical size, and that the population decline dates back to late 19$^{th}$ century or early 20$^{th}$ century. Despite an increase of over 50% in the census size of the population during the whole study period, there was only weak evidence that the effective population size during the last period was higher than during the first. This may be caused by increased inbreeding, diminished dispersal within the population, and decreased immigration to the population during the last study period.

### 17. USING MONITORING TO IMPROVE SITE MANAGEMENT

**AUSDEN**, **MALCOLM**, Royal Society for the Protection of Birds, United Kingdom; **Hirons**, **Graham**, Royal Society for the Protection of Birds, United Kingdom; **Beaumont**, **Dave**, Royal Society for the Protection of BIrds, United Kingdom

This presentation outlines the way RSPB uses monitoring to improve the management of its nature reserves. Each nature reserve has a management plan, which identifies those important species, assemblages of species and habitats at the site that are (or can be) influenced by intervention management. These are termed ‘Key Features Influencing Management’, and for each of these, a set of ‘Attributes’ is then defined. These ‘Attributes’ are measures of the condition of the ‘Key Features Influencing Management’. They are defined in such a way as to be both informative and also practical for site staff to measure. Targets are then set for these ‘Attributes’. The condition of all ‘Key Features Influencing Management’ is reported annually by site staff in a ‘Management Plan Progress Report’.
Two methods are then used to identify sites where management needs to be reviewed: 1) Annual scrutiny of the ‘Management Plan Progress Reports’ by HQ-based ecologists to identify ‘Key Features Influencing Management’ where progress towards the targets identified in the management plan is not satisfactory. 2) Periodic audits by visiting HQ-based ecologists to assess the condition of key habitats across reserves. Meetings are then convened at the sites where management needs reviewing and actions agreed to bring the ‘Key Features Influencing Management’ into the condition defined in the management plan.
Finally, information on the effects of management actions at RSPB sites is further disseminated by producing case studies, which are made available on the website conservationevidence.com.

### 18. ANTICIPATING THE EFFECTS OF AGRI-ENVIRONMENT SCHEMES ON BIODIVERSITY IN HUNGARY

**BÁLDI**, **ANDRÁS**, Hungarian Natural History Museum, Hungary; **Batary**, **Péter**, Hungarian Natural History Museum, Hungary; **Kleijn**, **David**, Wageningen University, Netherlands; **Erdős**, **Sarolta**, Szent István University, Hungary

Agricultural intensification is the major threat to biodiversity in Europe. A major challenge is to learn from the limited good examples of effective agri-environment schemes in Western Europe and apply them in the conservation of high farmland biodiversity in the new EU countries in Central Europe. We compared extensively and intensively grazed pastures (no chemicals) on 42 fields in Hungary. Plants, birds, and arthropods (spiders, carabids, orthopterans, homopterans, heteropterans, bees, weevils and leaf-beetles) were sampled. Management had no effect on species richness of any of the ten taxa, but affected abundance of six taxa. Multivariate GLM revealed interactions between the effects of management and grassland type, indicating that the similarly rich assemblages have different

species. Important protected and rare species did not increase in richness or abundance with reduced grazing pressure, although birds typical of extensively farmed grasslands those are in decline throughout north-western Europe benefited from extensive grazing. The difference in grassland composition of extensively and intensively grazed areas suggests that agri-environment schemes would promote overall farmland biodiversity, since both levels of grazing intensity examined in this study still produce grasslands well-worth of protecting.

### 19. APPLYING ECOREGION BASED CONSERVATION SCIENCE IN THE DANUBE-CARPATHIAN REGION: OPPORTUNITIES AND CHALLENGES FOR IMPLEMENTING ECOREGION CONSERVATION IN THE HEART OF EUROPE

**BALTZER, MICHAEL;** WWF Danube-Carpathian Programme, Austria; **Bratrich, Christine,** WWF Danube-Carpathian Programme, Austria; **Lieberman, Suzanne,** WWF Danube-Carpathian Programme, Austria; **Stanciu, Erika,** WWF Danube-Carpathian Programme, Austria; **Sylven, Magnus,** WWF International Europe and Middle East Programme, Switzerland; **Schwede, Georg,** WWF International Europe and Middle East Programme, Switzerland

WWF has now initiatied over 80 ecoregion-based programmes globally. Many of the best examples of WWF's adoption of large ecosystem conservation have been in Asia, Africa and South America. WWF has also supported an ongoing programme in the Danube-Carpathian region, in the heart of Europe. This large region (more than 15 countries) still comprises rich, diverse and extensive natural ecosystems. It has a high proportion of poor, rural communities and is undergoing dramatic economic, political and social change. It therefore shares many of the characteristics of similar ecoregions in other continents. Planning conservation in data-poor situations across multiple countries is challenging enough. Implementation of those plans, however, is often where ecoregion-scale initiatives fail. This presentation will show how lessons from pioneering programmes in other continents have been applied to improve the implementation of ecoregion conservation in Europe. Techniques for integrating conservation science target based plans, landscape-scale participatory planning, economic incentive-based approaches and focused capacity building to achieve both biodiversity conservation and sustainable development objectives have taken lessons directly from similar efforts in other continents. The presentation will also demonstrate how progressive policy intiatives such as those eminating from the European Union and the Convention of Biological Diversity can be merged with ecoregional scale plans and field-based implementation.

### 20. IDENTIFICATION OF PRIORITY AREAS FOR CONSERVATION OF TERRESTRIAL VERTEBRATES IN LOMBARDY, NORTHERN ITALY

**BANI**, **LUCIANO**, University of Milano-Bicocca, Italy; **Massimino**, **Dario**, University of Milano-Bicocca, Italy; **Bottoni**, **Luciana**, University of Milano-Bicocca, Italy; **Massa**, **Renato**, University of Milano-Bicocca, Italy

The objective identification of priority areas for conservation is presently a key issue in conservation planning. It may be achieved by means of semi-quantitative environmental suitability models for threatened terrestrial vertebrates. These models are based on the best available ecological information on specific habitat suitability coming from the scientific literature and the available digital thematic maps. In our study, developed for the whole Lombardy region (about 25 thousand sq km), we used the environmental data coming from a land use digital map (1:10,000). By means of this simple approach we identified priority areas for different ecological groups, on the basis of the major ecological assemblages of the regional landscapes. Moreover, we assessed the extent of the overlapping of the output of these semi-quantitative models compared with that of quantitative distribution models for selected focal species derived from large-scale faunal surveys. Finally, we evaluated the overlapping of the existing network of protected areas with priority areas based on the two different models.

### 21. THE HUMAN DIMENSIONS OF EUROPEAN LARGE CARNIVORE CONSERVATION

**BATH, ALISTAIR** et al., Geography Department, Memorial University of Newfoundland, Canada

The experience of trying to reintegrate large carnivores into European landscapes has shown us that the main challenges are associated with human acceptance rather than habitat or prey base. In response to this, a wide range of human-dimension studies have been conducted during the last 10 years in many European countries to try and identify the factors that influence the attitudes that people hold towards these species. This paper will review some of the studies that have been conducted using a more or less common methodology throughout Europe. The results indicate that a wide range of factors influence attitudes and that many of the conflicts with large carnivores may actually be more symbolic in nature, and may actually have very little to do with the species themselves. These findings have been used to design an approach to involving the public in decision making.

### 22. A COMPARISON OF GENETIC APPROACHES TO DEFINE POPULATION BOUNDARIES

**BEEBEE**, **TREVOR**, University of Sussex, United Kingdom

Although the concept of population is important to ecologists and conservation biologists, definition of the term in specific situations is often difficult. Assigning boundaries between populations, for example, is often arbitrary in the absence of information about gene flow. Recently developed Bayesian methods for analysing genetic data now provide a powerful approach to defining populations. I used such approaches with microsatellite data to define the population structure of an endangered toad in Britain. A large sample of toads from all locations where the species occurs was genotyped at eight microsatellite loci. Comparisons of two assignment methods (STRUCTURE and BAPS) indicated that in complex sampling areas BAPS yielded the most credible population groups. Reasons for differences between the two methods and the implications of this type of analysis for conservation planning and management are discussed.

### 23. INTEGRATING CONCEPTS OF NATURAL VARIABILITY INTO THE DESIGN AND MANAGEMENT OF MARINE PROTECTED AREAS

**BENEDETTI-CECCHI, LISANDRO**, University of Pisa, Dipartimento di Biologia, Italy; **Bulleri, Fabio**, University of Pisa, Dipartimento di Biologia, Italy; **Bertocci, Iacopo**, University of Pisa, Dipartimento di Biologia, Italy; **Vaselli, Stefano**, Dipartimento di Biologia, University of Pisa, Italy; **Maggi, Elena**, University of Pisa, Dipartimento di Biologia, Italy; **Balata, David**, Dipartimento di Biologia, University of Pisa, Italy; **Tamburello, Laura**, University of Pisa, Dipartimento di Biologia, Italy

Marine protected areas (MPAs) have variable effects on coastal biodiversity. Though many studies have documented positive effects of MPAs on assemblages, particularly on biomass of fishes, several investigations have reported equivocal results. In addition to variable degrees of compliance with restrictions, failure to match the scale of protection with the spatial and temporal scales at which important ecological processes operate, may also explain differences in effectiveness of MPAs. Because effects of protection are superimposed to variable patterns of biodiversity, understanding the scales at which assemblages display most variability is important to design better MPAs in terms of size, number and networking. By using data on fish and benthic assemblages from a number of MPAs in

the Tuscany Archipelago (northwest Mediterranean), we have tested the hypothesis that protection encompasses the relevant scales of variability displayed by these assemblages. In order to test this hypothesis, we quantified spatial patterns in biodiversity at a variety of scales and related these patterns to both the presence/absence of MPAs and to habitat complexity. Results show large spatial variability in assemblages at multiple scales and only in few cases patterns reflect local effects of protection. Habitat complexity is often more important than the presence of an MPA in determining patterns of biodiversity. Overall, our results emphasize the need of incorporating concepts of natural variability and spatial predictors of levels of biodiversity into the decision-making process for the design of MPAs.

### 24. FORAGING HABITAT SELECTION BY BREEDING YELLOWHAMMERS EMBERIZA CITRINELLA ON ARABLE FARMLAND AT TWO SPATIAL SCALES: IMPLICATIONS FOR CONSERVATION MANAGEMENT

**Benton**, **Tim**, University of Leeds, United Kingdom; **DOUGLAS**, **DAVID**, University of Leeds, United Kingdom; **Vickery**, **Juliet**, British Trust for Ornithology, United Kingdom

The decline of farmland birds is a major conservation issue in Europe. There is concern that one consequence of modern crop management is reduced abundance and accessibility of invertebrate food resources for foraging birds. This study found a seasonal switch in broad-scale foraging habitat selection of breeding yellowhammers, from field margins and other non-cropped habitat early in the season, to cereal fields later in the season. Margins supported a greater abundance of invertebrates than adjacent crop fields throughout the season. However vegetation density within the margins greatly increased as the season progressed, reducing accessibility and potentially the efficiency of foraging. At the fine-scale, within cereal fields, yellowhammers favoured tractor tramlines, resulting in the crop density at foraging patches being lower than at control sites located within the same field. However, differences in invertebrate abundance between foraging and control patches were small. The selection of tramlines within cereal fields suggests that management to benefit foraging birds could include the creation of patches of open vegetation within both margins and crop fields, to increase accessibility to invertebrates.

### 25. SUCCESS IN REDISCOVERING ENDANGERED SPECIES IN SOIL SEED BANKS DEPENDS ON THE METHOD USED

**BERNHARDT**, **KARL-GEORG**, Institute of Botany, Austria

Seed banks may play important roles in recovering endangered plant species and in conserving genetic diversity. The ephemeral grass Coleanthus subtilis had not been recorded for decades in the vegetation cover of semiaquatic environment in Austria. After the rediscovery of Coleanthus subtilis in one fishpond (2000), soils of 13 extant fishponds, in which Coleanthus was found during the past 130 years, were collected and examined. We used two complementary techniques to study seed banks: hand sorting (spoiling method) and seedling emergence. Frequency and densities of Coleanthus subtilis varied with the method used. Seeds of Coleanthus subtilis were significantly more abundant when using the hand sorting method (mean ± SE: 116363.1 ± 19351.3 and 7114.6 ± 2527.1, respectively; paired t-test: $t = 5.52$, $df = 13$, $p < 0.001$). In sandy soil, Coleanthus subtilis was only found with this method. The recovery of species from soil seed banks depends on the method used as well as on the vitality of seeds which can be used for conservation methods, such as sowing or incubation of potential habitats with seed-carrying soil.

### 26. SMALL WATER BODIES: A CRITICAL BUT NEGLECTED FRESHWATER RESOURCE IN EUROPE

**BIGGS, JEREMY**, Oxford Brookes University, Pond Conservation, United Kingdom

Ponds, defined as man-made or natural bodies up to 2 ha in area, represent 95% of discrete standing waterbodies in northern European landscapes. These small waterbodies are also surprisingly biodiverse. Recent research shows that, within catchments, ponds typically contribute around 70% of the aquatic invertebrate and plant diversity present, more than any other single waterbody type including rivers, lakes and streams.
Despite their value and ubiquity, small water bodies have been neglected by researchers and policy makers alike. In most EU countries they receive only accidental protection, for example as a result of species protection legislation or from incidental inclusion in larger protected areas. Similarly, although most EU states have national survey and monitoring strategies for lakes, rivers and streams, no state has a monitoring programme for small standing waters.
The Water Framework Directive (WFD) is theoretically concerned with 'all surface waters', with no lower size limit. Yet in practice virtually all states have excluded ponds from River Basin Characterisation so that ponds are not included in either monitoring or protection programmes. As a consequence of this the ecological quality of ponds may continue to decline following the implementation of the Directive.
The omission of ponds from WFD measures is important for a number of reasons: First, with no evaluation of the current status of ponds, or of trends in their quality, it becomes impossible to assess whether ponds are being adequately protected. Second, WFD catchment measures, introduced to reduce impacts (e.g. diffuse pollution) on larger waterbodies are likely to be insufficient to protect ponds. This is because ponds with their small size, shallow depth and small catchments experience a wider range of impacts than larger waters and are affected by these impacts more severely. Finally, there may also be benefits for the success of WFD implementation generally in including a representative sample of small waterbodies. The generally small catchments of ponds makes it simpler to protect them from damaging impacts, for example by completely eliminating sources of surface water pollution from those catchments. Because of this, pond protection is likely to be much easier and cheaper to achieve than the protection of larger waters which may be exposed to many different kinds of environmental stress and which commonly require costly and extensive measures for their protection.
The implications of these observations for regulators and managers involved with the Water Framework Directive are discussed.

### 27. THE EFFECT OF THE AGRICULTURAL LANDSCAPE ON THE POPULATION OF THE EUROPEAN BROWN HARE

**BIRÓ**, **ZSOLT**, St István University, Hungary; **Szemethy**, **László**, St István University, Hungary; **Katona**, **Krisztián**, St István University, Hungary

The number of brown hares (Lepus europaeus Pallas, 1778) has been drastically decreased in Hungary, as well as in whole Europe since the 1960's. One of the main causes for that is the structural change of their habitats. Moreover, the declining variability of food plants is the main cause for the summer mortality of young hares. We assessed the diet composition, the population density, the habitat preference of the hares and their distribution on the crop fields in autumn. The diet contained 24 plant species, and the diversity and the evenness were high. The proportion of the cultivated plants was larger in the agricultural landscape, than in the meadow or forest habitats, but they were not the main components. Hares used mainly the edges of the fields, but the corn and sunflower fields were not suitable for them. They preferred the wheat, the alfalfa and the meadows. However, there was high summer mortality in all study sites. Thus, the recent agri-environment can not maintain the hare population, even the decline will continue. Small fields

with varied plant species have to be inserted into the large monocultures. The margins of the fields have to be left to ensure weed plants for food, shelter and nesting sites for the hares. These conservation measures could be advantageous for the ground-nesting birds too.

### 28. WITHIN-POPULATION GENETIC STRUCTURE AND CLONAL DIVERSITY OF VIOLA CALAMINARIA, AN ENDEMIC METALLOPHYTE

**Bizoux**, **Jean-Philippe**, Gembloux Agricultural University, Belgium; **Mahy**, **Grégory**, Gembloux Agricultural University, Belgium

The zinc violet, Viola calaminaria is a threatened species, endemic to metalliferous sites in Belgium and West Germany. We studied the within-population genetic structure and the extent of clonality with RAPD markers in two populations in order to understand regeneration patterns and develop strategies for the conservation. At the very local scale (0.2 m), the proportion of distinguishable genets (0.90; 0.72) and Simpson's diversity index (0.99; 0.98) indicated high levels of clonal diversity. Spatial autocorrelation at short distances revealed positive correlation extent to 0.4 m in Prayon and extent to 1 m in Schmalgraf. This result pointed to a spatial genetic structure in very short distance resulting from clonality and/or limited gene flow probably due to limited seed dispersal (capsule explosion). The result indicated that clonality is not an important mean of propagation, even in populations that have undergone a recent extension. When the within population structure was examined at a 2m scale, spatial autocorrelation of genotypes revealed a positive correlation in the first distance class with subsequent sinusoidal pattern for the two populations. This suggested that the patchy distribution of the genetic diversity may be associated to high gene flow between patches probably due to pollen dispersal.

### 29. WOLVES IN THE SUNFLOWERS: ECOLOGY OF A WOLF POPULATION LIVING IN AN AGRICULTURAL HABITAT IN SPAIN

**Blanco, Juan Carlos**, WOLF PROJECT-CBC, Spain; **Cortés, Yolanda**, WOLF PROJECT-CBC, Spain

Since 1970 wolves have been increasing in Spain and expanding into areas with highly modified agricultural landscapes. From 1997 to 2005 we have radio-collared 16 wolves in a population established in an agricultural habitat where wild ungulates are almost absent. Wolf density, assessed by radio-tracking and simulated howling to detect different packs, was 2.4-3.0 wolves/100 $km^2$. Wolves expanded their range during the study period. Seventy five percent of the diet biomass, studied by the analysis of 603 scats, was made up of livestock carrion, very abundant during most of the study period. Wolves lived in packs, which averaged 9-10 individuals during the autumn but the percentage of solitary wolves was higher than in most other studies. The average home range of radio-collared wolves ranged between 150 and 200 $km^2$. Both resident and transient wolves crossed 4-lane, fenced highways using bridges built for vehicles, but where deterred by a barrier formed by the river Duero and a transport corridor. We conclude that these carrion-eating, adaptable wolves keep the same social and ecological behaviour as other wolves studied in natural and semi-natural areas of North-America and Europe.

### 30. CAUGHT IN THE EXTINCTION VORTEX? ENVIRONMENTAL, DEMOGRAPHIC AND GENETIC PROCESSES DETERMINE POPULATION PERSISTENCE IN THE DUNLIN (CALIDRIS ALPINA SCHINZII)

**BLOMQVIST**, **DONALD**, University of Gothenburg, Sweden; **Pauliny**, **Angela**, University of Gothenburg, Sweden

Subdivision of populations, created by habitat fragmentation, is often correlated with species declines and may follow patterns predicted by metapopulation theory. This theory considers demography across neighbouring subpopulations connected by dispersal. In addition to demography, many endangered species are also at risk from genetic factors. We examined the causes and consequences of metapopulation structure in a fragmented population of dunlins (Calidris alpina schinzii) breeding in SW Sweden. During 16 years, we recorded 7 extinctions and 4 colonisations of local populations, suggesting that the metapopulation is unstable. Subpopulations living in small areas and holding few breeding pairs were more likely to go extinct. With sexes equally likely to return to their birth site, these patterns have set the stage for loss of genetic variation and inbreeding, as revealed by an increased frequency of incestuous matings and degree of genetic similarity between mates. Consistently, the population shows evidence of inbreeding depression and other negative effects of reduced genetic diversity: relatedness between pair members predicted hatching failure, and young that died prematurely were more homozygous than those that survived. Our results demonstrate that the survival of small and threatened populations is determined by an interaction between demographic and genetic processes.

### 31. TRANSBOUNDARY WETLANDS IN THE CARPATHIAN BASIN - AN EFFECTIVE METHOD TO CONSERVE WETLAND BIODIVERSITY

**BÖHM**, **ANDRÁS**, National Inspectorate for Environment, Nature and Water, Hungary

Covering the central part of the Carpathian Basin, Hungary situated in a basin where nearly 96% of watercourses originate from upstream countries. Due to the geographical conditions, Hungary has been active always in bi- or multilateral international cooperation in the field of environment, water and especially in nature conservation. More than 60 % of the state boundary is situated on rivers, particularly the Danube and its tributaries (Drava, Tisza) as well as there are larger shared wetlands like Lake Ferto crossed by the state border. Among the 23 wetlands of international importance of Hungary, there are 4 transboundary ones (3 shared with Slovakia, one shared with Austria), while other 4 more are planned (with Rumania, Ukraine and Serbia). In this paper the management practice is evaluated in the transboundary wetlands of international importance as well as the strengths and weaknesses in biodiversity conservation is revealed. Similarities were found between Hungary and Slovakia in terms of management approaches, institutional and legislative background. However, other countries have different approaches to conserve wetland diversity, there is an urgent need to strengthen the cross-border coopation in the field of wetland conservation.

### 32. EDGE POPULATIONS AT RISK: GENETIC DIVERSITY OF THE GREEN LIZARD (LACERTA VIRIDIS) IN GERMANY AND IMPLICATIONS FOR CONSERVATION MANAGEMENT

**BÖHME**, **MANJA U.**, University of Leipzig, Germany; **Schneeweiß**, **Norbert**, Landesumweltamt Brandenburg, Germany; **Schlegel**, **Martin**, University of Leipzig, Germany; **Berendonk**, **Thomas U.**, University of Leipzig, Germany

For the conservation of biodiversity within a threatened species it is of vital importance to understand its overall genetic diversity. Considering this fact it is often problematic that edge and central populations can show great differences regarding their genetic variation and thereby also in their probability of extinction. The Green Lizard Lacerta viridis is one of several lizard species listed in the Flora-Fauna-Habitat directive (FFH) of the European Union (1992) as a strictly protected species of public interest. The northern edge populations of the species range, located in the German federal country Brandenburg, have a high extinction risk and many efforts are undertaken to protect these populations. With our analysis of the current genetic diversity of several wild populations and one captive breeding population we support an already established conservation project. Using fast

evolving microsatellite markers we demonstrate that the studied populations have a reduced genetic diversity in comparison to central populations of this species. However, we detected genetic differentiation between the closely located populations. Furthermore, these populations exhibit unique genetic features, which are important considering the maintenance of the biodiversity and the future adaptational potential of this species.

### 33. ASSESSMENT OF ECOLOGICAL STATUS USING MACOINVERTEBRATES ACCORDING TO THE EUROPEAN WATER FRAMEWORK DIRECTIVE WITHIN THE CONTEXT OF NATURE CONSERVATION

**BÖHMER**, **JÜRGEN**, Bioforum GmbH, Germany

The EU Water Framework Directive aims at restoring water bodies affected by human impact and protecting unimpacted or slightly impacted waters. For this purpose systems for assessing the ecological status streams and lakes were developed in the EU member states. The presentation outlines the principles of development of macroinvertebrate assessment systems in Germany and discusses them within the context of nature conservation and the EU Habitat Directive. Macroinvertebrate assessment follows the principles of ecological integrity. It is based on multimetric indices consisting of several metrics representing taxonomic richness and diversity, ratio of sensitive taxa and biocoentic composition. All metrics were tested for correlation with human impact variables. According to the Water Framework Directive these metrics must not deviate significantly from type-specific undisturbed conditions to achieve good ecological status. Otherwise restoration measures have to be taken. Thus naturalness is emphasised. Macroinvertebrate assessment was tested by water managers for reliability and practicability and subsequently refined.

### 34. ECOLOGICAL NETWORKS: A THEORETICAL PARADIGM IN ECOLOGY OR AN OPERATIONAL TOOL IN CONSERVATION?

**BOITANI**, **LUIGI**, Università di Roma, Italy

The concept of ecological networks (EN) has been proposed in landscape ecology and has gained attention by several national and European institutions. Promoters claim that it is an indispensable tool to counteract the increasing fragmentation of natural habitat, to complement the establishment of protected areas and to increase biodiversity. The theoretical foundations of EN refer to the function of connectivity among habitat patches provided by corridors that should enable species to exchange individuals and genes. As such, the EN concept is an interesting ecological paradigm. However, I argue that its use for practical biodiversity conservation is limited: a) EN are species/scale/context specific, but the information needed for their implementation is available for just few species; b) to overcome this limitation, EN are generally proposed at landscape scale (for few "focal" species at a time) but there is no indication that the structural connectedness of landscape features ensure the functional connectivity; c) the theory of corridors ha serious limitations in forming a body of practical indications on how to build the corridors (species-specific width, shape, content, context); d) no EN so far have been validated for accomplishment of their stated goals (functional connectivity and biodiversity conservation) and it will be very difficult in the future to gather this evidence. The paucity of scientific evidence on the effectiveness of EN in delivering on their goals and their high economic and political costs suggest a precautionary approach on their implementation.

### 35. THE FUTURE OF LARGE CARNIVORES IN 21$^{ST}$ CENTURY EUROPE - HOW FAR CAN WE PUSH THEIR REINTEGRATION INTO OUR LANDSCAPES ?

**BOITANI, LUIGI**, Dipartimento di Biologia Animale e dell'Uomo, Italy

Although large carnivores are protected by a complex array of national and international legislation across Europe, it is obvious that current legislation is insufficient to guarantee their optimal conservation. These species are loaded with high emotional values and cause a variety of conflicts with human interests. Predation on livestock affects farmers' economies, predation of wild prey affects hunters' activities and their potential predation on humans causes negative reactions across vast portions of the general public. To reconcile the needs to conserve viable populations of large carnivores with those of humans has been almost impossible throughout most of human history and it appears a formidable task in the European human dominated landscapes.
The goal of the Large Carnivore Initiative for Europe (LCIE) is to have more large carnivores in wider ranges where carnivores and humans are integrated through active management. A science based approach focused on populations as management units. The meta-population concept and the need to include human dimensions issues in every management plan are considered to be essential to ensure human-carnivores coexistence. Culling is acceptable to maintain coexistence as well as hunting within compensatory mortality. Populations should be self-sustaining on wild prey. Protected areas are one of the tools for broader conservation strategies. Management will require systems of temporal and spatial zoning to apply a variety of conservation rules. Land use and rural development policies should move away from direct production subsidies and towards environmental payments and these should include payments tied to the presence of large carnivores.

### 36. A MULTIDISCIPLINARY APPROACH TO DETECT SIGNIFICANT UNITS FOR THE CONSERVATION OF ALPINE CAPERCAILLIE

**BOLLMANN**, **KURT**, Swiss Federal Research Institute WSL, Switzerland; **Jacob**, **Gwenaël**, Swiss Federal Research Institute, Switzerland

The capercaillie (Tetrao urogallus) is an endangered forest grouse species that has extensive spatial requirements and needs a considerable amount of open-structured forest stands. Consequently, the species is sensitive to the spatial configuration of habitat patches and changes in forest structure. Capercaillie populations are declining in most of their central European range as loss and fragmentation of suitable habitats have split populations into loosely connected or even isolated patches. In Switzerland, the species is endangered and the remaining population of 900–1000 individuals faces a considerable risk to decline further on. We combined population and molecular studies to assess for demographic and genetic threats and detect important units for conservation. We found a source-sink population dynamics in which (i) 55% of habitat patches were occupied by local populations, (ii) patch area and patch isolation were good predictors of patch occupancy, and (iii) evidences of a decrease in genetic connectivity were recorded. All regional population networks identified by patch and genetic analyses occupy larger areas than the administrative units that are responsible for the species. Thus, large-scale action plans with regional specifications and interregional cooperation are required for the management of significant units for the conservation of Alpine capercaillie.

### 37. LARGE CARNIVORES AS FLAGSHIPS FOR BIODIVERSITY CONSERVATION

**Breitenmoser, Urs**, KORA, Switzerland; **Breitenmoser-Würsten, Christine**, KORA, Switzerland

Top predators, sitting on the pinnacle of the trophic pyramid, are undisputed umbrella species in their eco-systems. Many of them have demanding habitat requirements, and all of them need extended living space with healthy prey populations. Maintaining viable populations of top predators consequently conserves automatically a number of other species and their habitats. Large carnivores, as the most conspicuous among the top

predators, furthermore often serve as flagship species, as leading elements of campaigns to conserve an area or an entire eco-system. Hence large carnivores become symbols of pristine nature, continuous habitats, and areas of low human impact. On the other hand, large carnivores are controversial species, which must, most apparent in Europe, co-exist with humans in a multi-use landscape, and here they often become rather symbols for a socio-economic conflict than for nature conservation. To assess the actual value of large carnivores as flagship species for conserving biodiversity, we should address three questions: 1. Are large carnivores indeed indicators for "natural" landscapes? 2. Do zones with large carnivores have higher biodiversity than comparable areas without? And 3. Do people really identify large carnivores with healthy eco-systems?

### 38. CONSERVATION EDUCATION: BETWEEN A ROCK AND A HARD PLACE?

**BRIDE**, **IAN**, Durrell Institute of Conservation and Ecology, United Kingdom

This paper considers the position of Conservation Education (CE) in relation to the wider disciplines of Conservation Biology on the one hand and Environmental Education on the other. It argues that the methodological approaches and perspectives embodied in each serves to posit CE in a peripheral manner and leave it misunderstood from both directions. However, it also maintains that conservation educators should strive to persuade conservation biologists, not only of the fundamental importance of CE to the meaningful exercise of Conservation Biology, but that CE has much to offer it in terms of its future development and its understanding of itself. The example of the recent SCB guidelines for conservation literacy and the SCB Code of Ethics are used to illustrate this point.

### 39. MIRES: IMPORTANT CENTRES OF DIATOM DIVERSITY IN THE CARPATHIAN-BASIN - FAR FROM THE FOCUS OF WATER FRAMEWORK DIRECTIVE

**BUCZKÓ**, **KRISZTINA**, Hungarian Natural History Museum, Hungary; **Borics**, **Gabor**, Environmental Protection Inspectorate for Trans-Tiszanian Region,, Hungary; **Poulícková**, **Aloisie**, Faculty of Science, Palacký University, Czech Rep.

In 2005 a basic ecological survey was conducted in accordance of the Water Framework Directive (WFD) in order to create an ecological database for Hungary. More than 600 diatoms were recorded in it. Noteworthy, among the 394 sampling localities there was only one where the measured figure was lower than 7 pH. This kind of low measure is a characteristic feature for mires. Mires possess important ecological properties, and maybe the most threatened biotops of Europe. In spite of this, mires are completely omitted in the scope of WFD. The widely used classification of ecological indicator values for diatoms compiled by Van Dam contains 1016 taxa. Almost a quarter of species marked as acidophilous/acidobiontic (150 taxa) and three quarter was regarded as alkaliphilous/alkalibiontic (486 taxa), if we do not take into consideration into the indifferent and "unknown" taxa. According to this dataset we assume, that the diatom diversity in Hungary is highly underestimated by WFD. The results of the study focused on moss inhabiting diatoms in mires is presented. The analysis of diatoms collected in eleven Hungarian mires resulted data of 97 taxa. The importance of mires for diatom diversity is well demonstrates by the recently (1999-2004) conducted study in West Carpathian spring fens. To supplement this some data from mires of the Eastern Carpathian Mountains is also given.

### 40. EX SITU CONSERVATION OF NATIVE SPECIES: CONTRIBUTION OF GERMAN BOTANIC GARDENS TO THE GSPC TARGET 8

**Burkart**, **Michael**, University of Potsdam, Germany; **Gröger**, **Andreas**, Botanic Garden Muenchen-Nymphenburg, Germany; **VON DEN DRIESCH**, **MARLIESE**, University of Bonn, Germany; **LÖHNE**, **CONNY**, University of Bonn, **Lobin**, **Wolfram**, University of Bonn, Germany

Botanic Gardens are main actors on the field of ex situ conservation of plant taxa. However, to achieve the terms of the Global Strategy for Plant Conservation, activities have o be concerted and coordinated.
As a first step towards the fulfilment of Target 8 the current status of ex situ conservation measures of native plant species of Germany was assessed in German Botanic Gardens. The survey showed that 292 native species of German taxa are conseved ex situ in 26 German Botanic Gardens. Out of 21 highest priority taxa, 8 are conserved ex situ in German Botanic Gardens; 3 of them are included in recovery and restoration programmes.
In order to coordinate and strengthen Germany's efforts in ex situ conservation, the assessment also demonstrated that a common accepted priority species list and priority criteria for plant conservation in Germany is needed.
In November 2005, a working group on ex situ conservation was founded within the new "Network for Plant Conservation in Germany" (www.florenschutz.de). This working group aims to develop a priority species list and protocols for ex situ cultures of threatened native species and to design ex situ conservation programmes.

### 41. HISTORICAL DYNAMICS OF THE FLOODING REGIME OF THE DONANA MARSHES ANALIZED WITH PREDICTIVE MODELS

**BUSTAMANTE**, **JAVIER**, Estacion Biologica de Donana, CSIC, Spain; **Diaz-Delgado**, **Ricardo**, Estacion Biologica de Donana, CSIC, Spain; **Pacios**, **Fernando**, Estacion Biologica de Donana, CSIC, Spain; **Aragones**, **David**, Estacion Biologica de Donana, CSIC, Spain

The Donana marshes are a seasonal wetland of international importance. They are protected by a National Park, and constitute a biosphere reserve and Ramsar site. The marshes get flooded with autumn and winter rains and dry-up in summer. This seasonal flooding process is very variable depending on the amount of rainfall, that varies annually between 200 -1000 mm. The amount of area flooded, the depth and characteristics of flooded areas, and the amount of vegetation growth vary along the season, but are also very variable among years. How the marshes get flooded determines the amount of habitat for animal species in general, and waterfowl in particular. We have used a series of 224 Landsat images from the period 1975-2005 reconstruct the flooding regime of the marshes. During 2003-2004 we obtained ground truth data of flood characteristics in three field visits simultaneous with a satellite pass. We fitted models to field data to predict from satellite reflectance data, flood level, water turbidity and aquatic vegetation growth. Different models were evaluated and tested with independent data. Final models were used to generate historical maps of flood level, water turbidity, and aquatic vegetation cover and analyse the changes in the last 30 years.

**42. IS THE SPECIES RICHNESS OF AMPHIBIANS AND REPTILES COVER BY THE CURRENT PROTECTED AREAS OF PORTUGAL AND SPAIN?**

**CARVALHO**, **SILVIA**, CIBIO, Centro de Investigação em Biodiversidade e Recursos Genéticos, Portugal; **SILLERO**, **NEFTALÍ**, CIBIO, Centro de Investigação em Biodiversidade e Recursos Genéticos, Portugal; **Brito**, **José Carlos**, CIBIO, Centro de Investigação em Biodiversidade e Recursos Genéticos, Portugal; **Crespo**, **Eduardo**, CBA, Centro de Biologia Ambiental, Portugal

Many protected areas (PAs) were established using socio-economic and aesthetic criteria. The protection efficiency on amphibians and reptiles biodiversity in Iberian Peninsula´s PAs was determined using Gap analyses. Species predicted distribution maps were generated with Ecological Niche Factor Analysis. The predicted species distribution and PAs limits were overlayed in a Geographical Information System and the percentage of each species range covered by PAs was calculated. Species with a distribution range less than 1% of Iberia Peninsula were considered gap if their distribution was not fully covered by PAs. Remaining species were considered gap if less than 10% of their distribution area was covered by PAs. A simulated annealing algorithm was computed with MARXAN software to define which areas would optimize herpetofauna representation in a hypothetical expansion of the actual PAs network. The “cost” of each grid cell was modelled using “land quality” and “population density”. Eight Atlantic and 17 Mediterranean species were considered gap species, indicating that Iberian Peninsula’s PAs system should be expanded. Simulated annealing suggests that additional reserves should be priority designated for Galicia, Basque Country, Pyrenees, and Central Portugal for Atlantic species and for Iberian system, southern Murcia and eastern Andalusia for Mediterranean species.

**43. COST-EFFICIENCY IN CONSERVATION PLANNING: WHERE DO WE ACT TO GET THE BIGGEST BANG FOR OUR BUCK?**

**CARWARDINE**, **JOSIE**, The University of Queensland, Australia; **Kerrie**, **Wilson**, The University of Queensland, Australia; **Matthew**, **Watts**, The University of Queensland, Australia; **Etter**, **Andres**, The University of Queensland, Australia; **Possingham**, **Hugh**, The University of Queensland, Australia

Cost-efficiency is of increasing importance in conservation planning given a continuing decline of biodiversity and a shortage of conservation funds. Approaches currently used to identify important areas for conservation action usually attempt to maximise biodiversity conserved over a minimal number of sites or area. This implies a goal of minimising the cost of conservation, but the costs of conservation actions are almost always assumed to be spatially homogeneous. A limited number of studies have considered variation in the costs of conservation actions at broad scales (e.g. whole countries), or have used cost to compare alternative priorities post hoc. We demonstrate the first spatial prioritisation process at a broad scale (the continent of Australia) that integrates both biological information and fine-scaled cost data a priori. Alternative measures of the costs of conservation action are employed to reflect varying objectives: specifically the costs associated with land acquisition, stewardship, and management. We show that areas identified as priorities for conservation action differ when selected to minimise alternative costs, and that using an inappropriate cost measures reduces efficiency. The cost measure used should therefore be determined by the type of conservation action intended, forcing the objectives of prioritisation scheme to be clearly stated.

**44. APPLICATION OF A SAMPLE-BASED STRATEGY FOR MONITORING PLANT SPECIES DIVERSITY IN A NETWORK OF PROTECTED AREAS**

**CHIARUCCI**, **ALESSANDRO**, University of Siena, Italy; **Bacaro**, **Giovanni**, University of Siena, Italy; **Rocchini**, **Duccio**, University of Siena, Italy

The Sites of Community Importance (SCIs) constitute the Natura 2000 network, and were established to preserve European biodiversity. To accomplish the 2010 target, it is essential to assess how effective is the conservation provided by the Natura 2000 network and to develop tools to quantify future changes. As primary producers vascular plants represent main elements in shaping structure and functions of terrestrial ecosystems, provide physical habitat for other organisms and are used as focal taxon for the selection of nature reserves. A cost-effective monitoring of habitats could be achieved by remote sensing. On the other hand, the development of a reliable method to monitor plant species richness and composition is needed for validating remotely sensed data and planning management. We report the results of the application of a sample-based approach to the assessment of plant species richness and composition in a network of SCIs. Our project aimed to i) evaluate the performance of several indicators of plant species diversity in relation to their applicability, precision and reproducibility; ii) develop scenarios of different sampling strategies in order to maximize the efficiency for a given sampling effort; ; iii) depict pattern, distribution and complementarity of plant species diversity within a regional network of SCIs located in the province of Siena, central Italy.

**45. IS THE BLACK-BILLED MAGPIE (PICA PICA) REALLY A THREAT TO SONGBIRDS IN URBAN LANDSCAPES?**

**CHIRON**, **FRANCOIS**, Muséum National dHistoire Naturelle, France; **Huste**, **Aurelie**, Université Rouen, France

Rapid colonisation of urban habitats by mesopredators is ongoing changes that become matter for conservationists. Habitat fragmentation, nest visibility and supplementary food sources increase in urban landscape, allowing high predator abundances and serious predation risk. This could affect nest success which may have some impact on community composition. We investigate the consequences of recent increase in abundance of the Black-billed magpie in European cities. Although considered as a major nest predator, the impact of the magpie remains disputed. We have tested its effect on the productivity and adult abundance in 14 common songbirds using mist-nets and experimental magpie removals in suburbs near Paris. We then studied richness and species extinction rate variations of the whole bird community in response to magpie abundance variations. Methods are based on capture-recapture approaches and statistical models accounting for species detectability and habitat. We found that high magpie densities did not limit songbird productivity. However, magpie avoidance by fledged juveniles and adults could be effective for hole-nesters that are susceptible to be predated. Finally, community dynamic was not related to magpie abundance variations. Overall, results suggest that predator control is probably useless in this context and the utility of such studies for urban conservation.

**46. DEPENDENCE OF CLETHRIONOMYS RUFOCANUS ON FOCAL FOREST PATCH SIZE AND QUALITY**

**CHRISTENSEN**, **PERNILLA**, Sweden; **Ecke**, **Frauke**, Sweden; **Sandström**, **Per**, Sweden; **Nilsson**, **Mats**, Sweden; **Hörnfeldt**, **Birger**, University of Umeå, Sweden

There has been a long-term decline in the number of Clethrionomys rufocanus in boreal Sweden and habitat fragmentation has been suggested as a contributing factor to this decline. In a “field test” we evaluated this by comparing

trapping results in less fragmented landscapes, where we predicted C. rufocanus to occur, with those in highly fragmented managed forest landscapes and predicted absence of voles. Unexpectedly though, there was no difference in the number of C. rufocanus in the different types of landscape. However, additional trapping in a national park with large areas of un-fragmented forest yielded more voles than in the managed highly fragmented areas. The "local patch quality perspective" revealed the importance to C. rufocanus of a large patch of forest >60 yr old containing a lot of old-growth (pine) forest (>100 yr). In fact, at the landscape level, the frequency distribution of focal patches of forest >60 yr old and especially their content of old-growth pine forest (>100 yr), relative to the properties of plots with C. rufocanus, suggests that there are few forest patches left that are suitable for C. rufocanus in our study area. Our results strongly suggest habitat fragmentation as a contributing cause to the long-term decline of C. rufocanus.

### 47. AGRICULTURE INTENSITY AND FARMLAND BIRD DIVERSITY IN POLAND – HOW USEFUL ARE SIMPLE BIRD SURVEYS IN EVALUATION OF RURAL POLICY MEASURES?

**CHYLARECKI**, **PRZEMEK**, Museum & Institute of Zoology, Polish Academy of Sciences, Poland; **Kuczynski**, **Lechoslaw**, University of Poznan, Poland; **Tryjanowski**, **Piotr**, University of Poznan, Poland; **Mroszczak-Jawinska**, **Dagmara**, Polish Society for the Protection of Birds, Poland

Poland is a farmland country showing an extensive variation in intensity of farming practices. Main indices of agriculture intensity (e.g. cereal yield, fertilizer use) often vary several-fold across the countrys 16 administrative regions. This provides an opportunity to study spatial variation in bird diversity along a gradient of farming intensity, using standardized methods. Based on the results of the Common Breeding Bird Monitoring scheme (140-320 plots of 1 km2) surveyed annually in 2000-2005), we analyze relationships between local indices of abundance of farmland bird species and regional indices of agriculture intensity. We also examine whether composite indices of species richness and population trends of individual species are related to agriculture intensity indices. Finally, we look whether variation in abundance and diversity of farmland bird species might be better explained by local features of study plots, rather than coarse-grained agriculture intensity indices. Results enable to assess the utility of generic bird surveys conducted at small, local scale (1 km2) to reveal a spatial and temporal variation in agriculture intensity, as measured in regional scale. This provides a check to what extent quick, volunteer-based extensive surveys of farmland breeding birds might be useful in evaluation of efficiency of rural policy measures in new EU member state

### 48. INSTITUTIONALIZING EVIDENCE-BASED CONSERVATION IN THE NATURE CONSERVANCY

**COMENDANT**, **TOSHA**, The Nature Conservancy, United States; **Wiens**, **John**, The Nature Conservancy, United States; **Kareiva**, **Peter**, The Nature Conservancy, United States; **Muttulingam**, **Sanjayan**, The Nature Conservancy, United States

The Nature Conservancy (TNC), an international non-profit focused on biodiversity conservation, employs a variety of strategies to protect and manage land and water. These strategies, for example, range from indirect policy analysis, to on-the-ground interventions. Although TNC develops strategies through a systematic conservation planning process, it is a substantial challenge to translate vast amounts of scientific information into useful recommendations for managers. As a result, TNC is establishing an organization-wide initiative to promote decision making in an evidence-based framework. TNC intends to support systematic reviews on both issues that we and our partners are heavily invested in (e.g. land acquisition, fire, grazing, invasive species), as well as to explore emerging issues such as ecosystem services or effects of forest pests and pathogens. Additionally, TNC is examining the internal structural and cultural factors that will either promote or impede the adoption of evidence-based decision making. For example, TNC is highly decentralized and has a long history of being an action-oriented, place-based, story-telling culture. To catalyze a cultural shift, we will actively engage the senior management, in addition to science staff, in the process of question development, systematic review, and the integration of best practices into conservation action.

### 49. DESIGNING AND IMPLEMENTING CONSERVATION CORRIDORS IN PRODUCTION LANDSCAPES: LESSONS FROM SOUTH AFRICA

**COWLING**, **RICHARD**, Nelson Mandela Metropolitan University, South Africa

Since the achievement of conservation targets for representation and persistence of nature invariably requires large areas of habitat, in most parts of the world these cannot be achieved in protected areas alone. Instead, target achievement will require the identification and implementation of conservation actions in production landscapes. I present a framework for designing and implementing large-scale conservation corridors in production landscapes. The framework comprises a continuum of conservation actions comprising assessment, planning and management phases, which are ranged along axes of increasing stakeholder involvement and decreasing spatial scale, and culminate in achieving objectives for biological and socio-economic resilience. An essential but hitherto neglected part of the assessment phase is the spatial depiction of opportunities and constraints for achieving conservation targets. I illustrate the application of the framework at the broad (ecoregion) scale and the fine (corridor) scale. Lessons learnt from these applications have considerable relevance for conservation planning in many European landscapes.

### 50. RELATIONSHIPS BETWEEN BIODIVERSITY IN MARINE RESERVES AND SURROUNDING AREAS

**Crowe**, **Tasman**, University College Dublin, Ireland; **MULHOLLAND**, **OLWYEN**, University College Dublin, Ireland

Designation of marine reserves has often been due to historical, aesthetic or practical factors that may not effectively relate to the objective of conserving biodiversity. Progress on design and monitoring of marine reserves requires knowledge about how reserves function. A key issue is whether reserves exist in isolation or function as part of a network. As part of an interdisciplinary partnership, one of our aims was to determine the relationship between biodiversity in marine reserves and biodiversity at similar sites of increasing distances from them. Research focussed on reserves at Lough Hyne, Co. Cork and Strangford Lough, Co. Down. Molluscs associated with Fucus serratus were sampled in reserves and on similar shores at increasing distances from them. Analysis to date indicates that Strangford Lough contains species not found elsewhere locally and may be a regional biodiversity hotspot for molluscs in the habitat sampled. Assemblages within Lough Hyne, however, were similar to those in surrounding areas. Relationships between biodiversity within a reserve and in surrounding areas broke down at distances of 35-75 km. Genetic and larval research being undertaken by our collaborators will clarify these findings and should provide insight into maximal distances between reserves within functional networks.

**51. MONITORING THE CONSERVATION STATUS OF HARBOUR SEALS TO COMPLY WITH THE EU HABITATS DIRECTIVE**

**CUNNINGHAM**, **LOUISE**, Sea Mammal Research Unit, United Kingdom; **Duck**, **Callan**, Sea Mammal Research Unit, United Kingdom; **Hiby**, **Lex**, Conservation Research Ltd, United Kingdom; **McConnell**, **Bernie**, Sea Mammal Research Unit, United Kingdom; **Bold**, **Ian**, Sea Mammal Research Unit, United Kingdom

Harbour seals (Phoca vitulina) are protected under the EU Habitats Directive. The directive requires Special Areas of Conservation (SAC) to be set up for harbour seals and their conservation status to be reported to the European Parliament every six years. This study looked at the movements of seals caught in SACs in Scotland and compared abundance estimates from photographic capture-recapture methods with those from traditional aerial surveys.
Satellite telemetry showed that seals repeatedly travelled to up to 10-30 km offshore. Most trips were less than a day in duration (mean 21.07 hours, standard error 0.54). Of the time seals spent hauled out, 18% occurred within harbour seal SACs, suggesting that individual harbour seals repeatedly returned to the SACs.
Individual seals were recognised from unique pelage patterns using computer-assisted photo-identification over a seven-month period. The capture-recapture population estimate was 3.4 times greater than the number of seals counted during the aerial survey the same year. Aerial surveys only count animals on land whereas capture-recapture estimates include individuals that are not hauled out at the time of survey.

**52. CONSERVATION GENETICS OF THE CRITICALLY ENDANGERED SCANDINAVIAN ARCTIC FOX**

**DALÉN, LOVE**, Stockholm University, Department of Zoology, Sweden

Molecular techniques can be used as tools for conservation in several ways, for example to describe species distributions, population structure, dispersal and how low genetic variation and inbreeding affects individual fitness. The arctic fox in Scandinavia is classified as critically endangered after a severe decline in population size in the beginning of the 20$^{th}$ century, from which it has failed to recover despite more than 65 years of protection. We have analysed mitochondrial and microsatellite DNA from *c.* 550 arctic fox samples, collected both from the field and from museum collections. The results show that, despite the bottleneck, genetic variation has been retained over time, although a small decline has occurred during the last 20 years. The relatively high level of genetic variation in Scandinavia is probably a result of gene flow from Russia. However, analyses on modern samples show that the artic fox is fragmented into four isolated populations. This fragmentation seems to have developed recently and has consequences for the current management in Scandinavia. On an individual level, genetic variation was found to be correlated to fitness, suggesting an ongoing inbreeding depression. Future conservation actions could thus include translocation among Scandinavian populations or from Russia to Scandinavia.

**53. THE IMPACT OF *BT*-MAIZE (*MON 810*) POLLEN ON PROTECTED BUTTERFLIES SPECIES IN HUNGARY**

**DARVAS, BÉLA**, Hungarian Academy of Science, Plant Protection Institute, Hungary; **Lauber, Éva**, Hungarian Academy of Science, Plant Protection Institute, Hungary; **Csóti, Attila**, Hungarian Academy of Science, Plant Protection Institute, Hungary; **Peregovits, László**, Hungarian Natural History Museum, Hungary; **Ronkay, László**, Hungarian Natural History Museum, Hungary; **Polgár, László A.**, Hungarian Academy of Science, Plant Protection Institute, Hungary; **Székács, András**, Hungarian Academy of Science, Plant Protection Institute, Hungary

*Bt*-pollen settled down on weeds presents a danger in ~5 m to hatching caterpillars of protected butterflies. At the perimeter of cornfields in Hungary, the occurrence of nettle (*Urtica* spp.) is the third most frequent plant association. The protected butterfly species which lay eggs on nettles during maize pollination are the Peacock butterfly (*Inachis io*) and the Red admiral (*Vanessa atalanta*). Nearly a fifth of the hatching caterpillars of the Peacock butterfly could die in this perimeter. This means that in case of extensive *Bt*-corn cultivation, these two butterfly species could recede from the Hungarian corn growing areas. During our investigations with DIPEL, the caterpillars of the Peacock butterfly were shown to be extremely sensitive to Cry toxins. The caterpillars of the Comma butterfly (*Polygonia c-album*), are 19 times less sensitive. However, the dose permitted for use against European corn borer (*Ostrinia nubilalis*) is 50-times larger than this sensitivity level. On the hatching caterpillars of the Peacock butterfly, the effect of Cry1Ab toxin in DIPEL is 75 times stronger than the toxin in *Bt*-pollen. This could be due to further Cry toxin substances in DIPEL, as well as feeding, digestive and detoxification differences of the species studied.

**54. THE METAPOPULATION RECOVERY OF A THERMALLY CONSTRAINED SPECIES, THE SILVER-SPOTTED SKIPPER BUTTERFLY, IN BRITAIN**

**DAVIES**, **ZOE**, Univesity of Birmingham, United Kingdom; **WILSON**, **ROBERT**, Universidad Rey Juan Carlos, United Kingdom; **Thomas**, **Chris**, University of York, United Kingdom

We examine the rapid re-expansion of a species on the north-western edge of its geographic range. A survey of the entire British distribution of the grassland butterfly Hesperia comma, conducted in 2000, recorded a four-fold rise in the number of populations and a ten-fold increase in the habitat area occupied since 1982. In response to climate warming, the butterfly is now utilising a wider range of habitat types. Between 1982 and 2001/02, the optimum percentage of bare ground within habitat used for egg-laying shifted from 41% to 21%. Egg-laying rates are temperature-dependent and females actively adjust microhabitat usage in response to temperature variations. The improving status of H. comma is the product of good habitat management, recovering rabbit populations and climate change, which have improved the quality, and increased the availability, of thermally suitable habitat within the landscape. This has enabled remnant metapopulations to expand, via distance-dependent colonisation, through large networks of habitat. Conservationists often assume the habitat requirements of a species to be constant and manage habitats to maintain these conditions. For many species, these requirements are likely to change in response to climate warming, and care must be taken not to manage habitats based on outdated prescriptions.

**55. USING NON-INVASIVE GENETIC SAMPLING TO FOLLOW THE EXPANSION OF A TRANSLOCATED BROWN BEAR POPULATION IN THE ITALIAN ALPS**

**DE BARBA**, **MARTA**, University of Idaho, United States; **Waits**, **Lisette**, University of Idaho, United States; **Genovesi**, **Piero**, Istituto Nazionale per la Fauna Selvatica, Italy; **Randi**, **Ettore**, Istituto Nazionale per la Fauna Selvatica, Italy

Since the translocation of 10 individuals from 1999-2002, the brown bear population in the Italian Alps has increased to almost 20 individuals and is spatially expanding beyond the Western Trentino region. Local managers need an effective monitoring program to obtain data on bear reproduction and demography, to ensure the viability of the population, and to mitigate human-bear conflicts. We used different techniques of non-invasive genetic sampling (NGS) and a combination of opportunistic and systematic designs to collect hair and feces in the field as a source of genetic material for 3 consecutive years (2003-2005). In the 2003, 2004, 2005 field seasons we collected 342, 791, 346 samples respectively. Genetic analyses of these samples identified 9 bears in 2003, 15 bears in 2004, and 16 bears in 2005. The NGS approach proved to be effective at tracking the demographic and geographic expansion of the bear population and at identifying bears responsible for damages. In particular,

the simultaneous combination of systematic hair trapping and opportunistic collection of samples in the field was the optimal sampling strategy. The pattern of sampling success for the techniques employed in our 3 years results highlighted the importance of adapting the sampling design to the expanding population.

### 56. CHARACTERIZATION OF AUTOCHTHONOUS ROSES (ROSA SPP.) IN FLANDERS (BELGIUM), PLACED IN A EUROPEAN CONTEXT

**De Cock**, **K.**, Centre for Agricultural Research, Belgium; **Vander Mijnsbrugge**, **K.**, INBO, Belgium; **Breyne**, **P.**, INBO, Belgium; **Nybom**, **H.**, SLU/Balsgaard, Sweden; **Smulders**, **M.J.M.**, Plant Research International, Netherlands; **Van Slycken**, **J.**, INBO, Belgium; **De Riek**, **J.**, Centre for Agricultural Research, Belgium

During the past century the autochthonous plant communities were exposed to men-induced stress. In 1996, an inventory for autochthonous genetic sources of woody species in Flanders, the Northern part of Belgium, was authorized and it revealed some unexpected species and unknown growth sites. In order to identify and characterize the more valuable populations, we need to gain insight in both the genetic and morphological diversity of the Flemish autochthonous species. For roses, an extensive morphological study is combined with molecular-genetic analyses. Based on the genetic fingerprints we want to quantify the genetic and morphological diversity within and between autochthonous populations. Furthermore, we try to define the kinship and descent of the wild hybrids. In collaboration with other European research groups within the 5$^{th}$ framework EU-project GENEROSE, the genetic constitution of the Flemish species can be placed in an European context. Both the morphologic and genetic analyses discriminate between the species as expected. More interestingly, the presence of intraspecific variation correlated with geographical separation was observed. The integration and correlation of the morphological and molecular-genetic results is necessary to increase the comprehension of these output.

### 57. THE EFFECT OF POPULATION SIZE AND HABITAT QUALITY ON LEVELS OF GENETIC DIVERSITY AND REPRODUCTIVE PERFORMANCE IN MEADOW THISTLE, CIRSIUM DISSECTUM

**De Vere**, **Natasha**, University of Plymouth, United Kingdom; **Ford**, **Colin**, Whitley Wildlife Conservation Trust, United Kingdom; **Williams**, **Eirene**, University of Plymouth, United Kingdom; **Smithson**, **Ann**, University of Exeter, United Kingdom; **Plowman**, **Amy**, Whitley Wildlife Conservation Trust, United Kingdom

Cirsium dissectum is found within moist, nutrient deficient grasslands in Western Europe; such grasslands have decreased substantially in extent and become increasingly fragmented. We surveyed 23 populations of C. dissectum throughout Britain and Ireland; determined population size, collected seed heads to measure the number of seeds produced, germination and subsequent survival and used 8 microsatellite loci to determine levels of genetic diversity. We measured soil and vegetation variables to assess habitat quality and used principal components analysis to discover the most important habitat factors. Our results show that genetic diversity is lower in smaller populations of C. dissectum. Furthermore, seed number and germination is reduced in sites with very high or low levels of total nitrogen and organic matter in the soil and where vegetation height is very tall or short. Reduced levels of genetic diversity may reduce the ability of populations to adapt to changing environmental conditions; this may be exacerbated in populations where seed production is reduced due to habitat conditions as this will potentially reduce sexual recruitment. Small populations with nonoptimal habitat conditions may thus have a greater risk of extinction, but suitable site management could reduce this risk.

### 58. THE EU NATURE DIRECTIVES IN LIGHT OF ENLARGEMENT - WHERE SCIENCE MEETS POLICY

**Demeter**, **András**, Directorate General Environment, European Commission, Belgium; **Evans**, **Doug**, EEA- European Topic Centre on Biological Diversity, France

The Wild Birds and the Habitats Directives are the major EU legal instruments for nature conservation and they provide the legal basis for the creation of a network of sites which together form the Natura 2000 network. Site selection is based on lists of species and habitats of conservation interest given in the annexes of the directives. These annexes reflect the biodiversity of the EU at the time they were adopted and with new countries joining the EU, they have been examined and modified to take into acccount the biodiversity values of these countries. The 2004 enlargement of the EU with 10 new member states, and the ongoing accession process of two more countries was preceded by a lengthy technical exercise. The 12 candidate countries were asked to propose changes to the annexes which were then discussed at various meetings between accession countries, member states and the European Commission with scientific advice from the ETC following criteria developed from definitions given in the directives. The agreements at the technical level then formed the basis for negotiations at the political level. The presentation will describe the process and the major lessons learnt, with the aim of assisting scientists and practitioners dealing with the directives to better understand the composition of the annexes.

### 59. DRY GRASSLANDS AT THEIR NORTHERN LIMIT: BIODIVERSITY OF KOELERIO-CORYNEPHORETEA AND FESTUCO-BROMETEA COMMUNITIES IN THE NORDIC AND BALTIC COUNTRIES

**DENGLER**, **JÜRGEN**, University of Lüneburg, Germany

Dry grasslands for the most part are semi-natural plant communities. They host a considerable proportion of Europes biodiversity but they are seriously threatened under present conditions. These community types are largely built-up by species of submediterranean or Pannonian distribution and thus they reach their northern limit in the hemiboreal zone. The aim of this study is to present the first comprehensive overview of the dry grasslands of the Nordic and Baltic region. It is based on several thousand relevés from literature and own research. I analyse the communities with respect to their phytosiological classification and biodiversity patterns, and compare them to their central European counterparts. The hemiboreal communities of shallow, skeletal soils (Sedo-Scleranthenea) show the highest distinctness, followed by the basiphilous communities of deeper soils (Festuco-Brometea) whereas the dry grasslands of sandy soils (Koelerio-Corynephorenea) are quite similar to their southern equivalents. As regards phytodiversity, Sedo-Scleranthenea stands of the studied region are more than two times as species-rich than they are in central Europe, and they belong to the most diverse communities on small scales documented so far (up to 80 plant species per m²). The two other syntaxa also show an increased species richness though less pronounced.

### 60. HABITAT MOSAIC STRUCTURE AND PATCH CHARACTERISTICS INFLUENCE BIODIVERSITY IN AN ALKALINE WET-DRY GRASSLAND GRADIENT IN E HUNGARY

**DÉRI**, **ESZTER**, University of Debrecen, Hungary; **Lengyel**, **Szabolcs**, University of Debrecen, Hungary; **Deák**, **Balázs**, University of Debrecen, Hungary; **Horváth**, **Roland**, University of Debrecen, Hungary; **Tóthmérész**, **Béla**, University of Debrecen, Hungary

The spatial properties and diversity of landscape elements largely determine landscape-level biological diversity. Here we tested the hypothesis that the structural and compositional

diversity of grassland habitats along a wet-dry gradient influence landscape-level species richness. We sampled vegetation and characteristic animal taxa and measured habitat diversity in 53 habitat patches in the Egyek-Pusztakócs grasslands (1500-ha, Hortobágy National Park). A total of 443 species were detected (vascular plants: 170 species, Araneae: 108, Carabidae: 67, Orthoptera: 32, Heteroptera: 14, Auchenorrhyncha: 8, Aves: 44). Total and plant species richness increased with patch size and differed by habitat type. Habitat structural diversity, estimated by vegetation height, was positively related to species richness of ground-dwelling invertebrates (especially ground beetles) and birds, and negatively to plant species richness. Habitat compositional diversity, quantified as plant association diversity, positively influenced total and plant species richness, and that of vegetation-dwelling invertebrates (especially spiders). These results show that habitat diversity can influence species richness in several ways and that management of grassland mosaics should aim at maximising the heterogeneity of the patches. This research is funded by a LIFE-Nature program (LIFE04NAT/HU/000119).

### 61. TESTING BIODIVERSITY INDICATORS

**DEVICTOR**, **VINCENT**, MNHN-CRBPO-UMR5173, France; **Julliard**, **Romain**, MNHN-CRBPO-UMR5173, France; **Clavel**, **Joanne**, France; **Jiguet**, **Frederic**, MNHN-CRBPO-UMR5173, France; **Couvet**, **Denis**, MNHN-CRBPO-UMR5173, France

Many symptoms of biodiversity loss have a common denominator: the global decline of specialist species worldwide, which results in functionally homogenized communities. The fact that specialist species are negatively affected by habitat degradation is indeed predicted by niche evolution theory. Here, we propose the Community Specialization Index (CSI) as a means to assess global changes' effects on biodiversity. We studied the sensitivity of both CSI and traditional indicators using a large scale common bird monitoring program which covers the entirety of France. We found that CSI was strongly affected by both habitat fragmentation and disturbance, which were measured independently by two land cover surveys. In contrast, the two other traditional biodiversity indicators (species richness and community evenness) showed unclear or very weak responses. These findings hold true whatever the habitat or the biogeographic zones considered. Our results demonstrate that CSI is much more sensitive to habitat disturbance and fragmentation than other existing indices. CSI is based on existing programs and can already be calculated for most countries. Since CSI is simple to measure for any organism, we expect that it will greatly improve both local and global assessment of biodiversity loss in the short and long run.

### 62. THE APPLICATION OF A MARINE BIOTIC INDEX IN THE LIMA ESTUARY

**DIAS**, **SÉRGIA**, CIIMAR, Portugal; **Sousa**, **Ronaldo**, CIIMAR, Portugal; **Antunes**, **Carlos**, CIIMAR, Portugal

The principal aims of the European Framework Directive were to prevent the deterioration of the European Community waters and assure good conditions until 2015. Monitoring biotic factors is gaining in importance as the new directive emphasizes biological criteria as a complement to environmental quality elements. Lima River estuary (NW of Portugal) is subjected to urban, agricultural and industrial waste discharge, and dredging activities. Therefore, from Oct/01 to Sept/02, we developed a sampling program to assess the quality status of the Lima estuary through the analysis of the benthic communities. A total of 101 macrobenthic species were collected from 12 sites representing different environmental conditions and indices of diversity were used to establish differences between sampling stations and time of the year. It was possible to conclude that differences between samples were more consistent along space than along time. Based on the Marine Biotic Coefficient (using the AMBI software) we were able to identify different degrees of disturbance in the estuarine area (5 degrees scale: undisturbed to extremely disturbed): 1 undisturbed site, 8 slightly disturbed sites, 2 moderately disturbed sites (a dredging mud disposal area and a commercial harbour) and 1 heavily disturbed site (subjected to eutrophication). A continued research would be adequate, being macrobenthic species a valuable instrument to evaluate environmental quality.

### 63. THE SIGNFICANCE OF DESICCATING HEADWATER STREAMS FOR ECOLOGICAL STATUS OF DOWNSTREAM REACHES AND NATURE CONSERVATION

**DIETERICH**, **MARTIN**, University of Hohenheim, Germany

Desiccating headwater streams are a common, but usually neglected feature of drainage networks. Discharge area of such streams frequently is suspended sediment > 1,6 um) decreased more than 50% over a 100 m reach. Due to a suit of different aquatic habitat types during the desiccation process, species richness in temporary headwater streams may be higher as compared to adjacent permanent channels. This includes rare species adapted to the fish free space such as mayflies in the Siphlonuridae (e.g. Siphlonurus armatus) and Ameletidae (e.g. Metreletus balcanicus). Temporary headwater streams, their preservation and restoration, have to be an integral part of management schemes to be developed within the context of Water Framework Directive implementation.

### 64. ANTHROPOGENIC- DEPENDENT OVER - ABUNDANCE OF FOX POPULATIONS: PATTERNS AND CONSERVATION IMPLICATIONS

**DOLEV**, **AMIT**, Ben-Gurion University, Israel; **Saltz**, **David**, Ben-Gurion University, Israel; **King**, **Rony**, Israel Nature and National Parks Protection Authority, Israel

Human-related resources are the main factor driving wildlife overabundance, locally affecting densities and community structure. However, the extent of this influence is not well documented. For example, in addition to density, all aspects of demography may be affected, driving high dispersal rates, and impacting communities well beyond the immediate zone of anthropogenic influence. Here we compare the dynamics of red fox (Vulpes vulpes) populations relying on anthropogenic resources (poultry farms' waste) vs. populations in relatively natural areas. We tracked 77 radiocollared foxes (39 adults, 38 sub-adults) in 9 sites differing in sanitation level, and assessed densities using mark-resight techniques. Densities near poultry settlements were about 5 times greater than in natural areas (16-23 vs. 2-5 foxes per km2, respectively). Recruitment per den was 4.6 vs. 2.8 sub-adults per year, respectively. Sub-adults weighed on average 22% more near poultry settlements. Average home range size was similar in both areas (6.1?0.8 S.E. km2). Dispersal was recorded only in sub-adult males (35%, n=20) and all dispersers settled in natural areas. Mediated by high recruitment and dispersal, the impact of human-related poor sanitation on the overabundance of foxes extends well beyond the zone of anthropogenic influence, possibly impacting community structure in seemingly natural areas.

### 65. TRADITIONAL FARMING AS A TOOL FOR WEEDS CONSERVATION

**DOSTATNY**, **DENISE**, Plant Breeding and Acclimatization Institute, Poland

Poland's biological diversity is one of the most opulent in Europe. Flora of arable fields is one of the main elements of Polish landscapes and has been recently subject to violent and often irreversible changes. This process is accompanied, apart from the phenomenon of expansion, by the effect of recession of many species of segetal plants. Rich segetal flora should be sought in locations of small area agricultural economy with low or average level of agrarian technology, just like in the case of research area (in the South of Poland). Some more weed

species are considered extinct, others endangered or vulnerable. Expeditions of the National Centre for Plant Genetic Resources collected seeds of several weed species typical for rendzina soils that are affected by extinction. The seeds were reproduced in a conservatory and then forwarded to a long-term storage (ex situ conservation). The seeds are preserve in gene banks in order to save vanishing species of different plants. But the most valuable way of preserving plants is in situ, in the form of a still living population. Refugial areas of agriculture among natural ecosystems can be used for plant genetic resources conservation, and increase value of whole regions. Apart from the preservative role such reserves may also serve as didactic paths. The protection in situ constitutes a huge challenge for us, worth of effort.

**66. HUMAN IMPACT ON A THREATENED PLANT POPULATION OF NARCISSUS CAVANILLESII IN PORTUGAL AND ITS IMPLICATIONS FOR POPULATION MANAGEMENT**

**DRAPER**, **DAVID**, Museu Nacional de História Natural, Portugal; **Marques**, **Isabel**, Museu Nacional de História Natural, Portugal; **Iriondo**, **José María**, Universidad Politécnica de Madrid, Spain

N. cavanillesii is an autumn-flowering xenogamous species included in the EU Directive 92/43/EEC and critically endangered in Portugal. The largest Portuguese population is located on the ruins of an ancient bridge in a picturesque area on the border between Elvas, Portugal and Badajoz, Spain. The aim of this work was to evaluate human impact on N. cavanillesii during the stages of flowering and fruiting. A remote video camera was mounted on the bridge during weekends and on Portuguese and Spanish bank holidays from September to November 2004 to survey people's direct impact on the population. The number of flowering and fruiting plants was registered in a 15x15cm2 grid each day before recording time. The 172 tracked visits obtained at the end of the survey were overlapped with the population grid to evaluate the impact of these visits in space and time. Results showed that the greatest number of visits during flowering took place at noon, while during fruiting this number was greater in the afternoon. A clear overlap between human visits and pollinator activity was detected. The end of the survey had trampled 57% of the grid cells containing N. cavanillesii on. Quantification of trampled individuals during each stage as well as the restriction of human visits during flowering and fruiting should clearly be included in management actions.

**67. MARKET-BASED INSTRUMENTS FOR (BETTER) ACHIEVEMENT OF THE 2010 TARGETS**

**DRECHSLER**, **MARTIN**, EFZ - Centre for Environmental Research, Germany; **Wätzold**, **Frank**, UFZ - Centre for Environmental Research, Germany

An important pillar within the NATURA 2000 programme is the protection of areas. However, it is likely that these NATURA sites are insufficient to meet the objectives and they have to be accompanied by conservation measures in the surrounding areas. As these areas are usually used economically, e.g., by farmers, economic instruments are required to induce biodiversity-friendly land-use. One of the most common instruments in the EU are compensation payments. While offering a relatively simple solution to the problem of conserving biodiversity on private land, the efficiency of these instruments is questionable, as they are usually uniform in space and time, which is likely to lead to efficiency losses. To improve the efficiency of conservation, instruments that are heterogeneous and flexible in space and time are worth considering. Such instruments include among others, schemes facilitating co-operative behaviour among farmers, and markets where habitat development rights can be traded. In this talk we will present modelling studies where the ecological effects and economic efficiency of the mentioned instruments are investigated.

**68. DRAINAGE CHANNELS AND LAGOONS AS REFUGIA FOR MACROPHYTE ASSEMBLAGES: EVIDENCE FROM TRANSCARPATHIA**

**DRESCHER, ANTON C**., Institute of Botany, Karl-Franzens University of Graz, Austria; **Prots, Bohdan**, State Museum of Natural History, National Academy of Sciences of Ukraine, Ukraine; **Mountford, Owen J**., NERC Centre for Ecology and Hydrology, United Kingdom

Natural freshwater habitats are amongst the most threatened European ecosystems, and as such have received special attention under the EU Water Framework Directive. In large parts of Western Europe these ecosystems are now almost destroyed and the original macrophyte flora persists mainly in artificial habitats (drainage channels, irrigation pools etc). The same process has occurred in Transcarpathia (Ukraine) but partly because human impact started later than in western Europe and partly due to the location near the former iron curtain, the species assemblages are far richer, containing plants that are highly localised and threatened in Europe e.g. *Marsilea quadrifolia*, *Carex bohemica* and others. In the floodplains of the Tysa and Latorytsya rivers, the refugia include drainage canals, old oxbows, ditches in drained mires and artificial lagoons. These remarkable aquatic habitats survive in a farmed landscape, with blocks of floodplain and lowland forest providing the key biodiversity resource in the NE part of the Pannonian Plain. This paper compares the assemblages of such artificial habitats with those of more natural water-bodies. In addition, it assesses the threats to the survival of these rich communities and suggests management regimes to ensure that they persist in a rapidly changing socio-economic situation.

**69. EFFECT OF LAND USE INTENSIFICATION ON SOIL FAUNA ASSEMBLAGE: DO DIVERSE TAXA RESPOND WITH THE SAME LIFE-HISTORY TRAITS?**

**DUBS**, **FLORENCE**, UMR 137 BioSol, France; **Dolédec**, **Sylvain**, UMR CNRS 2053, France; **Ponge**, **Jean-François**, CNRS UMR 5176, France

The negative relationship between land use intensity and biodiversity impacts on soil communities, leading to a commensurate reduction in the ecosystem services they provide. However, the nature of this change remains poorly documented, and with it the understanding of which landscape and habitat features are responsible for the shift in community composition. We predicted that life history traits increasing the ability of soil fauna to disperse would be more prevalent as land use intensified. Ground beetles, collembolans and earthworms together with environmental variables were sampled in four land use types across 6 different landscapes in France, in 2001 and 2002. We used a three-table ordination method (RLQ analysis) to identify the relationship between species life-history traits, landscape and habitat attributes. In highly intensified farming, species were smaller and their dispersal abilities higher. Other traits also showed significant relationships with the main environmental axis: in the intensively managed sites species had broader and longer bodies. We conclude that despite the diversity of taxa in the soil faunal community, they have a similar response to land use intensification.

**70. DECLINE OF GREY-SIDED VOLES IN MANAGED BOREAL FORESTS TRACKS LONG-TERM HABITAT FRAGMENTATION**

**ECKE**, **FRAUKE**, Luleå University of Technology, Sweden; **Christensen**, **Pernilla**, Umea University, Sweden; **Sanstrom**, **Per**, Swedish University of Agricultural Sciences (SLU), Sweden; **Nilsson**, **Mats**, , Sweden; **Hornfeldt**, **Birger**, Umea University, Sweden

There has been a long-term decline, causing frequent local extinctions, of cyclic grey-sided voles (Clethrionomys rufocanus)

in northern Fennoscandia since 1971. Previous studies supported the hypothesis that altered landscape structure, especially in terms of forest patch area and fragmentation of old-growth forest, has contributed to the decline. Since those studies were based on cumulated vole time series data and static landscape structure, we now tested whether the long-term decline was related to a gradual change. We digitized landcover types (>0.25 ha) from aerial photographs within 6.25 km2 squares centred on each of the 27 sampling sites with 5 year intervals, starting in 1970. Because of clear-cutting, mean area of the patches of >35 year old forest that intersected the sampling sites decreased from 126 ha in 1970 to 44 ha in 2004. The main decrease in focal forest patch area occurred in 198085, coinciding with the major drop in vole numbers. Our results strongly suggest that long-term habitat fragmentation is involved in the current decline of grey-sided voles. However, climate change leading to warmer winters with a less stable snow cover is also thought to be of major importance, as indicated by a decrease in vole wintering success.

### 71. CAN LARGE CARNIVORES PAY THEIR WAY? RURAL DEVELOPMENT AND ECOTOURISM

**EDNARSSON, MARCUS,** Karlstad University, Faculty of Social and Life Sciences, Department of Human Geography and Tourism, Sweden**; Promberger, Christoph,** Fundatia Sinca Noua, Romania

Wolves or bears are species which attract the attention of many people, both in a positive and a negative way. Associations and societies for wolf or bear protection are amongst the most numerous organisations, when it comes to wildlife or animal protection and conservation. Many people think that this interest could be used to generate income through paying visitors and thus support conservation of these species. Indeed, several examples have shown that large carnivores can create substantial income for regions where wolves or bears are present. Yellowstone National Park, for example, has observed an increase of tourism revenues due to the reintroduction of wolves, of over 20 million USD per year. Another example is provided by the Carpathian Large Carnivore Project in the Romanian Carpathian Mountains. Due to an eco-tourism programme based on wolves and bears, over 100 jobs were created within a few years in an area of high unemployment and where natural resources were coming under increasing pressure. Although these positive examples are encouraging and the use of carnivores for eco-tourism must play an increasing important part for their conservation, it cannot be the only way to support the conservation of carnivores.

### 72. CULTURE AND CONSUMPTION – THE IMPORTANCE OF EXPLOITATION FOR CONSERVING THE SPECIES

**Edsman**, **Lennart**, Swedish Board of Fisheries, Sweden; **Taugbol**, **Trond**, Norwegian Institute for Nature Research, Norway; **Mannonen**, **Ari**, Päijänne-Institute, Finland; **Schulz**, **Ralf**, University Koblenz-Landau, Germany

Exploitation is usually thought as one of the main threats to preserving biodiversity. In northern Europe the endangered and red-listed native noble crayfish has steadily declined, due to the fungal disease crayfish plague, which is lethal to noble crayfish. The North American signal crayfish was introduced to substitute the fishery lost. It was thought to be more resistant to the disease but is also a chronic carrier of the plague, and waters with signal crayfish thus have permanent plague. In northern Europe crayfishery has old and strong traditions. Apart from having an important role in freshwater ecosystems, crayfish also plays a social, cultural and recreational role, resulting in a high economical value on the market. For people with fishing rights the main interest is a good catch of crayfish, regardless of species. With alien species readily available, the largest threat is therefore illegal introductions of plague-carrying signal crayfish by man, not over-fishing. Local people that are allowed to catch and benefit from noble crayfish are also the best protection against illegal stocking of alien crayfish. The possibility to exploit the crayfish is of major importance for the will to protect and will involve more people in the task. Exploitation, in the form of a sustainable fishery, is thus the key to successful conservation of the noble crayfish in northern Europe.

### 73. WILDFLOWER STRIPS AND EXTENDED FIELD MARGINS AS POSSIBILITIES TO ENHANCE BIODIVERSITY IN ARABLE LANDSCAPES IN SWITZERLAND

**EGGENSCHWILER**, **LISA**, Agroscope FAL Reckenholz (Swiss Federal Research Station for Agroecology and Agriculture), Switzerland; **Jacot**, **Katja**, Agroscope FAL Reckenholz (Swiss Federal Research Station for Agroecology and Agriculture), Switzerland; **Bosshard**, **Andreas**, Institute of Environmental Sciences, University of Zurich, Switzerland

To counteract the loss of biodiversity in agricultural landscapes, the implementation of compensation measures has since 1992 become an important objective in Swiss agricultural policy. Therefore, we examined the potential of wildflower strips to promote plant species richness in arable land and due to a lack of a permanent compensation element in arable land we are developing seed mixtures for extended field margins. Most conventional field margins in the Swiss midlands are grassy and species-poor. In on farm experiments in the Swiss midlands several seed mixtures were tested. Species richness in the wildflower strips was highest in the second year. Annual spontaneous plants were promoted best in the first year. After tilling, several species as Anthemis tinctoria occurred in the subsequent crop, especially if no herbicides were applied. Species richness in field margins was highest under fresh and dry soil conditions, whereas under shady conditions species richness was lower and the sown grasses were dominant. Species richness usually decreased from the first to the second year after sowing and then increased during the following years. Wildflower strips and extended field margins enhance floristic diversity. For the promotion of arable annual species, however, other steps must be taken.

### 74. KEY BIODIVERSITY AREAS: HOW TO CHOOSE SITES OF GLOBAL CONSERVATION CONCERN TO MEET 2010 TARGETS?

**EKEN, GÜVEN**, Doğa Derneği, Turkey; **Baytaş, Ahmet**, Montclair University, Economics Department, USA; **Karataş, Ahmet**, Niğde University, Biology Department, Turkey; **Demirci, Barabaros**, Middle East Technical University, Business Administration, Turkey; **Kiliç, Dicle Tuba**, Doğa Derneği, Turkey; **Per, Esra**, Doğa Derneği, Turkey; **Karaçetin, Evrim**, Erciyes University, Turkey; **Erkakan, Füsun**, Hacettepe University, Biology Department, Turkey; **Baran, Ibrahim**, Dokuz Eylül University, Biology Department, Turkey; **Vural, Mecit**, Gazi University, Biology Department, Turkey; **Ataol, Murat**, Doğa Derneği, Turkey; **Bozdoğan, Murat**, Doğa Derneği, Turkey; **Isfendiyaroğlu, Süreyya**, Doğa Derneği, Turkey; **Ekim, Tuna**, İstanbul University, Biology Department, Turkey

The Key biodiversity area (KBA) method seeks to identify and ensure that networks of globally important sites are conserved. Sites are selected using standardized, globally applicable, threshold-based criteria, driven by the distribution and population of species that require site-level conservation. The criteria address the two key issues for setting site conservation priorities: vulnerability (IUCN Red List species) and irreplaceability using quantitative thresholds. In Turkey, we have undertaken one of the first national applications of the KBA methodology. Our study has shown that, if conserved adequately, the network of KBAs in Turkey can ensure that the loss of biodiversity is halt by 2010. Nearly 100% of all globally significant populations of plants, dragonflies, butterflies, freshwater fish, amphibians, reptiles, birds and mammals are covered by 305 KBAs in Turkey which meet the standard criteria.

**75. SEASONAL CHANGES AND DISTRIBUTION OF GROUND BEETLES ASSEMBLAGES ALONG A FORESTED URBANISATION GRADIENT IN DENMARK**

**ELEK**, **ZOLTÁN**, Szent István University, Faculty of Veterinary Sciences, Zoological Institute, Hungary; **Lövei**, **Gábor**, Danish Institute of Agricultural Sciences, Flakkebjerg Research Centre, Denmark

Ground beetles were studied along an urbanisation gradient (forest-suburban area-urban park) in and near Sorø, South Zealand, Denmark, during April-October 2004 and 2005. The average number of species per trap differed significantly among the three urbanisation stages in both years. The average number of forest species was highest at the rural site in both years (6.2 sp./ trap in both years). The number of open-habitat species (2004: 1.8 spp/trap; 2005: 0.6 spp/trap ) and of the generalist species (2004: 2.3 spp/trap; 2005: 1.1 spp/trap ) were highest in the urban area. The number of predaceous species was highest at the forest site (2004: 8.1 spp/trap; 2005: 6.8 spp/trap). The number of omnivorous species in 2004: was highest in the urban site (0.9 spp/trap), while in 2005 their number was highest at the forest site (2005: 0.31 spp/trap). Multivariate statistical procedures (NMDS, Sorensen similarity plot) also confirmed that species composition changed remarkably along the urban rural gradient in both years. The main tendencies have not changed between years, in spite of a difference in the sampling regime (continuous in 2004, every second fortnight in 2005).

**76. SPATIAL HETEROGENEITY OF AN EXPLOITED AND INVADED INDIGENOUS MUSSEL IN SOUTH AFRICA: RECRUITMENT AND RE-COLONIZATION AT WITHIN-SHORE SCALES**

**ERLANDSSON**, **JOHAN**, Goteborg University, Sweden; **McQuaid**, **Christopher**, Rhodes University, South Africa; **Kostylev**, **Vladimir**, Bedford Institute of Oceanography, Canada; **Pal**, **Purba**, Swedish Museum of Natural History, Sweden

The populations of the indigenous intertidal brown mussel Perna perna on the south and east coasts of South Africa have been over-exploited on many shores, and another threat is the spread of the invasive blue mussel Mytilus galloprovincialis along the south coast. By analyzing semivariograms using a fractal approach at within-shore scales we found that the distribution of larger recruits of P. perna exhibited a spatial structure which was related to that of adults. In contrast, the distribution of late plantigrades (smaller recruits) showed mainly spatial independence (random pattern). These patterns were generated by both adult mussels and the red alga G. pristoides being suitable habitats for plantigrades (settlers and small recruits), while mussels being the main habitat for larger recruits. The fate of mussel larvae that settle onto algae, i.e. the question whether small recruits die or migrate to mussel patches at a certain size is being studied. The alga G. pristoides showed a strong negative relationship with adult mussel cover, probably due to competition for space. On the south coast, re-colonization rate of M. galloprovincialis was higher than that of P. perna after severe storm-driven dislodgement of mussels. These studies have consequences for the conservation of P. perna populations, both because it is an exploited species and storms are common along the coast.

**77. OWL AND NIGHTJAR' TRENDS STUDY FOR CONSERVATION ACTIONS**

**ESCANDELL**, **VIRGINIA**, SEO/BirdLife, Spain

Information on abundance, distribution and population trends of the species is required for developing conservation strategies. These parameters are relatively little known in Spain for owls and nightjars. There isn´t good estimates of its population and it is difficult to census the population of these species in all the country, so SEO/BirLife decided to design a survey to estimate the population trends, one of the UICN criteria for know the conservation status for each specie. The Nocturnal Owl Monitoring Program in Spain is been working since 1997 with volunteers. Last year the method have been changed because of the little quantity of the data collected. Actually, the monitoring method consist in listening for calling owls and nightjars in predetermined stations three times between December and June. This work must be repeated all the years. Data are analysed at the end of each period and the volunteers are informed every years of the population changes. Population trends can be useful to identify the species in need of particular conservation action and it is easier to obtain that than other parameters.

**78. RAPID ERADICATION AND LONG TIME CONTROL: ACTIVITIES AND EXPERIENCES FROM THE IAS MANAGEMENT IN GERMANY AND AUSTRIA**

**ESSL**, **FRANZ**, Federal Environment Agency, Austria; **Klingenstein**, **Frank**, Federal Agency for Nature Conservation, Germany

Management of invasive alien species (IAS) has recently been recognised by the European Commission as a key issue for reaching the 2010-target of halting the loss of biodiversity. A future comprehensive European-wide framework should incorporate the experience of IAS management gathered in the EU-member states. For this purpose, Austria and Germany have been selected. The following key findings will be presented: 1. The general national political framework on IAS management is inadequate, as authorities are divided in sub-national institutions and along different aspects of IAS management. Recently finished national strategies on IAS have proved as useful instruments to connect the interests of different stakeholders. 2. IAS management for nature conservation is strongly focused on a small subset of approx. 30-40 species in both countries. Most of the activities are usually lacking resources, adequate monitoring or appropriate scale. 3. Successful case studies on IAS management are presented (e.g. Anoplophora glabripennis, Lysichiton americanus). 4. As the problem can only be partly addressed on the national scale, an EU-level instrument focusing on IAS management should be developed. This seems realistic, as the importance of biological invasions is acknowledged by the EU and several projects (e.g. DAISIE) will soon deliver scientifically sound data on IAS for Europe.

**79. TRENDS IN LANDUSE AND HUMAN DISTRIBUTION - IS RURAL ABANDONMENT CREATING OPPORTUNITIES FOR LARGE CARNIVORES?**

**FALCUCCI, ALESSANDRA**, University of Rome "La Sapienza", Department of Animal and Human Biology, Italy; **Maiorano, Luigi**, University of Rome "La Sapienza", Department of Animal and Human Biology, Italy; **Boitani, Luigi**, University of Rome "La Sapienza", Department of Animal and Human Biology, Italy

Land-cover changes and the associated habitat loss represent one of the most important factors negatively affecting large carnivore populations in human dominated landscape on a global basis. Many studies indicate high rates of change since the 1970s associated with high human population growth rates, land-use intensification, and loss of natural habitat. However, during the last 40 years, a particular pattern of land-use change has taken place in Europe: the productive lowlands are being increasingly utilized, while hilly, mountain and other marginal areas are being abandoned by humans and naturally reforested. These new patterns are largely independent from planned conservation strategies and appear to have a substantial impact on landscape structure and biodiversity. Using different GIS layers we measured the land-cover change throughout Europe from 1990 to 2000, and at the same time we performed a more detailed analysis for the Italian peninsula from 1960 to 2000. We related these changes to changes in large carnivore distribution in the same time period. Apparently habitat that can support

large carnivore populations is increasing, at least in some parts of Europe, but we suggest that future conservation strategies should address the broad socio-political and ecological processes that are most likely to occur across Europe.

### 80. EXPERT KNOWLEDGE AND EVIDENCE-BASED CONSERVATION

**FAZEY**, **IOAN**, Tyn y Caeau Consulting, United Kingdom

Understanding the nature of expert knowledge (EK) is necessary to help understand its role in an evidence-based approach. EK has limitations, but some of these are derived from misperceptions about its nature. For example, expert knowledge is difficult to integrate with scientific information because it cannot easily be articulated as single 'facts'. There are three main roles of EK. First, in some cases it can be articulated quantitatively and integrated with scientific information. Second, it can be articulated qualitatively and either integrated with, or used as a complement, to other forms of knowledge. Third, EK unavoidably guides research and practice because past experience influences all aspects of conservation, such as the formulation of research questions and the interpretation of results. Thus, learning how to learn better from our experiences to develop expert understanding of social-ecological systems has important implications for conservation. An evidence-based approach will facilitate this process through promoting reflection and evaluation. However, developing a learning culture that can deal with the dynamic nature and inherent uncertainty surrounding most conservation problems will also require processes that facilitate the sharing and reflection of EK and which promote the development of the ability of individuals to learn effectively from their experiences.

### 81. OUTBREEDING DEPRESSION, HETEROSIS AND MUTATION: STUDIES WITH THE NORTH AMERICAN ANNUAL LEGUME *CHAMAECRISTA FASCICULATA* AND MUTATION ANALYSES WITH *ARABIDOPSIS THALIANA*

**FENSTER, CHARLES**, University of Maryland, Department Biology, USA

We quantified the performance of parental, F1, F2, F3 and F6 generations representing a cross between two populations found 1400 km apart, representing the range of the distribution of *Chamaecrista fasciculata* in eastern North America. We found parental home site advantage and consistent heterosis, suggesting that genetic differentiation for local adaptation was accompanied by fixation of deleterious alleles due to drift. The F3 performed in a manner consistent with the expression of outbreeding depression due to the disruption of genetic coadaptation. We expected further loss of fitness in the F6 because of the additional rounds of genetic recombination that occurred in the construction of the F6 progeny. However, the F6 performed surprisingly well, suggesting the formation of chance serendipitous recombinants of high fitness. Our results suggest that populations are genetically limited in their response to local selective pressures and that long gene flow or hybridization may introduce novel genetic variation of adaptive value. To evaluate the role of mutation in introducing new genetic variation and how quickly genetic coadaptation may evolve, we have begun studying mutation accumulation lines of *A. thaliana* when planted in the wild. Preliminary results will be presented, documenting the frequency of both deleterious and beneficial spontaneous mutations, and these results will be discussed in the context of conservation policy.

### 82. PHYLOGEOGRAPHY OF A BIOLOGICAL INVASION: THE AMERICAN BULLFROG IN EUROPE

**FICETOLA**, **GENTILE FRANCESCO**, Université de Savoie, France; **Bonin**, **Aurelie**, France; **Taberlet**, **Pierre**, France; **Miaud**, **Claude**, Université de Savoie, France

The American Bullfrog Rana catesbeiana is an exotic species introduced in several European countries since the first half of the XXth century. The Bullfrogs can have deleterious consequences on local ecosystems, because of the interspecific interactions and the risk of introducing diseases. However, in some localities the bullfrog introduction was not successful, and introduced populations are now extinct. Genetic diversity and patterns of introduction (one or several successive events) can play an important role in the success of introduced species. We studied mitocondrial DNA from bullfrog populations established in seven European countries, and we compared the haplotypes with those of native USA populations. Our data show that several independent introductions occurred, originating from different native populations. Moreover, introduced populations were genetically uniform also in several cases of successful introduction, suggesting that introductions involved a small number of founders. Our data suggest that this species can successfully invade also when a small number of founders is involved, and therefore it is necessary a very strict control to avoid further introductions and to manage the established populations.

### 83. CONSERVATION TILLAGE AS A TOOL FOR PROMOTING SUSTAINABLE FARMLAND BIRD POPULATIONS IN EUROPE?

**FIELD**, **ROB**, Royal Society for the Protection of Birds, United Kingdom; **Benke**, **Szabolcs**, Geographical Research Institute, Hungarian Academy of Sciences,, Hungary; **Badonyi**, **Krisztina**, Geographical Research Institute, Hungarian Academy of Sciences, Hungary; **Bradbury**, **Richard**, Royal Society for the Protection of Birds, United Kingdom

Conservation Tillage (CT) is becoming increasingly common across Europe, largely for agronomic and resource protection reasons. Whilst CT has been incorporated into some European agri-environment schemes for the enhancement of soil biodiversity and prevention of erosion, its wider biodiversity benefits have not often been considered in this context. Availability of food in winter is thought to be an important driver of recent European farmland bird population declines. Previous studies in the USA and the UK have suggested that CT may provide benefits not only to soil health, preservation and macrofauna, but also for winter food resources and summer nesting habitat for birds. Our experimental results in the predominant crop rotation in Hungary indicate that winter bird use of CT plots is consistently higher than that of conventionally ploughed plots, across several years and taxonomic and functional groups, implying greater food abundance or availability. In winter-sown wheat in the UK, CT also provides more nesting opportunities for, and increases the effective length of the breeding season of Skylarks. We suggest that CT may provide widespread winter food and summer nesting benefits to declining farmland bird species in European arable systems, and may represent an opportunity, alongside other agri-environment measures, to enhance the biodiversity value of arable land management.

### 84. CONSEQUENCES OF INTER-POPULATION CROSSES BETWEEN GENETICALLY DIFFERENTIATED PLANT POPULATIONS

**FISCHER**, **MARKUS**, University of Potsdam, Germany; **Vergnerie**, **Gillianne**, University of Zurich, Switzerland; **Hoehn**, **Sophie**, University of Zurich, Switzerland; **Dietrich**, **Stefan**, University of Potsdam, Germany; **Van Kleunen**, **Mark**, University of Potsdam, Germany; **Willi**, **Yvonne**, University of Zurich, Switzerland

Gene flow between populations may replenish genetically eroded populations. If populations are differentiated due to drift, and inbreeding depression occurs, such gene flow may enhance fitness, at least of the F1. However, it might also break up coadapted gene complexes. Finally, gene flow may break up local adaptation. We studied these issues in two plant species, for which molecular variation indicated population differentiation due to drift. Moreover, the habitats of Ranunculus reptans are

very similar to each other, while the ones of Lychnis floscuculi are not, suggesting that local adaptation plays a role in Lychnis. For both species, we did intra and interpopulation crosses with plants of 13 populations. Interpopulation crosses were beneficial for small populations of Ranunculus. This was more pronounced for more distant populationpairs, and these effects were maintained in the F2. Interpopulation crosses in Lychnis increased fitness of F1 grown in the garden, but not of F1 grown in the field habitats, and not for the F2. Moreover, Lychnis fitness decreased with ecological distance between parental populations. In conclusion, artificial gene flow can be a beneficial conservation measure, especially for small populations, but it should only be done between ecologically very similar populations.

### 85. THE ROLE OF HABITATS IN STRUCTURING AND CONSERVING BEE ASSEMBLAGES IN IRELAND

**FITZPATRICK**, **ÚNA**, Trinity College Dublin, Ireland; **Murray**, **Tomás E.**, Queen's University Belfast, United Kingdom; **Paxton**, **Robert J.**, Queen's University Belfast, United Kingdom; **Brown**, **Mark J.F.**, Trinity College Dublin, Ireland

As part of an ongoing, three-year research project into the conservation genetics and biology of bees, we have been documenting the distribution and abundance of bees across the island of Ireland. Bees provide the essential ecosystem service of pollination and are of great ecological and economic importance, yet they are thought to be in serious decline, principally due to habitat loss and degradation. As with most of Europe, relatively little is known about Irish bee community ecology and, consequently, their conservation biology. We have recorded the distribution and abundance of bees at six habitat types across Ireland (all sites surveyed were cSAC's). Our methodology critically assesses the influence of habitat type on structuring Irish bee communities, as well as prioritizing individual species for conservation action. A regional red data list has been produced for the 101 recognized species. In addition, we have recorded bee species at ten historically sampled sites, those for which good records exist in the literature. These data provide an insight into the changes in the bee fauna that have occurred over the past century in Ireland.

### 86. BIOGEOGRAPHY AND CONSERVATION OF THE HERPETOFAUNA OF THE AEGEAN SEA (GREECE)

**FOUFOPOULOS**, **JOHANNES**, University of Michigan, United States; **Pafilis**, **Panagiotis**, Univ. of Athens, Greece; **Valakos**, **Efstratios**, Univ. of Athens, Greece

The Aegean Sea Archipelago, located in the NE quadrant of the Mediterranean Sea, consists of thousands of islands with habitats ranging from deserts to alpine ecosystems. The Aegean herpetofauna is subject to influences from both Europe and Asia and despite a long history of human presence, harbors a remarkable number of species including several endemic taxa. The main factors determining reptile and amphibian diversity are size and palaeogeographic history of an island. Endemicity is most strongly determined by island age. Reptile communities on the geologically young, Pleistocene landbridge islands of the Aegean show little differentiation to, and are proper subsets of the mainland European and Asia Minor faunas. Species assemblages on these islands are structured by non-random extinction processes. Probability of extinction is determined by an interplay between island characteristics and species life history traits. Modern anthropogenic activities are likely to exacerbate these long-term natural extinction processes. Although local taxa appear to be well adapted to traditional land use practices, they are facing increasing problems because of rampant tourist development. In addition to habitat fragmentation due to road building and low density housing, wetland destruction and non-sustainable water use have the most severe impact on the local species communit

### 87. CONTRASTING RESPONSE IN FRUIT SET TO DIFFERENT FLOWER VISITOR GROUPS IN AN INSECT-POLLINATED HERB

**FRANZÉN**, **MARKUS**, Ecology Building, Sweden; **Larsson**, **Magnus**, Uppsala University, Sweden

Bees are often highlighted as the most important pollinators, but little is known to what extent different flower visitor groups contribute to pollination in generalized plant pollination systems. In this study we related fruit set of the gynodioecious herb Knautia arvensis to abundance, species richness, and foraging strategies of different flower-visitors. The study was performed in 52 plant populations in two regions in S Sweden. Fruit set was positively related to patch area and plant density, but fruit set was neither related with abundance or species richness of flower-visitors. Fruit set was higher in hay meadows compared with ungrazed and grazed grasslands. Fruit set decreased with increased abundance of pollen-foraging flower-visitors as well as relative abundance of pollen-foraging flower-visitors (solitary bees and beetles). Increased abundance of solitary bees tended to decrease fruit set. There was a positive relationship between the abundance of nectar-foraging flower-visitors (butterflies, moths, bumblebees, honey bees and flies) and fruit set. Abundance of social bees (bumblebees and honey bees) and furry flies contributed most to this increase in fruit set. This is the first study to show that flower-visitors actively removing pollen, from the pollination system, reduce fruit set in generalized plant pollination system.

### 88. CONSEQUENCES OF THE SPATIAL CONFIGURATION OF RESOURCES FOR THE DISTRIBUTION AND DYNAMICS OF THE ENDANGERED PARNASSIUS APOLLO BUTTERFLY

**FRED**, **MARIANNE**, Helsinki University, Finland; **Ohara**, **Robert**, Helsinki University, Finland; **Brommer**, **Jon**, Helsinki University, Finland

Based on several years of data from two populations of the endangered Apollo butterfly (Parnassius apollo, L 1758), we study how the amount and spatial location of patches of larval (host-plant) and adult (nectar plant) resources affects the distribution of females and their larval offspring in the following year. In the coastal population (nectar-plant and host-plant patches spatially segregated), females moved frequently between patches to aggregate on larger host-plant patches close to nectar-plant patches. In the archipelago population (where nectar-plants and host-plants co-occur), the abundance of females increased with higher proximity to other host-plant patches and with more nectar-plants on the patch. Next year's larval abundance correlated with the abundance of females in the previous season in both populations. A model of the population dynamics in the two populations in relation to the spatial configuration of nectar and host-plant patches showed that the spatial configuration of larval and adult resources had population-dynamical consequences. In many organisms, different life-history stages use different resources. Incorporation of information on the location and abundance of adult resources can provide additional insight for the suitability of a particular landscape in harbouring a population.

### 89. EPIPHYTIC LICHENS AND BRYOPHYTES IN STANDS OF FAGUS SYLVATICA OF DIFFERENT ECOLOGICAL CONTINUITY AND HABITAT QUALITY

**FRITZ**, **ÖRJAN**, Southern Swedish Forest Research Center, Sweden; **Gustafsson**, **Lena**, Conservation Biology, Sweden; **Larsson**, **Krister**, Sweden

Why do some beech forests host a great diversity of epiphytes whereas others do not? The aim of our study was to test the relative importance of ecological continuity (EC) for red-listed and indicator species of epiphytic bryophytes and lichens at stand level in beech forests in SW Sweden. We also wanted to

assess the importance of EC in relation to other stand and site factors. For this purpose the distribution of broadleaved forests on older maps (1650, 1850) was digitized and compared to the present distribution. In total 150 beech-dominated stands (0.5-5 ha) of different forest history (EC, nonEC) were investigated in the field. In order to exclude differences in stand age, only stands with the average age of 95-105 years were compared. There was a significantly higher number of species of lichens and red-listed bryophytes in stands with EC. However, the most important variables were related to presence of different substrates, mainly old and late-grown beeches. Furthermore there was a strong positive correlation between indicator and red-listed species. The study suggest that conservation of epiphytes in beech forests in south Sweden should focus on stands with a rich presence of indicators, substrates and EC.

### 90. LAND USE AND MANAGEMENT OF CRAYFISH IN ALPINE AND CIRCUM ALPINE REGIONS

**FÜREDER**, **LEOPOLD**, University of Innsbruck, Austria; **KOZAK**, **PAVEL**, University South Bohemia in Ceske Budejovice, Czech Rep.; **Smietana**, **Przemyslaw**, University of Sczcecin, Faculty of Natural Science, Poland

Species composition of freshwater crayfish and their distribution in Europe have been subject to major changes, the reasons certainly being the alteration and degradation of natural habitats by humans others are disease, interspecific competition and careless water/fishery management. The objectives of this paper were to a) provide information on land-use activities, b) evaluate potential effects on indigenous crayfish and population declines in selected areas, and c) provide an overview of management plans regarding crayfish conservation. In the alpine and circum alpine countries four indigenous crayfish species occur, i.e. Astacus astacus, Astacus leptodactylus, Austropotamobius pallipes and A. torrentium, together with the non-indigenous Pacifastacus leniusculus, Orconectes limosus and Procambarus clarkii. We found that the indigenous populations are still declining and highly threatened, especially in regions with long traditions in land-use. Remaining populations are mostly fragmented, intact populations still exist either in areas where habitats have sustained in good conditions or water bodies are less influenced by activities in the catchment. The majority of crayfish protection programs are individual activities at smaller scales. Concerted actions at interregional and international level may be a better guarantee for a successful crayfish protection.

### 91. HOW COMMON IS OUTBREEDING DEPRESSION? A COMPARISON OF THREE TAXA

**GALLOWAY**, **LAURA**, University of Virginia, United States

Increasing population size by adding individuals from other locations may enhance population stability. Alternately, robust new populations may be created using several source populations as genetic stock. However, conservation and restoration biologists must understand the potential for outbreeding depression to result from combining individuals from different populations. Studies of outbreeding depression in three herbaceous taxa will be presented. In Chamaecrista fasciculata, outbreeding depression was found only in recombinant hybrid generations. Little evidence for outbreeding depression was found in any generation in long-distance crosses between populations of Lobelia cardinalis. Finally, in Campanulastrum americanum long-distance crosses between populations showed outbreeding depression in first generation and poor hybrid performance was independent of local adaptation. Cyto-nuclear interactions contributed to outbreeding depression in C. americanum and to a lesser extent in C. fasciculata. These results will be compared with those in the literature and discussed in the context of local adaptation, genetic differentiation, and ploidy level.

### 92. REDUCED PLANT SIZE AND LOSS OF FITNESS IN AN ISOLATED, SMALL AND STRESSED POPULATION OF THE THREATENED ANDROSACE RIOXANA A. SEGURA

**GarciaBaquero**, **Gonzalo**, SEK University of Segovia, Spain; **AMAT DE LEON**, **MARIA ELENA**, Royal Botanical Garden of Madrid, Spain; **Valle**, **Cipriano Jesus**, University of Salamanca, Spain

Androsace rioxana (Primulaceae) is an endangered high mountain species endemic to the Iberian Mountain System (Spain). There are three known populations, one of which is small (18 reproductive individuals reported in 2005), isolated and under habitat degradation. Due to the morphological abnormalities (dwarf plants) and small population size observed in the smallest population, the following question arose: How do the fruit set and the number of seeds vary between populations, once the initial differences in the size of individuals have been taken into account? To address this question, a representative set of individuals was randomly selected from the three populations to measure their individual size and two variables related to fitness (fruit set and number of viable seeds) at the end of the growing session of 2005. Two models (ANCOVA) relating reproductive fitness to populations with plant size as a covariate were fitted. Both models explained around 50 variation, but, surprising, only individual size had a significant effect in the observed reproductive success and, taking into account the size of plant individuals, these three populations probably did not differ in reproductive fitness. Nowadays, the small population is being monitored and we are trying to determine whether the remnant unexplained variation is related to loss of genetic diversity.

### 93. STABLE ISOTOPES ANALYSIS (13C AND 15N) OF BOTTLENOSE DOLPHINS (TURSIOPS TRUNCATUS) AND COMMON DOLPHINS (DELPHINUS DELPHIS) IN SOUTH SPAIN

**GARCÍA-TISCAR**, **SUSANA**, Universidad Autónoma de Madrid; Madrid,, Spain; **Mons**, **Jose Luis**, Marine Species Recovering Centre, CREMA, Spain; **Sagarminaga**, **Ricardo**, Sociedad Española de Cetáceos (SEC-Spanish Cetacean Society), Spain; **Urquiola**, **Erika**, Sociedad Española de Cetáceos (SEC-Spanish Cetacean Society), Spain; **Baltanás**, **Angel**, Universidad Autónoma de Madrid, Spain

Trophic relationships of marine mammals have been traditionally assessed studying the stomach content of stranded animals. This approach, however, is not always feasible because stomachs are often empty. In addition, data obtained in that way may be biased because of the bad or stressed condition of animals that eventually become stranded. Under such circumstances stable isotopes analysis emerges as a helpful alternative given that the isotopic composition of a predator is related to that of its prey. In marine ecosystems this technique has been successfully used for the identification of the origin, inshore vs. offshore, of the food sources of several species.
Here we address the study of the trophic ecology of two marine mammal species (common and bottlenose dolphins) combining both approaches. The study concerns an area (south coast of Spain) where fishing grounds are overexploited and where captures have declined over 55% in the last 20 years leaving 44% of the fishermen unemployed. In this context many fishermen blame on dolphins for the decline of fish populations, and authorities claim for sound scientific grounds where to base management plans.
Samples of 21 stranded common dolphins and 44 (6 stranded) bottlenose dolphins have been analyzed (stable isotopes analyses and, for the stranded ones, stomach content). Both species differ markedly in their dietary habits. Small pelagic fish with high commercial value are the main food supply of common dolphins whereas bottlenose dolphins mostly feed on demersal fish species (such as hake and sea bream), together with small pelagic fish and flat fish, again species with high commercial value.

**94. GREEN INFRASTRUCTURE: ENVIRONMENTAL AND SOCIAL BENEFITS OF THE GOLF COURSE**

**GARDNER**, **EMMA**, University of Salford, United Kingdom; **James**, **Phillip**, University of Salford, United Kingdom

Controversy often surrounds golf courses mainly due to associated negative environmental and social impacts. Conversely, this paper proposes that golf courses can deliver social and environmental benefits through habitat management and environmental awareness. In order to analyse this hypothesis the impacts of sound habitat management on the golf course and increased environmental awareness were investigated. Qualitative and quantitative data were collected using biodiversity audits, participatory observation, and interviews with senior management, local community members and greenkeeping staff. Results indicate that species numbers and habitat diversity increased, and aesthetics improved when specific habitat management techniques were adapted and environmental awareness raised. In addition, it is suggested that benefits would prove more positive if constraints such as time, finance and lack of support from senior management were ameliorated. Data highlight the need for continual management support, employee enthusiasm, reward schemes, environmental awareness and monitoring policies. Moreover, there is a recognised need for further research and publicity which encourages the environmental, social and economic contribution golf courses hold.

**95. INFECTION AND TRANSMISSION OF THE CHYTRIDIOMYCETE FUNGUS, BATRACHOCHYTRIUM DENDROBATIDIS IN COMMON TOADS (BUFO BUFO) AND CONSEQUENCES FOR TOAD MORTALITY**

**GARNER**, **TRENTON**, Zoological Society of London, United Kingdom; **Walker**, **Susan**, Imperial College/Zoological Society of London, United Kingdom; **Bosch**, **Jaime**, Museo Nacional de Ciencias Naturales, Spain; **Cunningham**, **Andrew**, Zoological Society of London, United Kingdom; **Fisher**, **Matthew**, Imperial College, United Kingdom

Batrachochytrium dendrobatidis is recognized as one of the leading causes of amphibian declines and extinctions. It is commonly isolated from the skin of animals involved in mass mortalities or individuals of species suffering precipitous declines. However, more general screens for the presence of the pathogen has revealed that apparently healthy animals and many amphibian species for which no declines are known harbour infections. Exactly why some species and populations exhibit mortality effects and others do not is unclear, but experimental investigations would certainly aid in investigating this matter. Nevertheless, experimental evidence of B. dendrobatidis' infectivity, pathogenicity and virulence are limited. We have been using the common toad, Bufo bufo, as an experimental subject for assessing the infection dynamics of this chytridiomycete fungus. Our studies have shown that mortality responses are dose dependent, as are susceptibility to infection and time to death. Further, our transmission experiments have shown that infection is not easily achieved during the larval period under conditions likely to aid transmission. Also, substantial mortality was detected without evidence of infection at the time of death. These results will be discussed in the light of field evidence of common toad mass mortality events attributed to chytridiomycosis.

**96. RESTORATION OR RESTAURANT? THE IMPACT OF FEEDING PLACES ON VULTURE'S BEHAVIOUR**

**Gault**, **Agnès**, University Pierre & Marie Curie, France; **Bosè**, **Michela**, Université Pierre et Marie Curie, France; **SARRAZIN**, **FRANCOIS**, Université Pierre & Marie Curie, France

The ability of large scavengers such as vultures, to feed on carrions constitutes an effective ecological service. However vultures are threatened worldwide particularly in India and Africa. In Europe their situation is highly contrasted. Furthermore, national and common policies are imposing that all resources available for these birds should be put on feeding places. Nevertheless, the consequences of the management of feeding places on the foraging behaviour of these birds have rarely been evaluated. Using complementary approaches (video recording, telemetry) we studied the patterns of intraspecific competition for food in a colony of Griffon vultures (Gyps fulvus) that was reintroduced in Southern France 25 years ago. This population mostly feeds on both "heavy" feeding stations managed by conservationists and "light" ones directly managed in local farms. Overall, old birds were highly dominant in the main heavy feeding station whereas younger ones had to forage in the periphery of the colony. The consequences of food management on the demography of such population were explored according to the sensitivity regime of the population growth rate of such long lived species. These results are integrated in a wider agricultural context and provide good examples for eastern European countries where vulture populations are still declining.

**97. FOOD RESOURCES FOR BIRDS IN FIELDS OF GENETICALLY MODIFIED HERBICIDE-TOLERANT CROPS**

**GIBBONS, DAVID W**., RSPB, UK; **Bohan, David A.,** Rothamsted Research, UK; **Rothery, Peter**, NERC Centre for Ecology and Hydrology, UK.; **Stuart, Rick C.,** NERC Centre for Ecology and Hydrology, Lancaster Environment Centre, UK; **Haughton, Alison J.,** Rothamsted Research, UK; **Scott, Rod J.,** NERC Centre for Ecology and Hydrology, Lancaster Environment Centre, UK; **Wilson, Jeremy D.,** RSPB, Scotland; **Perry, Joe N.,** Rothamsted Research, UK; **Clark, Suzanne J.,** Rothamsted Research, UK; **Dawson, Robert J. G.,** RSPB, Scotland; **Firbank, Les G.,** NERC Centre for Ecology and Hydrology, Lancaster Environment Centre, UK.

The UK Farm Scale Evaluations (FSEs) have shown that the use of broad spectrum herbicides on genetically modified herbicide-tolerant (GMHT) crops can have dramatic effects on weed seed production compared to management of conventional varieties. In this presentation, we shall outline the main results from the FSEs and show how these data, combined with information on diets of individual bird species, have been used to determine how GMHT cropping might change the weed seed food resources available to granivorous farmland birds. In beet and spring oilseed rape crops, for all bird species, abundance of weed seeds important in their diets was substantially reduced in GMHT half-fields compared to conventionally managed half-fields. In winter oilseed rape, weed seed abundance was reduced for most bird species in GMHT halves. By contrast, in maize, weed seed abundance tended to be greater in GMHT halves. These results suggest that should beet, spring and winter rape crops in the UK be largely replaced by GMHT varieties and managed as in the FSEs, they would markedly reduce important food resources for farmland birds, many of which declined during the last quarter of the twentieth century. By contrast, GMHT maize would be beneficial to farmland birds.

**98. CONSERVATION OF ARTHROPODS AND PLANTS IN LARGE WETLANDS USING FEN ROTATIONAL FALLOWS**

**GIGON**, **ANDREAS**, Institute of Integrative Biology, Switzerland; **Rocker**, **Sabine**, Institute of Integrative Biology, Switzerland

How can one avoid the damage to many arthropods that occurs when large scale simultaneous mowing of fens takes place, as practiced for economic reasons since ~20 years? Fen rotational fallows, i.e. a year-to-year shifting of ?0.1ha fallow strips, is a measure offering protection to certain arthropod species against predators and unfavourable weather as well as for maintaining a nutritional basis for them. Rotation is necessary to prevent nutrient accumulation due to the remaining litter. This would favour tall forbs, which outcompete many low growing (rare) species. In 3-year-rotational fallows more individuals of Heteroptera and phytophagous Coleoptera as well as cocoons of Araneae and Red List spider species were found to hibernate than in annually mown control plots. Several Heteroptera and

Auchenorrhyncha species were found to be “fallow specialists”. The orchids Dactylorhiza incarnata and Orchis morio showed a 90% decline in flowering in the fallows. The flowering of Iris sibirica was delayed by several days. These effects are only partly reversible. As expected, fen rotational fallows are not “positive“ for all groups of arthropods and plants, but can be useful for conserving many endangered species.

### 99. BIODIVESITY, LANDSCAPE AND PEOPLE IN THE CONSERVATION OF URBAN BLUE SPACES: A CASE STUDY OF PONDS IN THE NORTHWEST OF ENGLAND

**GLEDHILL**, **DAVID**, University of Salford, United Kingdom; **James**, **Philip**, University of Salford, United Kingdom; **Davies**, **David**, University of Salford, United Kingdom

The northwest of England has one of the densest pond landscapes in Europe. Continued urban expansion has seen many former rural ponds incorporated into urban developments. This paper considers a case study of 18 ponds in Halton, northwest England. Ecological quality was assessed following the Predictive SYstem for Multimetrics (PSYM) methodology. Faunal and floral (vascular plant) diversity were recorded and an assessment of the Landscape Character surrounding each pond was noted. Aesthetic attributes were recorded by monthly fixed-point photographs. The median species diversities were 26 invertebrate and 10 plant species per pond. Amphibians were found in 15 out of 18 ponds with Rana temporaria and Lissotriton vulgaris being the most frequent. A significant relationship between increasing diversity of aquatic macrophytes, structural diversity of vegetation and the diversity of aquatic invertebrate was identified (F=24.77 P=0.0001) and increased with the amount of green spaces within 250m. The composition of invertebrates exhibited changes with increasing housing density. There was a high degree of variation in visual impact between ponds and across the year.Human activities such as feeding wildfowl, fishing and the introduction of exotics impact pond ecology and the people-nature relationship requires careful consideration especially when manageing urban sites.

### 100. THE SPECIES-AREA RELATIONSHIP FOR VASCULAR PLANTS IN THREE HABITATS IN NORTHERN PORTUGAL

**GOMES**, **INÊS**, Instituto Superior Técnico, Portugal; **Pereira**, **Henrique**, Instituto Superior Técnico, Portugal; **Vicente**, **Luís**, Faculdade de Ciências da Universidade de Lisboa, Portugal

Understanding how diversity in partitioned into different components is of great importance for conservation management. Comparision of diversity patterns across scales often use data from different studies that show a large methodological variation and are confined to specific land use types. We studied the species-area relationship for plant diversity in a nested hierarchy of scales across different habitats - forests, scrubland and agricultural fields. Field studies were conducted in Peneda mountain range, in northwest Portugal. Although there are differences in alpha diversity in the different habitats they show similar values of beta diversity. Slopes of the species-area relationship varied across scales suggesting that different factors are affecting different scales. Similarity between different habitats was calculated at the species and family level. Agricultural fields was the habitat with less similarity with the other two, but in all habitats similarity decreased with distance between plots.

### 101. INFLUENCE OF VEGETATION AND CATTLE GRAZING IN HABITAT SELECTION OF IBERIAN HARE (LEPUS GRANATENSIS) IN SOUTH PORTUGAL

**GONÇALVES**, **PAULA**, Universidade de Évora, Portugal; **Santos-Reis**, **Margarida**, Faculdade de Ciencias da Universidade de Lisboa, Portugal; **Mira**, **Antonio**, Universidade de Évora, Portugal

Iberian hare (Lepus granatensis), is an endemic species of the Iberian Peninsula, usually associated with open spaces. These areas are also often used for cattle grazing in free range. Our main goal is to understand the impact of grazing in the presence and abundance of hares. The main land uses in the study site (proposed Natura 2000) are sparse oak stands, known as montado, with different understory shrub densities. Pastures, grassland, fallows lands and crops fields are also present. Twice a month, during five months, we made night transects in four different areas, and registered the hares and cattle observed. Transects were divided in segments and the relationships between cattle and hares analysed. Hares selected positively areas of oak stands with median tree density and without shrubs. However, space use was dependent on the presence of cattle. They strongly avoided sites with cattle, even in small numbers, and use less areas that were often grazed. Our results will be useful to establish guidelines to manage cattle grazing in free range, in terms of numbers of animals and time of permanence on each location.

### 102. THE TRADE-OFF BETWEEN IMPROVING DATA AND IMPLEMENTING CONSERVATION ACTION

**GRANTHAM**, **HEDLEY**, University of Queensland, Australia; **Pressey**, **Bob**, University of Queensland, The Ecology Centre, Australia; **Wilson**, **Kerrie**, University of Queensland, School of Integrative Biology, Australia; **Possingham**, **Hugh**, University of Queensland, Australia

The aim of this project was to investigate the resource allocation trade-off between improving data on species and implementing conservation action to promote the persistence of those species. We constructed scenarios where the objective was to optimise species persistence within a conservation system, constituting both reserves and off-reserve management areas. Our two main constraints were that the distributions of species were unknown, and there was ongoing destruction of species habitat. A fixed amount of money was available annually to allocate between two options: improving data or implementing conservation action. Several scenarios were investigated using different types of data. The problem is significant because it addresses a typical situation: the combination of progressive loss of species habitat and limited conservation resources. It is also significant because the choice between collecting additional data or implementing additional conservation areas is seldom made explicitly. Depending on the effectiveness with which surrogates like vegetation types represent the distributions of species, too much survey effort can reduce money for implementation and allow important areas for species to be lost. On the other hand, insufficient data can lead to outright loss of species due to poor placement of conservation areas.

### 103. ESTIMATING SPECIES RICHNESS: IMPLICATIONS OF NOT TAKING ACCOUNT OF HABITAT HETEROGENEITY

**GRAY, JOHN S**., Marine Biodiversity Research program, Department of Biology, University of Oslo, Norway; **Ugland, Karl I**., Marine Biodiversity Research program, Department of Biology, University of Oslo, Norway; **Thrush, Simon F**., National Institute of Water and Atmospheric Research, New Zealand; **Hewitt Judi E**., National Institute of Water and Atmospheric Research, New Zealand

The classical way to estimate species richness of a given area is to plot the cumulative number of species observed as the samples are accumulated. Samples are randomized so that sample order is not considered. The resulting species-accumulation curve can be fitted using two newly developed analytical approaches (Ugland et al. 2003 and Cao et al. 2005). Yet such curves rarely reach an asymptote and the problem is to estimate how many species might occur in the area if a complete sample had been taken. A variety of non-parametric methods have been developed most of which are based on how many singleton species occur and estimating the number of missing singletons. The randomization techniques do not take into account that sub-areas may be species rich or species poor due to habitat heterogeneity. We developed a model (Ugland et al.

2003) to take this heterogeneity into account which led to new estimators of richness. The model was applied to marine data and has been applied successfully to data on birds in Ecuador, (O'Dea et al. 2005). We have used the model on data from New Zealand estuaries to compare effects of habitat homogenization based on area with those taking into account habitat heterogeneity. Taking into account habitat heterogeneity had the largest effect on species loss. Thus these results have important consequences for development of conservation strategies.

### 104. THE RESPONSE OF AVIAN FEEDING GUILDS TO TROPICAL FOREST DISTURBANCE

**GRAY**, **MICHAEL**, University of York, United Kingdom; **Baldauf**, **Sandra**, University of York, United Kingdom; **Mayhew**, **Peter**, University of York, United Kingdom; **Hill**, **Jane**, University of York, United Kingdom

Anthropogenic habitat disturbance is a major threat to the bird communities of tropical forests. There have been many attempts to determine the ecological traits associated with species' vulnerability to disturbance, but no consensus has yet been reached and no attempt has been made to synthesize these studies to establish general patterns. We analyzed data from 57 published studies (covering 1214 bird species) and showed that feeding guilds responded differently to moderate habitat disturbance. Granivores significantly increased in abundance following disturbance, whereas insectivores and frugivores significantly decreased. These general conclusions were robust to the effects of phylogeny, body size, local population size and geographic range size. Responses of carnivores, nectarivores and omnivores were less clear, but analyses that took account of phylogeny indicated that these guilds declined following disturbance. In contrast to the other guilds, reported responses of carnivores and nectarivores were influenced by the sampling protocols used by different studies, which may explain the difficulty in detecting responses to disturbance in these guilds. Our findings indicate that general patterns govern the responses of species to habitat disturbance; differential responses of guilds suggest that disturbance affects trophic organization and thus ecosystem functioning.

### 105. STANDING WATERS OF HUNGARY, CROATIA, SPAIN: INTERNATIONAL IMPORTANCE, VEGETATION CHANGE AND SOME OBJECTIVES FOR NATURE CONSERVATION BY DINOPHYTA SPECIES

**GRIGORSZKY**, **ISTVÁN**, University of Debrecen, Hungary; **Kiss**, **Keve Tihamér**, Hungarian Academy of Sciences, Danube Research Center, Hungary; **Ács**, **Éva**, Hungarian Academy of Sciences, Danube Research Center, Hungary; **Gligora**, **Marija**, University of Zagreb, Croatia; **Miracle**, **Maria Rosa**, University of Valencia, Italy; **Vicente**, **Eduardo**, University of Valencia, Italy; **Dévai**, **György**, University of Debrecen, Hungary; **Nagy**, **Alex Sándor**, University of Debrecen, Hungary

Dinoflagellates are microscopic, unicellular, flagellated, often photosynthetic protists, commonly regarded as "algae". Both heterotrophic and autotrophic dinoflagellates are known. Besides being important primary producers, and therefore an important part of the food chain, dinoflagellates are also known for producing nasty toxins, particularly when they occur in large numbers, called "red tides" because the cells are so abundant they make the water change color. Free-living dinoflagellates are a successful group of aquatic organisms and the taxa highly adapted to various trophic conditions. In spite of the importance of the Dinophyta in many freshwaters, very little is known about factors that influence their occurrence. Accumulating information on Dinophyta ecology did not solve some crucial questions since much of it remained scattered without substantial ecological analyses. In this paper our purpose is to investigate the importance of Dinophyta species in various water types and compare the distribution of Dinophyta species found in three countries. The objective is to determine the relative level of eutrophication by comparing different standing waters using Dinophyta taxa in protected regions of Spain, Croatia and Hungary. A total of 225 samples collected from Spanish, Croatian and Hungarian water bodies were analyzed for Dinophyta species and compared to limnological characteristics.

### 106. KEY FACTORS FOR THE CONSERVATION OF CEPERO'S GRASSHOPPER, TETRIX CEPEROI BOLÍVAR, 1887, IN NORTHWESTERN GERMANY

**GRÖNING**, **JULIA**, University of Osnabrück, Germany; **Deppermann**, **Jana**, University of Osnabrück, Germany; **Hochkirch**, **Axel**, University of Osnabrück, Germany

During the last decades, Orthoptera have become an important group for bioindication in conservation and landscape planning. Information on the decline, threats and habitat preferences of Orthoptera species is of crucial importance for any conservation decision. While the knowledge on many Central European species is rather good, Tetrigidae have received less attention. Tetrix ceperoi is listed as "data deficient" in the red list of Germany. In order to elucidate possible threatening factors for the species, we investigated its habitat requirements and distribution on the East Frisian Islands and adjacent mainland. In contrast to the mainland, where T. ceperoi occurs exclusively in anthropogenic habitats, this pioneer species was rather common on the islands. Here, it was found in a broad range of habitats, like dune valleys, mud patches or shores of ponds. The analysis of microhabitat-preferences and grid mapping confirmed the importance of damp, open ground as a key-factor for the species. Wet dune slacks, which are the only remaining primary habitats of T. ceperoi in Germany, are threatened by the lowering of water tables, succession, and the restriction of natural dynamics by coastal protection. Cutting of plaggen, grazing and mowing are proposed conservation measures to preserve the highly diverse dune-slack-ecosystem.

### 107. PLANT DIVERSITY OF NORTHERN CYPRUS AND ITS CONSERVATION STRATEGIES

**GUCEL**, **SALIH**, Near East University, Turkey; **Gokcekus**, **Huseyin**, Near East University, Turkey; **Ozturk**, **Munir**, Near East University, Turkey

Cyprus is the third largest island after Sicily and Sardinia in the Mediterranean Basin. The island experiences a typical mediterranean climate with mild and rainy winters, hot and dry summers. A perusal of the historical records reveals that the island had a rich diversity of plants distributed in the forests , maquis and phryganic vegetation cover. However, population growth, tourism, urbanisation, fire, wood cutting for timber and wars have destroyed this rich plant cover and today we find only about 1300 plant taxa in the Northern part of the island. Out of these 45 are endemic to Cyprus and 19 are endemic to North Cyprus. Presently the forests are occupying an area of less than 10 % in the north. There is a great need to put an end to the destructive activities in order to improve the biodiversity as well as ecodiversity of the island.This paper will present an overview of the plant divesity as well as the conservation stategies developed by the Environmental Protection Office of North Cyprus and Near East University.

### 108. PREDICTIVE MODELLING AND GLOBAL CHANGE: CONFRONTING GLOBAL TO LOCAL VIEWS

**GUISAN, Antoine,** University of Lausanne, Department of Ecology and Evolution, Switzerland; **Randin, Christophe F.**, University of Lausanne, Department of Ecology and Evolution, Switzerland; **Zimmermann, Niklaus E.**, University of Lausanne, Department of Ecology and Evolution, Switzerland; **Thuiller, Wilfried**, University of Lausanne, Department of Ecology and Evolution, Switzerland; **Pearman, Peter**, University of Lausanne, Department of Ecology and Evolution, Switzerland

There is now large evidence that ongoing climate change is impacting ecosystems, but we still lack a clear view of ecological impacts that will occur in the longer term. As a result, modelling

studies of species' distribution, as powerful predicting tools, are receiving renewed attention. Alpine ecosystems were identified as potentially very sensitive to climate change. For instance, it has been hypothesized that alpine plants with narrow niche should be at greatest risk of extinction. However, projections made for these species at the European scale can differ greatly from those obtained at finer scale, e.g. due to the presence of micro-topographic refugias. Thus, species' turnover calculated on large scale may be entailed with errors. Lack of consideration for validation and uncertainty may also prevent proper interpretation of model projections. Once projections are made, some biological traits and dispersal ability may further explain species' vulnerability. Here, I present results from the MODIPLANT project in the Swiss Western Alps. I conclude with some perspectives that have broader applications to other climate change impact studies

### 109. INTEGRATING BIODIVERSITY IN URBAN PLANNING

**GYLLIN**, **MATS**, Swedish University of Agricultural Sciences, Sweden

The potential conflict between the prevailing housing policy towards very dense city districts and recent development in environmental psychology, stating that a variation of green environments is essential to human well-being, might be difficult to solve. Demands on urban planning are therefore strong, and the various constraints influencing the urban environment seem to divide urban biodiversity planning into two main branches – 1. isolated biodiversity projects and 2. biodiversity integrated in a more general planning process. In three projects in, or close to, the city of Malmö, Sweden, the outcome of different planning strategies in terms of biodiversity have been studied. The first is a typical, isolated biodiversity project where species numbers and biological qualities are high, but integration in the urban fabric is doubtful. The second project is an entire, new city district. The biodiversity idea was incorporated from the beginning in the planning process. New methods were tested, some of which were not particularly successful vis-à-vis biodiversity, although perhaps more 'urban adapted'. The third project is an ongoing project where a quarry is transformed into a recreation area. User participation is highly integrated in the process of planning of measures aimed at both biodiversity and recreation values.

### 110. EFFECTS OF WAR AND WAR-LIKE CONFLICTS ON FORESTS AND FOREST BIODIVERSITY IN EUROPE: CASES FROM THE LAST 400 YEARS TO PRESENT

**HAHN**, **KATRINE**, The Royal Veterinary and Agricultural University, Denmark; **Strange**, **Niels**, The Royal Veterinary and Agricultural University, Denmark

The current study describes and analysis the consequences of war and war-like conflicts in Europe on forests and forest biodiversity in a historical and institutional perspective. Historically, massive exploitation of forests have occurred during the wars and post-war. A large number of non-man's land along national borders was created by warfare often protecting wildlife and habitat by limitting human interferense and population growth in these areas. Other linkages between conflicts and environmental degradation and conservation are presented. We discuss the causes and extend the work of Homer-Dixon (1993) and Lietzmann and Vest (1999). A number of historical and present cases are discussed. It is shown for the case of biodiversity protection in Bosnia Herzegovenia how political violence/in-robustness may lead to social conflict and unsustainable pressure on environmental resources and losses of biodiversity. We outline that joint management between local communities and non-governmental organisations may be crucial during periods with political instability to ensure long term conservation efforts. We show that post-war rebuilding of society on Balkan should emphasis not only economic development but also the reconstruction of institutions which promote conservation.

### 111. SCENARIOS OF LANDSCAPE CHANGES AND THEIR IMPACT ON GRASSLAND BIODIVERSITY

**HALABUK**, **ANDREJ**, Institute of Landscape Ecology, Slovak Academy of Sciences, Slovakia; **Halada**, **Lubos**, Institute of Landscape Ecology, Slovak Academy of Sciences, Slovakia

Natural and semi-natural grasslands represent a specific feature of the Poloniny National Park with the great biodiversity value. However, agricultural decline and consequent landscape changes in this region affect grasslands significantly. We attempt to predict future distribution of grassland types based on different scenarios of landscape change. A combination of habitat suitability modelling and landscape change modelling was used. The scenarios were derived from different possible agricultural policies in the study area. The Business as usual scenario (BAU) assumes continuation of current trends in sense of support payments to agriculture. Contrarily, the Liberalization scenario was based on the key assumption of all agriculture support withdrawal. The Biodiversity scenario was based on strict support of the activities linked only to the nature conservation. A total area and spatial distribution of grassland types in year 2030 upon different scenarios represent main results of the work. A general trend of grassland overgrowing is documented in all scenarios. The results have revealed that the BAU and Biodiversity scenarios implying more positive consequences on grassland biodiversity in comparison with the Liberalization scenario. However, differences were identified in scenario impact on mountain meadows that represent the most threatened grassland type in the region.

### 112. THE CONTRIBUTION OF AGRI-ENVIRONMENTAL SCHEMES TO THE BIODIVERSITY CONSERVATION IN SLOVAKIA

**HALADA**, **LUBOS**, Institute of Landscape Ecology SAS, Slovakia

The agri-environmental schemes represent one of 14 parts of the Rural Development Plan in Slovakia. Besides the basic scheme, they include 9 other measures focused to the erosion prevention; animal breed and habitat conservation; wood in agricultural landscape protection; transformation of arable land to grasslands; and organic farming. We provide summary of activities supported by the agri-environmental schemes, a review of their practical application and quantitative data related to the number of projects and the amount of support. The expected contribution to the biodiversity conservation is discussed with the main focus to 2 activities: Conservation of semi-natural and natural grassland habitats and Protection of the water and wetland habitats. Some weaknesses of the current system and of its application as well as gaps in the agro-environmental measures are analysed. The need to interlink agro-environmental measures with other parts of the Rural Development Plan, especially with the Land consolidation (reparcelling) is discussed. The agro-environmental measures used in other countries were analysed from the viewpoint of their possible integration into agri-environmental schemes in Slovakia. Their potential to contribute to the biodiversity conservation is estimated.

### 113. USING SATELLITE VESSEL TRACKING TO PROTECT DEEP WATER CORALS

**Hall-Spencer**, **Jason**, University of Plymouth, United Kingdom; **GONZALEZ-MIRELIS**, **GENOVEVA**, University of Plymouth, United Kingdom

In this paper we assess the use of vessel tracking data as a tool for deep sea habitat conservation. In 2000, an agreement was made between European Union member states to satellite track all fishing vessels 24m in length and this regulation was amended to include vessels 15m in January 2005. A similar vessel monitoring system (VMS) exists for members of the North Atlantic Fisheries Association including Canada, the Faeroes,

Iceland, Greenland and Norway. At present these data are collated by the various fisheries authorities for the control and surveillance of fisheries. However, with spatial management approaches increasingly becoming adopted across Europe, satellite tracking of fishing activity offers strong potential as a key tool for the conservation and management of areas known to support vulnerable marine habitats. We examined the spatial distribution of fishing effort, its seasonal variability and medium term changes, placing emphasis on the deep water coral Lophelia pertusa. We also conducted an analysis of effort on the basis of fishing fleets. Our results are from the Rockall Bank area (UK/Ireland), and reveal patterns that seem to be strongly correlated with seabed features. We conclude that VMS can aid in enforcing spatial closures, as well as help monitor fishing effort in relation to different seabed features and habitats.

### 114. WOODLAND KEY HABITATS AND CONSERVATION OF BIODIVERSITY IN BOREAL FORESTS

**HANSKI**, **ILKKA**, University of Helsinki, Finland

In northern Europe, the woodland key habitats are delimited as small patches of distinct forest types in the midst of managed forest. Woodland key hebaitats often represent forest types that are appropriate for some threatened species, and woodland key habitats are therefore assumed to help halt biodiversity decline in boreal forests. I examine critically the ecological bases of this expectation. I conclude that woodland key habitats, as currently preserved in forestry in Finland and elsewhere in northern Europe, comprise such a sparse network of tiny habitat fragments that they do not facilitate the persistence of threatened species, though they may to some extent prevent the further decline of species that are still relatively common. The notion that woodland key habitats are important for maintenance of biodiversity in boreal forests has been promoted for political rather than ecological reasons. Conservation biologists have argued for a long time about the relative importance of the pooled area of habitat and the spatial configuration of habitat in supporting viable populations of focal species. The woodland key habitats provide a good example of situations where the spatial configuration makes a big difference.

### 115. UNCERTAINTIES IN BIOCLIMATIC ENVELOPE MODELLING – EFFECTS OF LAND COVER, DATA RESOLUTION AND GEOGRAPHICAL DISTRIBUTION OF SPECIES

**HEIKKINEN, RISTO K**., Finnish Environment Institute, Research Department, Finland; **Luoto, Miska**, Thule Institute Research Centre, University of Oulu, Finland; **Virkkala, Raimo**, Finnish Environment Institute, Research Department, Finland; **Pöyry, Juha**, Finnish Environment Institute, Research Department, Finland

Potential impacts of projected climate change on biodiversity are often assessed using bioclimatic 'envelope' models. Applying bioclimatic models in an informative way is hampered by many methodological uncertainties, e.g. the choice of modelling technique, model validation, biased sampling of variables, scaling and impacts of non-climatic factors. Our results, based on data from national butterfly and bird atlases, and climate and CORINE land cover in a 10-km grain grid system, suggest that species geographical attributes, scaling and the inclusion of land cover all affect the performance of bioclimatic envelope models. The accuracies of climate-butterfly models were related negatively to the latitudinal range and species prevalence, and positively to the clumping of the species distribution. Integration of the land cover data into the models increased the performance of species-climate models particularly in the case of birds. Thus, the distributions of many bird species (e.g. marshland birds), and certain habitat specialist butterflies, at the scale of 10-km reflect the interplay between habitat availability and climate. Our bird-climate-land cover models conducted at four resolutions suggested that inclusion of land cover increases the performance of bioclimatic envelope models at 10 km and 20 km resolutions, but not at 40 km and 80 km resolutions.

### 116. MONITORING TERRESTRIAL AMPHIBIANS THAT ARE NOT ALWAYS AVAILABLE FOR SAMPLING: THE CASE STUDY OF SALAMANDRA ATRA, AN ENDEMIC SPECIES OF THE ALPS

**HELFER**, **VÉRONIQUE**, Laboratory for Conservation Biology, Switzerland; **Lauber**, **Anita**, KARCH, Switzerland; **Rohr**, **Fanny**, Laboratory for Conservation Biology, Switzerland; **Fumagalli**, **Luca**, Laboratory for Conservation Biology, Switzerland; **Schmidt**, **Benedikt R.**, KARCH, Switzerland

Reliable monitoring protocols are an urgent need for efficient conservation. The alpine salamander (S. atra) is a species that poses special challenges when designing a monitoring program. Total population size can be viewed as composed of two parts: the population available for monitoring at the surface and another part that is underground and unavailable for sampling. Surface population size and exchange rates between population segments likely vary with climatic conditions and habitat structure. Classic population size estimators will be biased if population structure and its dynamics are not taken into account. We evaluated monitoring schemes for this species that take these complexities into account. We used mark-recapture and distance sampling methods to estimate total and surface population size, respectively, and evaluated the influence of climatic conditions on surface population size. Distance sampling worked well to estimate surface population size when they were sufficient active salamanders. It is not a reliable proxy for total population size, however. Mark-recapture methods provided reliable estimates of total population size and exchange rates between population segments if recapture probabilities were high. Rainfall seems the most influent parameter on surface population size. Combining these results, we propose a monitoring design for this emblematic species.

### 117. AGRICULTURAL LANDSCAPES IN EASTERN EUROPE AS REFERENCE AREAS FOR WEST-EUROPEAN NATURE CONSERVATION

**Helldin**, **Jan Olof**, Swedish Biodiversity Centre, Sweden; **LENNARTSSON**, **TOMMY**, Swedish University of Agricultural Sciences, Sweden; **Arsene**, **Gabriel**, University of Agricultural Sciences of the Banat, Dept. of Botany and General Ecology, Romania; **Dahlstrom**, **Anna**, Swedish University of Agricultural Sciences, Sweden; **Emanuelsson**, **Urban**, Swedish Biodiversity Centre, Sweden; **Hasund**, **Knut Per**, Swedish University of Agricultural Sciences, Sweden; **Manci**, **Cosmin**, Romania; **Turcus**, **Violeta**, Western University Vasile Goldis, Romania; **Bjorklund, Jan-Olov**, Upplandsstiftelsen, Sweden

European biodiversity is threatened by changes in land use, and much effort is spent on restoring degraded habitats and landscapes, and on improving habitat management. In most West-European countries, threatened habitats in the cultural landscape are fragmented and reduced to remnant patches without or with suboptimal management. It is usually difficult to develop proper management regimes based on ecological data from such degraded ecosystems. However, vast areas in eastern Europe still have intact, traditionally managed agricultural landscapes, that can serve as reference areas for West-European conservation efforts. We use the Romanian agricultural landscape to describe how species diversity may be affected by structural and functional connectivity among semi-natural grasslands, by land use dynamics, and by some specific management traditions. For example, we study diversity linked to managed trees and shrubs (such as pollarded trees) on semi-open land. Furthermore, in order to make conservation plans for five species that are red-listed in Sweden, we study Romanian populations, to infer about habitat affiliation and niche width, obligate demands on management and habitat structure, and response to management changes.

**118. FACTORS CONTRIBUTING TO INCREASED BIRD POPULATIONS ON COMMERCIAL ARABLE FARMLAND: CROP ROTATIONS VERSUS PESTICIDE LOADS AND BIRDS OF CONSERVATION CONCERN.**

**Henderson**, **Ian**, British Trust for Ornithology, United Kingdom; **Clark**, **Nigel**, BTO, United Kingdom

One of the most important conservation issues effecting bird populations in lowland Europe has been the widespread loss of structural diversity on farmland, due to simplified crop rotations and increasing pesticide use. The Colworth Farm Project shows six years of data that identify the response of bird populations to experimental combinations of mixed cropping and low pesticide regimes on commercially viable crops. Bird numbers were monitored all year, in every year. A more complex crop mosaic and low pesticide usage led to a rapid population increase among a wide range of bird species; 70% of which occurred within three years. Species of high conservation concern, and those monitored as Government 'environmental indicators' increased by 30% and 20% respectively. Winter and summer field conditions both contributed but the long-term relaxation of weed control allowed pernicious weeds to flourish at a cost to general plant and bird biodiversity, and crop yield. Crops mosaics, however, contributed as legitimate bird-habitats for species that were otherwise poorly represented among cereal monocultures. These findings show populations recovering at a rate that would meet national conservation targets, using relatively simple but widely adopted modifications to management practice. The skills needed are familiar to most arable farmers.

**119. IDENTIFYING CONSERVATION PRIORITIES FOR FRESHWATER BIODIVERSITY IN THE UPPER MISSISSIPPI RIVER BASIN, USA**

**HERKERT, JAMES**, The Nature Conservancy, Peoria, Illinois, USA; **Weitzell, Roy**, Minnesota Pollution Control Agency, Minneapolis, Minnesota, USA; **Khoury, Mary**, The Nature Conservancy, Chicago, Illinois, USA; **Gagnon, Paula**, The Nature Conservancy, Omaha, Nebraska, USA; **West, Paul**, The Nature Conservancy, Madison, Wisconsin, New York, New York, USA; **Braun, David**, The Nature Conservancy, USA

The Upper Mississippi River Basin (UMRB) is a vast floodplain river system that drains over 490,000 square kilometers in central North American, and is an important area for freshwater biodiversity. The UMRB supports 200 native, regularly occurring fishes, roughly 25 percent of North America's fish species as well as a rich diversity of freshwater mussels and crayfish. In its current state, however, the UMRB is also highly regulated and degraded. In an effort to identify areas of biological significance, we used data on the distribution of rare and imperiled species from three taxonomic groups (fishes, mussels, crayfishes) and a freshwater ecological systems classification scheme (based on physical attributes and land use patterns) to identify focal conservation targets. We assessed the ecological integrity of these targets using spatial data on land use patterns, which provide information on large-scale and non-point sources of impacts, as well as more site-specific information such as dams and industrial facility locations. This information was then synthesized to create a network of areas that capture the full diversity of target species and aquatic systems within the basin and to serve as the foundation for the development of conservation strategies to protect the identified areas of biological significance.

**120. FACTORS AFFECTING THE ABUNDANCE OF BIRDS ON FARMLAND OF THE BALTIC STATES**

**HERZON**, **IRINA**, Universoty of Helsinki, Finland; **Auninš**, **Ainars**, Latvian Fund for Nature, Latvia

Much of Eastern Europe is known to support rich farmland wildlife, which is threatened by intensification under the European Unions agricultural policy. We related data on birds occurring in farmland in the Baltic states of Estonia, Latvia and Lithuania to the spatial organisation of farmed habitats in areas differing in landscape type and intensity of land-use. Species richness, abundance, and diversity of farmland bird communities, as well as the numbers of numerous species were positively related to the number of residual non-cropped elements within farmland, the local mixture of annual crop and grass fields, and the variety of field types. The positive associations were most prominent in a generally open landscape. The response to certain residual habitats varied among species of different ecological profiles, with ditches and small rivers having predominantly positive effects. The results suggest that, by altering the farmland structure towards simplification and homogenisation, EU agricultural policies will have a detrimental effect on farmland bird populations in Eastern Europe. The existing heterogeneous farmland may partly be sustained with well targeted agri-environment schemes, which will be illustrated with specific examples of the schemes adopted in the region.

**121. THE DISTRIBUTIONS OF A WIDE RANGE OF TAXONOMIC GROUPS ARE EXPANDING POLEWARDS.**

**HICKLING**, **RACHAEL**, University of York / CEH Monks Wood, United Kingdom; **Roy**, **David B.**, CEH Monks Wood, United Kingdom; **Hill**, **Jane K.**, University of York, United Kingdom; **Fox**, **Richard**, Butterfly Conservation, United Kingdom; **Thomas**, **Chris D.**, University of York, United Kingdom

Evidence is accumulating of shifts in species' distributions during recent climate warming. However, most of this information comes predominantly from studies of a relatively small selection of taxa (i.e. plants, birds and butterflies) which may not be representative of biodiversity as a whole. Using data from less well-studied groups, we show that a wide variety of vertebrate and invertebrate species have moved northwards and uphill in Britain over approximately 25 years, mirroring, and in some cases exceeding, the responses of better-known groups.

**122. GMOS AND NATURE CONSERVATION IN EUROPE**

**HILBECK, ANGELIKA,** Swiss Federal Insititute of Technology, Institute of Integrative Biology, Switzerland

GMOs, their compatibility with the goals of nature conservation and risks posed to these goals has not been discussed at great detail until today in Europe. This is a peculiar situation since conservation circles almost always take an opposing position towards GM technology and view it as a potential threat to their mission. It has not been until last year that the German competent authority on conservation - Federal Agency for Nature Conservation - has taken up this issue and called for a conference involving the relevant players from the conservation circles in Germany. This lead to the publication of a common position document called the 'Vilmer Resolution'. In this presentation, I will provide an overview on the current status of the discussion in Germany and Switzerland, describe the involved scientific and legal issues and present a summary of the relevant scientific knowledge currently available on these issues.

**123. IMPACTS OF HABITAT FRAGMENTATION ON TROPICAL FOREST BUTTERFLIES**

**HILL**, **JANE**, University of York, United Kingdom; **Hamer**, **Keith**, University of Leeds, United Kingdom; **Benedick**, **Suzan**, University of York, United Kingdom; **Mustaffa**, **Nazirah**, Universiti Malaysia Sabah, Malaysia

Throughout the world, previously extensive tracts of tropical forest now exist as fragments scattered across agricultural landscapes. We investigated the consequences of this habitat fragmentation on the diversity of forest butterflies in Sabah

(Malaysian Borneo). Species richness in forest remnants was positively related to remnant size and negatively related to isolation. Species assemblages at different sites were significantly nested, with those species most adversely affected by forest fragmentation having a narrow range of larval host plants. No endemic butterflies were recorded in forest remnants but even the smallest remnants supported species with restricted geographical distributions. There was substantial ß-diversity among sites, which was related to variation in both fragment size and vegetation structure. Despite having lower species richness, relatively small and isolated remnants made a substantial contribution to regional diversity and our results indicate that the conservation value of small remnants of forest should not be overlooked.

### 124. MODELLING BEARDED VULTURE (GYPAETUS BARBATUS) ECOLOGICAL REQUIREMENTS IN THE SWISS ALPS BY THE ECOLOGICAL NICHE FACTOR ANALYSIS (ENFA)

**HIRZEL**, **ALEXANDRE**, University of Lausanne, Switzerland; **Arlettaz**, **Raphael**, University of Bern, Switzerland

Bearded Vultures were extirpated from the Alps about one century ago. An international reintroduction programme was launched en 1986, releasing individuals in four different locations. Since then, birds dispersal has been far from homogeneous, resulting in three main zones of occupancy, which do not necessarily coincide with release areas. In order to discern species ecological requirements we performed an Ecological Niche Factor Analysis (ENFA) of Bearded Vulture sightings in Valais (Swiss Alps) from 1988 to 2001. Although this area harbours no release site, it has been visited by birds stemming from all release places. The analysis distinguished a prospective phase (1987-1994, mostly immature birds) from an installation phase (1995-2001, mostly maturing subadults) differing according to geography and ecology. This analysis shed some light on the Bearded Vulture habitat requirements and may prove useful to optimize the release site locations.

### 125. TOWARDS A WHOLE SYSTEM APPROACH IN FOREST CONSERVATION: FINE-TUNING THE EVALUATION AND CONDITION ASSESSMENT PROCESS

**HOBSON**, **PETER**, Writtle College, United Kingdom

The aim of preserving biodiversity supports the tendency within conservation to measure and evaluate performance outcomes and successes in terms of entities such as species and communities. This paper proposes a modification to the evaluation process by recommending a shift in criteria weighting towards valued attributes of ecosystem structure and function, based on evidence gathered in the field. Various attributes of forest structure and dynamic patterns were analysed as surrogate measures of population trends for selected taxa. The research included six forest study sites located in the UK, Canada and Finland. The findings suggested that the scale and shape of disturbance in environmental release sites contrasted sharply with forests managed primarily for conservation. Furthermore, structures associated with natural disturbance increased the occupancy potential for a range of functional indicator taxa. In Finland the cascade effect of forest fire on different taxonomic indicators, including a conservation priority species was evident. In conclusion, legacies of ecosystem disturbance provided surrogate measures for selected taxa. Ultimately, whole system evaluations would provide managers with more effective benchmarks for protecting biodiversity in biological reserves, and would move conservation strategies away from the existing atomised approach to preservation.

### 126. THE EFFECT OF PRESCRIBED BURNING AND WILDFIRES ON ORTHOPTERA IN NORTHERN GERMAN PEAT BOGS

**HOCHKIRCH**, **AXEL**, University of Osnabrück, Germany

During the last decades fire has been identified as a natural disturbance agent and key factor for the persistence of many ecosystems. Prescribed burning has become a frequently advocated method in nature conservation. While the effect of burning has been intensely studied in open grassland ecosystems and coniferous forests, wetlands have rarely been studied in this context. In northern German peat bogs prescribed burning is often combined with sheep grazing in order to prevent these habitats from succession. In 2003 two peat bogs were burned, while two others were affected by wildfires. We analysed the effect on Orthoptera species by comparing burned and adjacent unburned sites, as well as the transect between both. While none of the analysed species showed any negative effects of burning, one endangered species even profited from burning (Omocestus rufipes). Even species ovipositing in stems did not decline significantly after a fire. Our results suggest that fire does not represent a threat for the Orthoptera fauna of peat bogs. However, long-term negative effects can not be excluded, since Molinia might profit from burning.

### 127. BARN OWL PRODUCTIVITY AND CONSERVATION IN AN UPLAND, PASTORAL ENVIRONMENT

**HOLDEN**, **JENNY**, World Owl Trust, United Kingdom

Following intensive work by conservation groups, the white-breasted barn owl Tyto alba alba has made a good recovery in the UK and its range is expanding. In Cumbria, North West England, barn owls are now found to be occupying habitats that are apparently sub-optimal and outside their normal range; so potentially altering our perception of the habitat requirements for this species. Analysis of pellets from nest sites both in sub-optimal and optimal foraging have revealed significant differences in the proportions of prey species taken. In the past, fluctuations in barn owl populations have been found to be correlated with vole cycles and they are frequently described as being a specialist predator. However, barn owls have also been shown capable of taking a wide range of prey species and behaving as generalists. This study examines the importance of Microtus agrestis to breeding barn owl by correlating the percentage found in the diet with breeding success, in terms of number of chicks fledged, in an attempt to evaluate the viability of these “out-lying” populations and to learn whether assuming the role of a specialist is the most effective strategy for this owl. Improved success in raising offspring was found to be positively correlated with an increasing proportion of Microtus in the diet, but negatively correlated with increasing numbers of prey species taken.

### 128. ARE NORTH-EUROPEAN PREDATORS OF VOLES THREATENED BY DECLINING PREY POPULATIONS?

**HÖRNFELDT**, **BIRGER**, Umeå university, Sweden; **Hipkiss**, **Tim**, Queens University Belfast, United Kingdom

Monitoring of cyclic small mammal populations forms part of the Swedish National Environmental Monitoring Programme (NEMP). Basic aims of the NEMP are to give an “early warning” of any environmental disturbances and to indicate biological diversity. Voles and lemmings are a staple food of many northern predators and govern their reproduction and population cycles. Monitoring the main prey populations provides an indirect general insight on the potential status of these predators and the biological diversity they represent. We have snap-trapped small mammals at the landscape scale near Umeå in boreal Sweden since 1971. This has revealed an unexpected long-term decline of the vole populations, as has also been observed elsewhere at northern European latitudes. In a parallel study of the vole-eating Tengmalm’s Owl (Aegolius funereus), we have also observed a long-term decline, and the population is now around 75% lower than the peak level at the start in the early 1980’s and has remained at a fairly stable level for the last 5-6 years. We conclude that several other specialist predators have probably also declined in a similar way, and that scarcity of food is a new threat that must be accounted for in any conservation efforts towards these predators.

### 129. SIGNIFICANCE OF RETENTION TREES FOR WOOD-DECOMPOSING FUNGI

**HOTTOLA, JENNI** , University of Helsinki, Department of Biological and Environmental Sciences, and Finnish Forest Research Institute, Vantaa Research Unit, Finland; **Siitonen, Juha**, Finnish Forest Research Institute, Vantaa Research Unit, Finland

Forest management practices have been modified to better sustain biodiversity in most European countries starting from the early 1990s. Leaving living and dead retention trees on clear-cuts is now a widely applied practice. However, the significance of the current amounts of retention trees (an average of 3-4 $m^3$ per ha in Finland) for saproxylic species in ordinary managed forests has not been extensively studied. Our objective was to assess the effects of amount and quality of dead retention trees on polypore species richness, and on the occurrence of red-listed species. In addition, we explored the variation in different parts of southern Finland. Altogether 138 cutting areas that had been cut in 1995-1998 were inventoried in seven study areas in autumn 2004. Volume of dead retention trees varied from 0 to 61 $m^3$ per cutting site, whose areas ranged from 0.4 to 3.5 ha. A total of 5,600 surveyed dead trees supported 120 species, of which 30 are classified as threatened or near threatened. Volume of dead retention trees explained significantly both species richness ($r^2$ = 0.45) and the number of red-listed species ($r^2$ = 0.53). The number of red-listed species differed between the study areas with different land-use history.

### 130. GREEN BRIDGES AND OTHER MITIGATION STRUCTURES ON HIGHWAYS IN CROATIA FOR LARGE CARNIVORES

**Huber, Djuro**, Biology Department, Veterinary Faculty, University of Zagreb, Croatia; **Kusak, Josip**, Biology Department, Veterinary Faculty, University of Zagreb, Croatia,

New highways through the wildlife rich areas of Croatia have been constructed in the period from 1997 through 2005. Out of a total of 325 kilometers, 224 km are in the habitat of three large carnivore (LC) species: brown bear (*Ursus arctos*), gray wolf (*Canis lupus*), and Eurasian lynx (*Lynx lynx*), and the remaining 101 km are in wolf habitat. There are a number of viaducts, tunnels and six specifically constructed (100-200 m wide) green bridges where big mammals can cross the highway route. All green bridges, two tunnels and 8 viaducts have been added on a specific requirement to mitigate the permeability for animals. We considered only structures with >80 m in width for animal crossing as fully useable for all large carnivores. Such calculation revealed 69 structures where all 3 LC species live and 22 in areas where only wolves occur.
We studied the use of the green bridge at Dedin (100m wide) using infrared (IR) sensors. The height of IR beams was set at 40 cm above the ground to permit the smaller animals (up to the size of fox, hare and badger) to cross the bridge unrecorded. A total of 9471 crossings have been recorded during 563 different days of active monitors operation. Recalculated to the yearly level (365 days) it gives an estimate of a total of 6096 bridge crossings, or 16.7 per day. Concurrently we noticed 402 animal tracks, 284 of which belonged to animals taller than 40 cm: roe deer 37.0%, red deer 28.2%, wild boar 29.0%, brown bear 9.1%, wolf 1.4, and man 5.3%. A total of 26 brown bear tracks were detected. The brown bear share of 9.1% in all recorded tracks permits a calculation that the share in IR recorded crossings is 548 bear bridge crossings per year, or 1.5 per night (24 hours). We conclude that this green bridge served it purpose effectively. Only radio telemetry study of marked animals could reveal the share of individual animals that perhaps avoided the use of this bridge to cross the highway. However, as different reproductive categories of bears did cross the bridge we hope that the barrier effect will not have long-term negative effect on bear population.

### 131. LANDSCAPE ECOLOGICAL HABITAT MAPPING OF HUNGARY (MÉTA)

**ILLYÉS**, **ESZTER**, Institute of Ecology and Botany of the HAS, Hungary; **Molnár**, **Zsolt**, Institute of Ecology and Botany of the HAS, Hungary; **Bölöni**, **János**, Institute of Ecology and Botany of the HAS, Hungary; **Horváth**, **Ferenc**, Institute of Ecology and Botany of the HAS, Hungary; **Botta-Dukát**, **Zoltán**, Institute of Ecology and Botany of the HAS, Hungary; **Molnár**, **Csaba**, Hungary; **Révész**, **András**, Institute of Ecology and Botany of the HAS, Hungary

The aim of the MÉTA project is to compile a comprehensive, multi-layered, multi-scale database on the actual state of natural habitats in Hungary in order to gain scientifically sound data to facilitate the incorporation of ecological knowledge to conservation, landscape planning, infrastuctural planning on regional and country levels. We performed field mapping in a hexagonal grid of 35 hectares for the whole country; collecting data on three nested spatial levels: the habitat level inside the hexagons, the hexagon level, and the ca. 35 km2landscape-level of approximately 100 hexagons. List and area proportions of habitats in each hexagon, and 17 other attributes including naturalness, threats, presence of invasive species, land use and landscape-ecological attributes (pattern, connectivity, junxtaposition, etc.) were documented. The consistent data collection was performed by 190 mappers, ensured by pre-printed data sheets, field-trainings and detailed field-guides; followed by a 4-step quality controll. A GIS-linked SQL database with 500,000 records is being built from the field data enabling to create numerous queries and maps for example on particular habitat types, threats, invasiveness. The MÉTA project is the third biggest field vegetation survey in the world.

### 132. THE SWISS AGRI-ENVIRONMENTAL PROGRAMME AND ITS EFFECTS ON SELECTED BIODIVERSITY INDICATORS

**JEANNERET**, **PHILIPPE**, Agroscope FAL Reckenholz, Swiss Federal Research Station for Agroecology and Agriculture, Switzerland; **Aviron**, **Stéphanie**, Agroscope FAL Reckenholz, Swiss Federal Research Station for Agroecology and Agriculture, Switzerland; **Birrer**, **Simon**, Schweizerische Vogelwarte Sempach, Switzerland; **Herzog**, **Félix**, Agroscope FAL Reckenholz, Swiss Federal Research Station for Agroecology and Agriculture, ; **Walter**, **Thomas**, Agroscope FAL Reckenholz, Swiss Federal Research Station for Agroecology and Agriculture, Switzerland; **Pfiffner**, **Lukas**, Forschungsinstitut für biologischen Landbau, Switzerland; **Schüpbach**, **Béatrice**, Agroscope FAL Reckenholz, Swiss Federal Research Station for Agroecology and Agriculture, Switzerland

In Switzerland, parallel to agri-environmental measures which apply directly to the field management, farmers had to convert at least 7 % of their land to ecological compensa¬tion areas – ECA. Major ECA are extensified grassland, traditional orchards, hedges, wild flower strips. In 2003, farmers practised the agri-environmental scheme all over Switzerland with a total of 119000 hectares of ECA (11% of the utilised agricultural area). The introduction of ECA throughout the agricultural area can be seen as a large scale landscape restoration. This paper aims to analyse the role of ECA in promoting biodiversity at habitat and landscape scale. In three case study areas of about 6 km2, biodiversity indicators (plants, birds, spiders, carabid beetles, grasshoppers and butterflies) were recorded in ECA and intensively managed fields between 1997 and 2004. Results showed that ECA had generally more species or different assemblages than the intensively managed fields. The most successful ECA types were the hedges and the wild flower strips. Over the period of investigation, a light positive trend of biodiversity development could be demonstrated. The impact of the ECA programme on biodiversity can globally be considered as moderate but positive because ECA contribute significantly to the regional biodiversity.

**133. BIODIVERSITY ANALYSES AND SITES SELECTION IN DALMATIAN COUNTIES (CROATIA), AS A STARTING POINT IN THE UNDP/GEF COAST SUSTAINABLE DEVELOPMENT PROGRAM**

**JELASKA**, **SVEN D.**, OIKON Ltd. Institute for Applied Ecology, Croatia; **Nikolic**, **Toni**, Faculty of Science, Croatia; **Šeric Jelaska**, **Lucija**, Faculty of Science, Croatia; **Kušan**, **Vladimir**, OIKON Ltd. Institute for Applied ecology, Croatia; **Gužvica**, **Goran**, OIKON Ltd. Institute for Applied Ecology, Croatia; **Major**, **Zoran**, OIKON Ltd. Institute for Applied Ecology, Croatia; **Peternel**, **Hrvoje**, OIKON Ltd. Institute for Applied Ecology, Croatia

The COAST Project has emphasized the problem of biodiversity protection and conservation in Dalmatia, (with a unique patchwork of marine, coastal, island, terrestrial and agricultural ecosystems), within a multi-disciplinary and multi-sectoral context of ICM and sustainable development. All available data were georeferenced to the Central-European MTB/4 grid units.. To ensure consistency and homogeneity of results, (having in mind unevenly surveyed COAST area) instead of using simple richness analysis indicating a-diversity - special emphasize was given to the endangered and endemic species. Most representative data was available for vascular flora, which is a proven indicator and a surrogate group. Although the four counties in the COAST Project make only 22.9% of total Croatian inland area, here we found 41% of Croatian vascular plant taxa and more than half of endemic plant species. As a result of GIS spatial analyses of habitat, fauna and flora data, for each county 4 to 6 areas were identified and ranked according to their biodiversity importance. After multi-sectoral consultations, demo-site were proposed in each county, that was also the site with highest biodiversity in just two of them, indicating that sole high biodiversity level is not always the strongest reason for conservation action to take place.

**134. THE CHALLENGE OF TARGET-SETTING IN TEMPORALLY AND SPATIALLY DYNAMIC HABITATS: THE CASE OF DEAD WOOD IN BOREAL FORESTS**

**JONSSON**, **BENGT GUNNAR**, Mid Sweden University, Sweden

A very large group of boreal forest species, and in fact the majority of declining forest species, are associated with habitats and substrates that are temporary in space and time, i.e. they depend on living or dead trees. As a consequence, these species must track an ever changing and ephemeral habitat. To strengthen the basis for conservation management of these species, a number of topics should be addressed, including the description of historical habitat loss, dynamics of dead wood in natural and managed forests, habitat demands for individual species, and species dispersal ability. A comprehensive understanding also requires synthesis of such data, which is best explored in modeling approaches. Synthetic modeling suggests that management should focus on the landscape scale and include a historical perspective. However, current models suffer from the lack of solid empirical data concerning effective dispersal distance, the relative role of landscape history, as well as the basic problem of many species being naturally low in abundance, implying absences despite suitable conditions. Given these limitations, we cannot yet provide quantitative targets for effective management, and the guidance given to managers is at best general and qualitative.

**135. WINNERS AND LOSERS IN HUMAN-ALTERED ENVIRONMENTS**

**JULLIARD**, **ROMAIN**, MNHN-CRBPO-UMR5173, France; **Clavel**, **Joanne**, MNHN-CRBPO-UMR5173, France; **Devictor**, **Vincent**, MNHN-CRBPO-UMR5173, France

Specialist species have been declining all over the world in various ecosystems leading to species assemblage increasingly made of generalist species. For practical reasons, the effect of human perturbation on this so called biotic homogenisation process was rarely investigated directly. Moreover, environmental perturbations caused by human are often viewed only in terms of their harmful impacts on the affected species, although some species may benefit from any disturbance. We studied the sensitivity of 100 bird species with contrasted specialist strategies, to spatial fragmentation and temporal disturbance of the landscape. We tested each effect using data from more than 1,000 samples monitored by national bird monitoring program and land-cover surveys. We show that the specialiation level of a given species is a very good predictor to its vulnerability to current global changes: habitat perturbation strongly affect spatial repartition of species. More interestingly, we show that species responses are very contrasted according to their specialisation level and the perturbation considered. Therefore, bird communities are strongly structured along a specialisation gradient. These results have major conservation implications in providing a methodology to assess “who wins the game” when facing global changes.

**136. SHORT-TERM EFFECTS OF CONTROLLED BURNING ON ASSEMBLAGES OF WOOD-DECAYING FUNGI IN MANAGED BOREAL FORESTS**

**JUNNINEN**, **KAISA**, University of Joensuu, Finland; **Kouki**, **Jari**, University of Joensuu, Finland

Effective fire suspension in Fennoscandian boreal forests has led to alarming decrease of biodiversity. To compensate this deficit, prescribed burning as a restoration method of managed forests has been introduced, but the impacts of the practice are still largely unknown.
We studied the immediate effects of controlled burning on assemblages of wood-decaying fungi, including several red-listed species, in a large-scale field experiment in Finland. A total of 24 forest sites were included in the factorial study design, with three different levels of logging and uncut controls. Twelve of the sites were burned. Each treatment combination was replicated three times. Polypore assemblages at the sites were studied at one-hectare plots one year before the treatments, and one and four years after the treatments.
Over 10,000 records of wood-decaying polypores were made. Change in the fungal species composition due to logging and burning could be seen already at the first year after the treatments and the effects were very distinctive after four years. Particularly the abundance of a few fire-favored species became manifold, and some, apparently fire-associated, red-listed species appeared at the burned sites. Prescribed burning seems to be an effective method for conserving some rare species typical of natural disturbance regimes.

**137. BUILDING CONSENSUS ABOUT MEASURING CONSERVATION SUCCESS: PRELIMINARY RESULTS FROM A 20-ORGANISATION PROJECT**

**KAPOS, VALERIE**, Cambridge Conservation Forum, c/o Dept of Zoology, University of Cambridge, United Kingdom; **Aveling, Rosalind**, Fauna & Flora International, United Kingdom; **Bubb**, **Philip,** UNEP World Conservation Monitoring Centre, United Kingdom; **Carey, Peter**, Centre for Ecology and Hydrology, United Kingdom; **Entwhistle**, **Abigail,** Fauna & Flora International, United Kingdom; **Hopkins, John**, English Nature, United Kingdom; **Mulliken, Teresa**, TRAFFIC International, United Kingdom; **Safford, Roger**, BirdLife International, United Kingdom; **Stattersfield, Alison**, BirdLife International, United Kingdom; **Walpole, Matthew**, Fauna & Flora International, United Kingdom; **Balmford, Andrew**, Dept of Zoology, University of Cambridge, United Kingdom

A major challenge facing conservationists, policy-makers and donors alike is how to evaluate the success of conservation efforts in order to identify those approaches that are most effective. We report the results of a collaborative project among the diverse members of the Cambridge Conservation Forum to develop harmonised approaches for assessing conservation

success. The participating organizations include international, national and local NGOs and partnership organizations, IGOs, national statutory bodies and academic research groups. The resulting scorecard style questionnaire is designed to help project implementers identify the impacts of their actions. It addresses seven major categories of conservation activity and focuses on the linkages between the different types of conservation action and their outcomes and ultimate conservation impact. We report the results of trial application of this tool to conservation projects from 10 different organisations, and discuss its potential for synthesizing conservation experience using common measures, and thereby opening up opportunities for quantitative identification of determinants of project success.

### 138. BIODIVERSITY HOTSPOTS ALONG AN ELEVATION GRADIENT: A COMPARISON OF PATTERNS IN BIRDS, BUTTERFLIES AND PLANTS

**KARK**, **SALIT**, The Hebrew University of Jerusalem, Israel; **Shmida**, **Avi**, The Hebrew University of Jerusalem, Israel; **Banker**, **Eran**, , Israel; **Bino**, **Gilad**, The Hebrew University of Jerusalem, Israel; **Levanoni**, **Oded**, The Hebrew University of Jerusalem, Jerusalem, Israel; **Levin**, **Noam**, Ben-Gurion University of the Negev, Israel; **Peer**, **Guy**, The Hebrew University of Jerusalem, Israel; **Tamari**, **Hagit**, The Hebrew University of Jerusalem, Israel

Mapping biological diversity has become a major goal in recent years. Much work has focused on quantifying and comparing diversity patterns in different ecological systems in a search for hotspots. However, if we aim to understand the effects of global change and the response of communities to changing environments, transitional areas, especially in mountains, may serve as excellent models. Working on birds, butterflies and plants in Mount Hermon, Israel, we examined the hypothesis that faunal ecotones correspond with vegetation boundaries and that species diversity peaks in ecotones. We sampled in the same spots plants, butterflies and birds along the entire elevation gradient between 300-2200m and examined the rate of change in diversity along the elevation gradient to detect ecotones. Each of the three groups showed different patterns, with vegetation hotspots, as well as ecotones, found in areas that differ from those found for the animal groups, and especially for the birds. We conclude that due to different locations of richness hotspots and ecotones, when making conservation plans, each taxon should be studied in detail and cannot necessarily serve as an indicator for other groups if we aim to make wise conservation decisions.

### 139. HUMAN LAND USE THREATENS ENDEMIC WETLAND SPECIES: THE CASE OF CHORTHIPPUS LACUSTRIS (LA GRECA AND MESSINA, 1975) (ORTHOPTERA: ACRIDIDAE) IN EPIRUS, GREECE.

**KATI**, **VASSILIKI**, University of Ioannina, Greece; **Mani**, **Paraskevi**, University of Ioannina, Greece; **Von Helversen**, **Otto**, Friedrich-Alexander University of Erlangen-Nürnberg, Germany; **Willemse**, **Fer**, Netherlands; **Elsner**, **Norbert**, University of Göttingen, Greece; **Dimopoulos**, **Panayotis**, University of Ioannina, Greece

Chorthippus lacustris is an endemic grasshopper (Orthoptera) species in Epirus, Greece. Its population status, habitat characteristics, and relation to historical and current human land use are investigated. The species has a restricted and fragmented distribution pattern. Five locations, four within Pamvotida Lake basin and one in Lake Paramythia, cover a total of 0.12 km2. It is strongly dependent on wet grasslands, flooded on a seasonal basis. The greatest population density is recorded in the site with the greatest diversity of dominant plant species. Ch. lacustris is estimated to have lost 85-99% of its habitat during the last fifty years due to wetland drainage. The main threat to the species survival is further habitat loss by urbanization around Pamvotida Lake and by land conversion to agriculture in Paramythia Lake, even though both sites belong to the Natura 2000 network. The species status is Critically Endangered and it should be listed in Annex II of the Habitat Directive (92/43/EEC) as a priority species for conservation. Restoring wet grasslands, protecting them from further urbanization and drainage, and monitoring species population are the main measures proposed for its conservation.

### 140. NATURAL FOOD RESOURCES OF THE UNDERSTORY AFFECT THE UNGULATE BROWSING IN HUNGARIAN FORESTS

**KATONA**, **KRISZTIÁN**, St István University, Hungary; **Szemethy**, **László**, St István University, Hungary; **Bleier**, **Norbert**, St István University, Hungary; **Székely**, **János**, St István University, Hungary; **Nyeste**, **Mariann**, St István University, Hungary; **Fodor**, **Áron**, St István University, Hungary

In many European countries large herbivore-forest relationships causes conflicts between game and forest managers and nature conservers. Overpopulated red deer are named as primary factor for the forest damages. However, forest habitat improvement is hardly-considered as a solution against game damages. To describe the problem, availability of different plant forages and browsing on them by ungulates were seasonally investigated by sprig counting in the understory of five forested areas in Hungary. Biomass of available sprigs was also calculated. Our results show that natural food supply can reach 1500 and 3000 kg per ha during the vegetational period. Some species were generally preferred (e.g. locust, elderberry or blackberry), but many other plant species in the understory was also browsed. Proportion of the browsed sprigs was always between 0 and 10 percent, but in one area with very low forage availability this proportion was 35-50 percent. The highest browsing was found during the vegetational period not in winter. There was no strong relationship between the proportion of sprigs browsed and the local intensity of area use of ungulates. Our results show that browsing damages could be much more effectively reduced by establishing rich understory besides local red deer population control.

### 141. THE "PANNONIAN GROUP" OF THE BOTANICAL GARDEN, UNIVERSITY OF VIENNA: ITS POTENTIAL FOR ENVIRONMENTAL EDUCATION, EX-SITU CONSERVATION, LANDSCAPE ARCHITECTURE, AND HORTICULTURE

**KIEHN, MICHAEL,** Botanical Garden, University of Vienna, Austria; **Schumacher, Frank**, Botanical Garden, University of Vienna, Austria; **Stampf, Johann**, Botanical Garden, University of Vienna, Austria

The "Pannonian Group" of the Botanical Garden, University of Vienna, displays plants of dry area grasslands (Trockenrasen) in the north-east of Austria and gives an impression of these habitats. Often mistaken as waste land, such grasslands represent extremely valuable and diverse ecosystems. Due to a shift in their utilisation, e.g. from extensive cattle farming to intensive wine production, these ecosystems are now drastically altered and many of their indigenous species are threatened with extinction.
The group provides information about the ecology of these areas and explains the need of landscape and species protection. Thus it helps to create public awareness for these largely unknown vegetation types and their vanishing plants.
The setting of the group also is intended to give inspirations how to use elements of the dry area grassland vegetation in landscape architecture. In this context the documentation of experiences in the establishment and maintainence of the group is extremely valuable.
Each of the rare species displayed is cultivated from a documented single origin; all species can spread within the group. Thus small ex-situ-populations of several endangered species could be established, the seeds of which even could be used for re-introduction programs.

Based on such plant material, a project in collaboration with the University of Agriculture and the Federal School of Horticulture in Vienna has been started to evaluate the horticultural potential of "pannonian" species.
The scientific and horticultural expertice gained through the work with the Pannonian plants was base for the Botanical Garden´s participation in a monitoring, management and reintroduction project for threatened plant species of sandy and loamy dry area grassland in Lower Austria in 2002-2004. For 2006, a new “Life” project on limestone dry area grassland will start in Lower Austria, again with the Botanical Garden as partner.

### 142. PREDICTING INDIVIDUAL HABITAT CHOICES AND REGIONAL DISTRIBUTION OF WILDCATS (FELIS SILVESTRIS) ON LAND USE MAPS OF DIFFERENT SCALES

**KLAR**, **NINA**, UFZ Centre for Environmental Research, Department of Ecological Modelling, Germany; **Fernandez**, **Nestor**, Spain; **Kramer-Schadt**, **Stephanie**; UFZ Centre for Environmental Research, Department of Ecological Modelling, Germany**; Herrmann**, **Mathias**, Öko-Log Freilandforschung, Germany

To support the slow recovery of wildcat populations (Felis silvestris) in Germany detailed knowledge on habitat requirements is needed. Single locations of 13 wildcats from a radio-tracking study as well as presence/absence data for the whole area of Rhineland-Palatinate (Germany) were used to build habitat models on different scales and different landscape data. The coarse scale land use map CORINE was compared to a more detailed regional land use map (ATKIS). The models were built using generalised linear mixed models (GLMM) and generalised additive models (GAM) and were validated on telemetry locations of another 10 wildcats in a different area. Wildcat habitat choices are explained best by distance to forests, human settlements and watercourses. On the larger scale wildcats occur in areas with a high percentage of forest and a low percentage of artificial surfaces. For the radio locations the model on the fine-scale regional map performed better (AUC: 0.72) than the model on the Corine map (AUC: 0.66). Models on the presence/absence data performed equally well with both maps (AUC: 0.82).Our results suggest that coarse scale land use maps are suitable to predict potential wildcat occurrence on the large scale, but to predict habitat use to define corridors and find connections to unoccupied habitat patches a finer scaled land use map is needed.

### 143. REVISION OF BARN OWL (TYTO ALBA) CONSERVATION IN HUNGARY: IS EXTERIOR NEST BOX PROVISIONING THE MOST EFFECTIVE METHOD PROTECTING BARN OWLS?

**KLEIN**, **ÁKOS**, Eötvös Loránd University, Hungary; **Nagy**, **Tibor**, Hungarian Barn Owl Protection Foundation, Hungary; **Csörgő**, **Tibor**, Eötvös Loránd University, Hungary; **Mátics**, **Róbert**, Faculty of Medicine, University of Pécs, Hungary

The widely applied method of barn owl (Tyto alba) conservation in Europe is the placement of exterior nest boxes in church towers. Despite the usefulness of nest boxes, there are several studies showing that artificial nest site supplements can have many disadvantages. The main objective of the present study was to elucidate whether the type of nest-site provisioning (nest box vs. open church tower) causes any difference in survival of the barn owl. We used survival time analysis (STA), which showed that owlets developing in nest boxes had significantly lower survival than those hatched in church towers. This difference was remarkable after the parent dependent period of the life history. Since barn owl conservation largely depends on the support of building owners, we verified the conservational force of our findings with a survey of churchmen’s attitude, which showed that 63% of the questioned people supported the reopening of the church against nest box installation. Based on these results we offer some alternative methods (e.g. partial reopening), which may better meet both the owls’ and churchmen’s requirements. We recommend similar revision of other endangered species to get feedback on the methods, whether any modifications are needed.

### 144. WHY IS CURRENT PARADIGM FAILING TO STOP INSECT EXTINCTIONS IN CENTRAL EUROPE?

**KONVICKA, MARTIN**, Institute of Entomology, Czech Academy of Sciences, & School of Biological Sciences, University of South Bohemia, Czech Republic; **Cizek, Lukas**, Institute of Entomology, Czech Academy of Sciences, & School of Biological Sciences, University of South Bohemia,Czech Republic; **Fric, Zdenek**, Institute of Entomology, Czech Academy of Sciences, & School of Biological Sciences, University of South Bohemia, Czech Republic

Overview of biotope associations of insect taxa considered as extinct in several countries of Central Europe point to a massive failure of conservation policy. A majority of extinctions affected species of early seral biotopes (barren soils, rocks, steppe grasslands) and sparse traditionally managed woodlands. These biotopes had long been considered "unnatural", in contrast to such biotope types as close-canopy woodlands, wetlands or later-successional grasslands. They are underrepresented in systems of protected areas. If reserves exist, they protect isolated remnants, often uniformly managed, instead of trying to restore more viable networks characteristic for historical landscapes. The extinctions are accelerating despite increases in conservation funding unprecedented in human history. Majority of the funds tend to be misallocated to such projects as afforestation, maintenance of low-value agricultural biotopes, or general “greening” of landscapes, rather than to (much cheaper) restoring of priority biotopes. Main legal obstacles include powerful forestry and "soil preservation" interests, whereas the main social obstacle seems to be a view that nature equals trees, deeply ingrained in public consciousness. The ongoing losses of European biodiversity cannot be reverted without a substantial policy change.

### 145. CONSERVATION OF BIODIVERSITY IN THE LARGEST FLOODPLAINS AND LOWLAND MIRES IN EUROPE: THE PRYPIAT RIVER REGION (BELARUS AND UKRAINE)

**KOZULIN, ALEXANDER**, Institute of Zoology NAN Belarus, Department: Ornithology, Belarus; **Belyakova**, **Olga**, Minisrty of Nature of Belarus, Belarus

Polesie is a unique biogeographical area covering mainly the south of Belarus and northern Ukraine and characterized by specific geological, morphological and hydrological features. In spite of the large-scale drainage, there are sections of fens, broad-leafed forests and meadows that still remain in their natural condition. Analysis of distribution of European threatened species (Greater Spotted Eagle, Great Snipe, Black-tailed Godwit, Aquatic Warbler) evidences that the most important breeding habitats of the species are located on the protected areas in the trans-boundary area between Belarus and Ukraine. The habitats are threatened by disturbance of the hydrological regime, overgrowing of the mires and meadows with shrubs, non-sustainable use. To ensure conservation and sustainable use of the trans-boundary areas an Agreement on Cooperation for Environmental Rehabilitation of the Dnieper Basin has been concluded, a Strategic Action Program and Regional Biodiversity Conservation Strategy have been elaborated, management plans for key areas have been prepared and are being realized. At present an Agreement on Management Procedure for Trans-Boundary Areas between Belarus and Ukraine is being prepared. As a result a legal framework for elaboration and realization of joint management plans for trans-boundary areas will be created.

**146. FISH PASSAGE USE AND MOVEMENT BEHAVIOUR OF THE ENDANGERED BULHEAD (*COTTUS GOBIO*): IMPLICATIONS FOR CONSERVATION**

**KNAEPKENS**, **GUY**, University of Antwerp, Belgium; **Maerten**, **Evelien**, University of Antwerp, Belgium; **Verheyden**, **Yves**, University of Antwerp, Belgium; **Eens**, **Marcel**, University of Antwerp, Belgium

Despite the increasing recognition that instream movement probably represents an important aspect of the ecology of many stream fish populations, there is still limited and often conflicting information on the movement behaviour of a wide range of fish, especially species that are threatened and/or with no economic interest. Consequently, a better insight in the movement behaviour of these species is necessary to fully understand their biology and also to develop sound conservation strategies. The goal of the present study was therefore to assess the movement behaviour of the bullhead (Cottus gobio), a benthic fish species listed in Annex II of the EC Habitat Directive, using mark-recapture methodology. Specific objectives were to examine the degree of residency and movement, the temporal variation in movement behaviour and the ability to pass fishways. Major results include the observation that bullhead populations consist of both stationary and mobile individuals, seasonal differences in movement behaviour varies between study sites and fishways are ineffective due to excessive water velocities. Consequently, to effectively conserve this endangered species, fisheries managers should consider sufficiently large areas of habitat as critical to bullhead populations, minimise the impact of physical barriers on movement and construct effective fish pass facilities.

**147. ENHANCING DIVERSITY OF FORBS AND POLLINATORS IN INTENSIVELY MANAGED AGRICULTURAL LANDSCAPES; THE ROLE OF REMAINING HIGH QUALITY HABITATS**

**KOHLER**, **FLORIAN**, EPFL, Swiss Institute of Technology, Switzerland; **Verhulst**, **Jort**, Wageningen University, Netherlands; **Van Klink**, **Roel**, Wageningen University, Netherlands; **Kleijn**, **David**, Wageningen University, Netherlands

The aim of this study was to evaluate the effects of nature reserves on the biodiversity of ditch banks embedded in intensively managed agricultural landscapes. In the Netherlands, we selected 4 nature reserves that formed small islands in landscapes dominated by agriculture. Next to each reserve we selected two straight ditches that were perpendicular to the border of the nature reserve. On one side of the ditch we established a transect of 300 m subdivided into 12 plots. In each plot we recorded the forbs, counted the number of inflorescences and caught bees and hover flies during three survey rounds. We also measured insect pollination by evaluating the reproduction success of experimental self-incompatible plants placed at increasing distances from the reserves. We observed a clear decline of plant and hover fly species along the transect up to 100 and 200 m respectively. The number of seeds per flower showed a significant decrease with the distance to the nature reserve. We conclude that high quality habitats increase the potentials for colonization in species poor agricultural landscapes. Thus, in simple landscapes agri-environment schemes focussed on biodiversity conservation will be more effective when implemented very close to high quality habitats.

**148. WHY DO SO FEW WOLVES DISPERSE FROM FINLAND TO SCANDINAVIA?**

**KOJOLA**, **ILPO**, Finnish Game and Fisheries Research Institute, Finland

Finnish wolf population increased annually by 18% from 1996 through 2005 but is still fairly small (200) and strongly concentrated in the east-central part of the country. Most of the 82 wolves collared in east-central Finland dispersed from their home territory but none of them moved to Scandinavia where wolf population is rooting from 3 founders and is suffering from severe inbreeding. We examined details of the dispersal behaviour by using GPS transmitters. Our results suggested two factors decreasing dispersal to Scandinavia. The first of them concerns the timing of dispersal and animals that move to the coast of Botnian Bay that is located between Finland and Scandinavia: most wolves depart their home territories in spring and settle down before the Bay gets frozen in the next winter to enable moving over the ice. Secondly, harvest in the north where wolves cause considerable depredation in semi-domesticated reindeer herds probably decreases dispersal to Scandinavia; none of the 7 collared wolves having their destination in the reindeer management area succeeded in reproducing while in other destinations most dispersers were successful.

**149. EFFECTIVENESS OF NOVEL MANAGEMENT PRACTICES AND RESTORATION ACTIONS IN PROMOTING THE POPULATIONS OF THREATENED FOREST SPECIES**

**KOUKI**, **JARI**, University of Joensuu, Finland

Saproxylic species constitute numerically the largest forest-dwelling species group currently threatened in Fennoscandia. We analysed availability of habitats in landscape (12000 ha), including protected (10%) and managed (90%) forests, in eastern Finland under different management scenarios and assessed the efficiency of conservation actions. All the threatened and NT species were first classified according to their habitat requirements. 27 species groups were formed. The long-term (60 years) availability of habitat was analysed with stand-level forest simulator. Habitat availability for many groups will improve within the next decades. The future, however, will be heavily dependent on species group: those that can breed only in the large diameter trunks with advanced decay are likely to remain at low levels. Further, species associated with pine and birch are predicted to face a brighter future than species associated with spruce or aspen. The conservation can be efficiently improved with only small economic losses and management modifications: by reducing the value of timber production with ca. 6%, there is a long-term possibility for ca. 40% increase in habitat availability for the species. Not all the species, however, will be saved with these investments, and more extensive conservation area network is also needed to promote all the threatened and NT saproxylic species.

**150. COUPLING LANDSCAPE STATIC AND POPULATION DYNAMIC MODELS TO STUDY REINTRODUCTION SCENARIOS – THE CASE OF THE EURASIAN LYNX IN GERMANY**

**Kramer-Schadt**, **Stephanie**, UFZ Centre for Environmental Research, Germany; **REVILLA**, **ELOY**, Estacion Biologica de Donana, Spain; **Wiegand**, **Thorsten**, Germany; **Breitenmoser**, **Urs**, Switzerland

Currently there are several reintroduction programs of wildlife species in progress, e.g., for the Eurasian lynx in Germany. To assess whether the single patches are suitable to host viable populations, we first developed a landscape map of Germany by means of logistic regression from field data. This map is dividing the landscape with a 1km2 resolution in four different habitat classes: (1) unsuitable, (2) matrix, (3) suitable for dispersal and (4) suitable for reproduction. We then introduced a dynamic simulation model describing the probability of a dispersing animal reaching another suitable patch in complex heterogeneous landscapes. This dispersal module was calibrated with field data from dispersing lynx. Third, we combined the dispersal module with a demographic module to predict viability and colonisation success of the populations in the different patches and to give guidelines for species reintroductions. The demographic module used published information on lynx life history. The results indicated that in

principal a viable population is possible in Germany, but that the source patches are not interconnected except along the German Czech border. The survival rate of adults with territories was the most sensitive parameter. Increase in dispersal habitat had less effect on patch connectivity than reducing road mortality.

### 151. POPULATION TRENDS OF ORTHOPTERA IN NORTHWESTERN GERMANY

**KRAUSE**, **SASCHA**, University of Osnabrück, Germany; **Hochkirch**, **Axel**, University of Osnabrück, Germany

The loss of biodiversity is a major problem of modern times. While long-term population trends of many species are rather well documented, knowledge about recent trends of populations is only available for higher taxa, such as birds or larger mammals. It has been proposed that endangered species have been declining in Central Europe until they reached a stable level of low abundance at the end of the 20th century. Hence, recent population trends have become an important criterion for red list assignment. However, data on mid-term population trends of insects are sparse. Here we present an analysis of mid-term population trends of Orthoptera in northwestern Germany (Lower Saxony, Emsland). In the year 2005 we repeated a mapping project of Orthoptera of 1986. 150 study sites were monitored for changes in Orthoptera assemblages. Our results show that rare species have still been declining, while some common species have spread. This results in a higher similarity of species composition across the study sites. Main factors promoting such changes were habitat loss due to changes in land use, eutrophication and succession. Positive population trends of rare species were found only in nature reserves.

### 152. CONSERVATION GENETICS OF A CHARISMATIC GIANT, CIRCELLIUM BACCHUS, IN SOUTH AFRICA

**KRYGER**, **UTE**, University of Pretoria, South Africa; **Behrends**, **Dieter**, Martin-Luther-University Halle-Wittenberg, Germany; **Scholtz**, **Clarke**, University of Pretoria, South Africa

The large, flightless dung beetle, Circellium bacchus, is rare and endangered and therefore the target of conservation plans (including translocations). This study investigates the genetic structure among beetles from the twelve known localities by sequencing 545 base pairs of the mitochondrial cytochrome oxidase I gene. Sequence data of 42 specimens identified 38 different haplotypes (haplotype diversity of 0.997, and nucleotide diversity of 0.05822). Phylogenetic analyses in PAUP resulted in five distinct mitochondrial lineages. The sequence divergence between the population from Addo Elephant National Park (AENP) and all the other populations was 10 to 14 %, in the range of divergences commonly found among sister species in Coleoptera. AMOVA analysis in Arlequin confirmed the deep division between the AENP population and all the remaining populations (highly significant FST = 0.85). The remaining four populations diverged less than 8 % from each other and the divergence within populations was 0 to 4 %. Results of a Nested Clade Analysis determined allopatric fragmentation as the major factor forming the genetic structuring within this species. Reciprocal monophyly of the two major clades (bootstrap supports of 98-100%) suggests they should be managed separately as evolutionarily significant units – translocations should not be undertaken across this divide.

### 153. URBANIZATION AND HOMOGENIZATION - COMPARING THE FLORAS OF URBAN AND RURAL AREAS IN GERMANY

**KÜHN**, **INGOLF**, UFZ - Centre for Environmental Research Leipzig-Halle, Germany; **Klotz**, **Stefan**, UFZ - Centre for Environmental Research Leipzig-Halle, Germany

The process of urbanization has resulted in an expansion of alien plant species and declines of native species, in particular already rare species. These processes may cause a greater similarity between different urban regions, i.e. biotic homogenization. We explored the relationship between urban regions and homogenization for plant species in Germany focusing on selected groups of natives and aliens. We used the database FLORKART for species distribution on a 6 minutes latitude x 10 minutes longitude (c. 130 km²) scale. We calculated mean similarities for the 60 “most urbanized” cells. We then resampled 60 randomly drawn “less urbanized” cells and 60 “rural” cells and compared these results to the “most urbanized” cells taking distance effects into account. Urbanization does not have an overall effect on homogenization of all species, but native species as well as pre-1500 alien plant assemblages show effects of homogenization while post-1500 alien plant assemblages show the opposite effect. On a regional scale, urbanization is not unequivocally related to homogenization. Therefore, specific management of urban reserves has to take this fact into account.

### 154. BEHAVIOUR OF EU WATER FRAMEWORK DIRECTIVE PRIORITY SUBSTANCES AND MAIN POLLUTANTS IN FRESHWATER ECOSYSTEMS

**KUTICS, KÁROLY,** R&D Consulting Ltd.and Environmental Advisor to the Association of Civil Organizations of Lake Balaton, Hungary

Importance of understanding of the behaviour of synthetic chemicals in the ecosystem and their effects on living organisms including humans is being recognized since the publication of Rachel Carson’s “Silent Spring”. The European Union formulated the Water Framework Directive (WFD, Directive 2000/60/EC) with the ultimate aim to eliminate priority hazardous substances from aqueous ecosystems. Seriousness of the issue is indicated by the fact that the list of priority substances (LPS) could be agreed upon more than a year after WDF came into effect, through a painstaking process (Decision No 2455/2001/EC of the European Union and the Council of 20 November 2001). Constituting Annex X of WFD, the LPS contains 33 individual chemical substances or groups of such substances.
In this presentation, LPS chemicals showing endocrine disruption activity, such as nonylphenols and related compounds are discussed. Emergence and behaviour of their precursors and their environmental transformation and fate are studied. A fate model of nonylphenol polyethoxylates is introduced and results of simulation of a model implemented in Stella Research ecological modelling language for a small shallow lake (Lake Teganuma) are presented. Model calibration was based on laboratory and field survey data, and it can assist the evaluation of water management decisions.

### 155. DEVELOPING AND TESTING A MODEL FOR PRIORITIZING FAUNA SPECIES FOR CONSERVATION ACTION: A CASE STUDY OF THE EUROPEAN ALPS

**LABORDERIE**, **ALISON**, University of Kent at Canterbury, France

Focusing on the fauna of the European Alps, this study attempts to develop and test a method for identifying priority species for conservation action using ecological, social and economic criteria. It develops a protocol that incorporates Freitag and van Jaarsveld’s model for prioritization based on ecological values while adding indices developed to prioritize species based on social and economic values. In testing the model an overall priority score was calculated for fifty-two Alpine fauna species by averaging scores across the three priority indices. This paper reports the outcomes of applying the model, critically assesses the value of its different components, and argues that despite some drawbacks, it does provide a useful basis for developing a more sophisticated means for identifying priority species based on ecological and socioeconomic parameters. It also maintains that if this or other models are to be applied consistently in practice such that conservation targets species of high

ecological, social and economic value, then further research must be undertaken to provide the necessary input data and to refine and give credibility to prioritization protocols.

### 156. THE USE OF SPIDER AND CARABID BEETLE ASSEMBLAGES FOR HABITAT EVALUATION AND RESTORATION MANAGEMENT ALONG A LOWLAND GRAVEL RIVER (INTERMEUSE, BELGIUM)

**LAMBEETS**, **KEVIN**, Ghent University, Belgium; **Maelfait**, **Jean-Pierre**, Institute of Nature Conservation, Belgium; **Bonte**, **Dries**, Ghent University, Belgium

Gravel banks can be considered as highly dynamic biotopes due to flooding and shifting local habitat characteristics. They enclose a typical spider and carabid beetle fauna. Along the Intermeuse an ambitious nature-restoration project, conform the “LivingRiver” concept, is carried out since 1995. By means of pitfalls, gravel banks were sampled in order to investigate how assemblages of spiders (Araneae) and carabid beetles (Carabidae) are structured as influenced by local habitat characteristics (size, vegetation cover, substrate structure, degree of isolation), surrounding land-use and flooding disturbance. Data analysis reveals important local environmental properties and landscape ecological features that relate to species occurrence patterns. Riparian spider species occur on gravel banks with specific characteristics, whereas stenotopic carabid beetles are found all along the river trajectory. Ecological indicators with regard to conservation purposes and river ecosystem management are identified. Data from the onset of the large-scale restoration is compared with recent data. In order to obtain a high degree of local and regional heterogeneity throughout the river system, both dynamic and more elevated gravel banks should be preserved. This will allow for an increase of riparian arthropod biodiversity and the expansion of specialist species along the Intermeuse.

### 157. ASSESSING ENVIRONMENTAL EFFECTS OF GENETICALLY MODIFIED CROPS: GUIDELINES FOR A POST-RELEASE MONITORING OF BUTTERFLIES AND MOTHS

**LANG, ANDREAS**, University of Basel, Institute of Environmental Geosciences, Switzerland; **Berhorn, Frank**, Bundesamt für Naturschutz, Fachgebiet I 1.3 Monitoring, Germany; **Seitz, Heike**, VDI-Kompetenzfeld Biotechnologie, Germany

The monitoring of genetically modified organisms (GMOs) after deliberate release is essential in order to assess and evaluate possible adverse environmental effects. The legislative framework of the European Community based on the EU Directive 2001/18/EC requires post-release surveillance of any GMO placed on the market and released into the environment, including a detailed monitoring plan. So far, required contents and design of surveillance plans for a monitoring of the biodiversity are neither notified nor specified. Two transgenic Bt maize events are already registered for cultivation in Europe, and especially large-scale growing of Bt maize may have negative consequences for (protected) butterflies and moths (Lepidoptera). Therefore, an expert commission on behalf of the German Federal Agency for Nature Conservation (BfN) and The Association of German Engineers (VDI) is currently developing technical guidelines for the design and execution of a monitoring scheme for Lepidoptera according to the EU Directive 2001/18/EC. These guidelines will be presented, and we will report and evaluate (i) the suitability of Lepidoptera as indicators, (ii) the selection of focus species and developmental stages, (iii) and the technical and scientific requirements for the conduct of the monitoring procedure including sampling area selection and design as well as sampling intervals and methods.

### 158. IDENTIFYING PRIORITY AREAS FOR BIODIVERSITY CONSERVATION: ON THE USE OF SPECIES FROM A SINGLE TAXON AS INDICATOR

**LARSEN**, **FRANK WUGT**, University of Copenhagen, Institute of Biology, Center for Macroecology, Denmark; **Bladt**, **Jesper**, University of Aarhus, Department of Systematic Botany, Denmark

Since information on biodiversity is scarce, indicators are needed to guide the identification of priority areas for biodiversity conservation. Often priority areas for conservation have been identified based on data on a single taxon, e.g. birds, which are assumed to act as an indicator for overall biodiversity. Here we test various aspects of the effectiveness of this approach by using three data sets on the distributions of species in Denmark (847 spp.), Uganda (2799 spp.) and sub-Saharan Africa (4039 spp.), respectively. Firstly, we evaluated the performance of single taxon groups (e.g., birds, butterflies, orchids etc.) as indicators compared to groups composed of randomly chosen species (rather than solely comparing with random area selection). Our results reveal that indicator groups composed of random sets of species among the various taxa perform significantly better than most of the groups based on a single taxon. Secondly, since data on birds are more readily available they will often in practice serve as indicators. Thus, we examined to what extend data on birds can be supplemented with data on other taxa to improve indicator performance. We demonstrate that supplementing bird data with data from other taxa can considerably improve indicator performance.

### 159. A MODEL TO TEST THE EFFICIENCY OF MANAGEMENT SCENARIOS ON ACONITUM NAPELLUS, A FRENCH ENDANGERED SPECIES

**LE CADRE**, **SOLENN**, Conservatoire Botanique National du Bassin Parisien, Muséum National dHistoire Naturelle, France; **Gauduchon**, **Mathias**, Ecole Normale Supérieure, France; **Moret**, **Jacques**, Conservatoire Botanique National du Bassin Parisien, Muséum National dHistoire Naturelle, France; **Machon**, **Nathalie**, Conservatoire Botanique National dHistoire Naturelle, Muséum National dHistoire Naturelle, France

Aconitum napellus L. subsp. lusitanicum is a rare and protected Ranunculaceae in the Parisian region. It occurs in lowland along rivers. It can be found only in a few number of remnant populations. Its important regression is certainly due to wet zone drainage in France. It can reproduce both sexually through seed production and asexually through the formation of rhizomes. Flowers were pollinated mainly by bumblebees. We analyzed free pollinations and manual pollen supplementation. Results showed that manual pollinations were always more efficient than pollinator ones and especially in the low density patches. In the natural populations, low density patches and isolated patches were pollen-limited (component Allee effect). Moreover, plants that were not or poor pollinated invested more in vegetative reproduction. A model including genetic and demography was developed to better understand the impact of clonal reproduction favored by an Allee effect on population viability. It was also used to test the efficiency of two management scenarios – (1) reinforcement of existing patches and (2) creation of relay patches. Results showed that the creation of relay patches had no significant impact of the extinction probability, whereas the reinforcement of existing patches delay significantly the population extinction.

### 160. GENETIC EVALUATION OF RESTORATION OF THE GRIFFON VULTURE POPULATIONS IN SOUTH OF EUROPE

**LE GOUAR**, **PASCALINE**, UMR5173 MNHN, CNRS, UPMC species conservation, restoration and monitoring of populations, France; **Rigal**, **Fabienne**, UMR5173 MNHN, CNRS, UPMC species conservation, restoration and monitoring of populations, France; **Sarrazin**, **Francois**, UMR5173 MNHN, CNRS, UPMC species conservation, restoration and monitoring of populations, France; **Boisselier-Dubayle**, **Marie Catherine**, UMR 7138 IRD, UPMC, MNHN, CNRS Systématique, Adaptation, Evolution, France; **Hatzofe**, **Ohad**, Science & conservation, Israel nature & parks authority, Israel; **Susic**, **Goran**, Ornithological station cres, Institute of Ornithology, Croatia; **Samadi**, **Sarah**, UMR 7138 IRD, UPMC, MNHN, CNRS Systématique, Adaptation, Evolution, France

The importance of genetic processes on the success of population restoration through reintroduction is often discussed but accurate data remain scarce because it requires replicates and long term post release genetic monitoring. We examined genetic data from a network of native and reintroduced Griffon vulture (Gyps fulvus) populations successfully restored in Southern Europe. Using microsatellite markers, we investigated genetic diversity and structure of three native colonies and estimated recent gene flow among them. We then estimated genetic diversity and effective size of one settled reintroduced colony and its connections with native populations. We also assessed the impact of the random choice of founders among native populations on the genetic variability of four founding groups. We found a high genetic diversity in Griffon vulture populations with no difference between native and reintroduced ones showing the effectiveness of the random choice strategy. Results of genetic differentiation tests showed that, formerly, populations constituted one genetic unit. However, we detected that native populations have been recently fragmented. By analyzing effective size trend with time and gene flow into reintroduced population, we suggested that immigration rate was a key factor of its success.

### 161. LESSONS FROM RED DEER POPULATION INCREASES IN HUNGARY

**Lehoczki**, **Róbert**, Szent István University, Hungary; **CSÁNYI**, **SÁNDOR**, Szent István University, Hungary; **SZEMETHY**, **LÁSZLÓ**, Szent István University, Hungary

Red deer numbers increased dramatically throughout Europe over the last century. Part of the increase results from deer management practises but environmental changes also contributed to increasing numbers/range of deer. We analyse the patterns of population change of red deer in Hungary based on game management statistics. Our results reveal the complex relationships among the increase of available deer habitats, contradicting management startegies, slowly changing attitudes, and overregulation of management. We underlie three important elements of the system: (1) In recently afforested areas red deer populations can increase exponentially, depending on the increase of available habitats and resulting in considerable range expansion in non traditional deer areas. (2) As a consequnce of population underestimates, harvest growth rates are consistently lower than necesery to halt the growth process. (3) To manage this situation the cultural aspects of management should be changed and application of new knowledge needs to be accelarated. In the next decades low productivity lands will be afforested and forest cover will increase from 20% to around 27%. As these lands become deer habitats, deer populations can incerease at a rate of 1 deer / km2. If managed well red deer can be an important natural resource for these areas but mismanagement will make deer a pest requiring control.

### 162. HOME SWEET HOME: GENERALITY OF LOCAL ADAPTATION IN PLANTS AND IMPLICATIONS FOR CONSERVATION

**LEIMU**, **ROOSA**, University of Potsdam, Germany; **Fischer**, **Markus**, University of Potsdam, Germany

Environmental variation between plant populations may lead to differential selection and therefore to local adaptation. However, while some experimental plant studies report local adaptation, others do not. Moreover, the factors underlying differences in the occurrence and strength of local adaptation are not clear. Understanding local adaptation matters for conservation in the contexts of defining units of conservation, and of selecting plant material for restoration and for replenishing existing populations. We examined the generality of local adaptation and whether it is affected by different habitat, population, plant, and study characteristics with meta-analysis covering 37 published studies of 31 species based on 1200 pair-wise home-away comparisons. Overall, there was strong significant evidence for local adaptation. Its strength was independent of the particular measure of plant performance, of plant mating system, of longevity, and methodological approach. On average, local adaptation was also independent of the distance between populations, while variation in local adaptation was much higher at short distances. We conclude that local adaptation is general in plants. Moreover, as variation in habitat type appears to influence the strength of adaptation more than transplanting distance, local adaptation cannot be neglected in conservation even when considering short distances between populations.

### 163. MODEL-BASED SAMPLING HELPS DETECT POPULATIONS OF RARE SPECIES

**Le Lay**, **Gwenaelle**, University of Lausanne, Switzerland; **Franc**, **Erika**, University of Lausanne, Switzerland; **Engler**, **Robin**, University of Lausanne, Switzerland; **Guisan**, **Antoine**, University of Lausanne, Switzerland

Preservation of rare species is a central issue, but accurate data on their distribution and ecology can be paradoxically scarce. Predictive models of species distribution are tools with the potential to enhance our capacity to detect new populations of rare species in the field. We developed a multi-resolution approach combining several modelling methods and data sets. Field work provided an independent validation dataset for evaluating the models. We tested this approach on three endangered alpine plants and five common species as controls. We studied a mountain landscape, which varied strongly in topography, climate, and land use. We show that species occurrence largely coincides with areas predicted to have suitable habitat and abiotic conditions. The model-based sampling was particularly successful for one rare species, for which six new populations were found. This approach can be reiterated by conducting additional modelling and field steps, which we have theoretically demonstrated to successively improve model accuracy. We conclude that model-based sampling can assist conservation planning by focusing effort and improving survey results.

### 164. CHAMOIS (RUPICAPRA RUPICAPRA) IN THE RODNEI MOUNTAINS NATIONAL PARK AND BIOSPHERE RESERVE (ROMANIA)

**LENGYEL**, **PETER**, UNESCO Pro Natura, Romania

Chamois (Rupicapra rupicapra) represents an emblematic species of high mountains, being a symbol in the Carpathians. Populations of this species are isolated in specific habitats, and they are very vulnerable in front of aggressive human interventions like poaching. At the World Hunting Exhibition in Vienna (1910) the world trophy of chamois was from Rodnei Mountains. Poaching after the World War I produced a fast decrease, and the population of the Rodnei Mountains got extinct probably in 1924. Reintroduction between 1964 and 1970

was a big success. In 1990 in the Rodnei Mountains National Park and Biosphere Reserve there was a population of about 600 exemplars. After the changes in 1989, the state authority was diminished, poaching by very rich and very poor people in the Wild Capitalism produced a new disaster, reducing in 15 years the number of chamois to less then 10 %, more that 90 % being lost. The authorities were hiding the real situation, but we (UNESCO Pro Natura) have organized the first evaluation of a population, where environmental NGO representatives have cooperated with the forest and hunting authorities. We have published a brochure, and we had a large media presence in newspapers, radio and in the national TV, to attract attention on the situation and to help the survival of the chamois in Rodnei Mountains and other places in the Romanian Carpathians.

### 165. MAN-MADE HABITATS AS ECOLOGICAL TRAPS FOR PIED AVOCETS: GOOD NESTING SITES MAY BE BAD FOR CHICK-REARING

**LENGYEL**, **SZABOLCS**, HAS-UD Evolutionary Genetics and Conservation Biology Research Group, Hungary

Ecological traps are increasingly suspected to operate in many human-altered landscapes. I studied the breeding biology of Pied Avocets (Recurvirostra avosetta) in natural habitats (alkaline lakes) and in semi-natural sites (drained fishpond, reconstructed wetlands) in S Hungary to identify potential ecological traps. Colonies were initiated earlier and hatching success was higher in semi-natural sites than in natural habitats. However, most pairs hatching young in semi-natural sites tried to lead their brood to natural habitats, whereas no such movement occurred in the opposite direction. Chick mortality was high during brood movements and only 23% of the pairs moving their young produced fledglings, compared to 43% for pairs remaining in semi-natural sites and 68% for pairs hatching and rearing young in natural habitats (total n = 192 broods). The results show that semi-natural sites were more suitable for nesting, whereas natural habitats were more suitable for chick-rearing. The contrasting trends suggest sub-optimal habitat selection by Pied Avocets due to a possible mal-assessment of the potential for successful reproduction of semi-natural sites, which may thus function as ecological traps. Future habitat restoration projects to benefit shorebirds should focus on enhancing mosaics of natural and semi-natural habitats in proximity to one another.

### 166. THREATENED ADAPTATIONS IN GRASSLAND HABITATS

**LENNARTSSON**, **TOMMY**, Swedish University of Agricultural Sciences, Sweden

Open grasslands are kept free of shrubs and trees by stress or regular disturbances, such as grazing. Hence, plants in grassland habitats need to be adapted to the disturbances, for example by defense or tolerance traits. Herbs of the genus Gentianella show several such traits, and the adaptations are essential determinants of population viability. By manipulating both the environment (by changing the disturbance regime) and the phenotypic material (by transplantation experiments) I show how inbreeding and outbreeding depression are related to the evolution and maintenance of adaptations to the grassland environment. During the evolutionary process, the plants are subject to strong outbreeding depression, leading to selection for selfing. Once the adaptation is fixed enough in the population, the costs of inbreeding depression exceed the costs of outbreeding depression, leading to selection for outcrossing. If new phenotypes are introduced in well adapted, outcrossing populations, otbreeding depression occurs because the adaptations break down faster than they can be defended by the re-evolution of selfing. If, on the other hand, the environment changes, outcrossing populations survive better in the new environment, and adapt faster to it than selfing populations.

### 167. DETECTING ECOTONES OF MONTANE VEGETATION: A COMPARISON OF REMOTE SENSING, GIS AND FIELD APPROACHES AND THEIR IMPLICATIONS FOR CONSERVATION

**LEVIN**, **NOAM**, Ben-Gurion University of the Negev, Israel; **Shmida**, **Avi**, The Hebrew University of Jerusalem, Israel; **Levanoni**, **Oded**, The Hebrew University of Jerusalem, Israel; **Tamari**, **Hagit**, The Hebrew University of Jerusalem, Israel; **Kark**, **Salit**, The Hebrew University of Jerusalem, Israel

Ecotones, areas of environmental transition, have been suggested as indicator areas that could be effectively modeled and monitored for predicting future climate changes. As such, they may provide useful conservation targets. In this study we demonstrate how Landsat, Aster and QuickBird satellite images can be used to identify the ecotones between vegetation belts in Mount Hermon, Israel. In the spring of 2005, we sampled plants in 34 quadrats from 300 to 2,200m following Whittaker's sampling method. We calculated Normalized Difference Vegetation Index (NDVI) and additional vegetation parameters from 10 satellite images from different seasons. Plant richness and percent tree cover were both strongly correlated with NDVI spring values and with direct satellite estimates of tree cover (R2=85% for both). Three altitudinal vegetation belts were identified using the first derivatives of NDVI and estimates of the relative cover by isolated trees out of total tree cover derived from the Quick Bird image. The ecotones between them were located at 1,200 and 1,900m, corresponding with earlier field derived ecotones. Identifying ecotonal areas using remote sensing and GIS tools, and understanding relationships between biodiversity, NDVI and tree cover may thus provide a useful tool for conservation biologists.

### 168. POTENTIAL IMPACTS OF CLIMATE CHANGE ON THE DISTRIBUTIONS AND DIVERSITY PATTERNS OF EUROPEAN MAMMALS

**LEVINSKY**, **IRINA**, University of Copenhagen, Denmark; **Skov**, **Flemming**, National Environmental Research Institute, Denmark; **Svenning**, **Jens-Christian**, University of Aarhus, Denmark; **Rahbek**, **Carsten**, University of Copenhagen, Denmark

The Intergovernmental Panel on Climate Change (IPCC) predicts an increase in global temperatures of between 1.4 and 5.8C during the 21$^{st}$ century, as a result of elevated CO2 levels. As climatic changes have influenced the survival and geographic ranges mammals in the past, these are likely to be affected by future climatic changes as well. Using bioclimatic envelope models we evaluate the impact of climate change on the distributions and species richness of 120 native terrestrial non-volant European mammals under two of IPCC's future climatic scenarios. Assuming unlimited and no migration, respectively, our model predicts that 1% and 5-9% of European mammals will become extinct, while 32-46% and 70-78% will become threatened (lose >30% of their current distribution). Furthermore, species richness is predicted to become increasingly spatially autocorrelated, as well as to shift northeast-wards and towards increasing elevation. As non-climatic factors influencing species distributions, e.g. land-use, biotic interactions, human interference, dispersal and history, are not accounted for in bioclimatic envelope models, our results should solely be viewed as first approximations of the potential magnitude of future climatic changes, but they nevertheless emphasize the importance of considering these in conservation planning.

### 169. ROLE OF THE MATRIX IN CONSERVATION: AN OVERVIEW

**LIDICKER**, **WILLIAM Z.**, University of California, Berkeley, United States

The array of communities (biocoenoses) that surround focal patches of fragmented habitats (the matrix) can have major

impacts on the viability and character of those patches, and therefore on species of special conservation concern. In spite of this importance, the role of the matrix is often misunderstood and under appreciated. Moreover, useful modeling of community or species viability will depend on accurate understanding of matrix/fragment interactions. Outlined here (with examples) are various aspects of matrix influence on focal patch conservation, with emphasis on those that are often neglected: 1) dynamic aspects of matrix; 2) effects on connectivity among patches; 3) role of edges (ecotones) and edge effects; 4) the diverse influences on population dynamics of focal species; 5) role of exotics both within and between the patches; and 6) potential long-term evolutionary effects. Conservation efforts that pay insufficient attention to the matrix are unlikely to be successful.

### 170. CAN PALEOECOLOGY CONTRIBUTE TO FOREST CONSERVATION?

**LINDBLADH**, **MATTS**, SLU - Swedish University of Agricultural Sciences, Sweden

Almost all terrestrial conservation actions are, more or less explicit, based upon assumptions of the area's vegetational (or faunal) history. Often these assumptions lack a scientific fundament but are merely based upon a "general knowledge" of the regions historical vegetation. I here give example of how studies of a sites vegetational history can give insights important for conservation. Studies from Sweden show that previous human impacts can be underestimated or neglected in forests with a "virgin" appearance. A spruce swamp forest was considered as a fire refugium with long-term continuity, but pollen analyses showed that it was under extensive cultivation 500 years ago. Another pollen analysis from an old-growth beech/spruce forest in southern Sweden revealed that spruce and beech had only been present 200 and 400 years respectively. Dendrochronology showed that the transformation to beech/spruce from oak/pine largely was performed by man. Another study from Southern Sweden illustrates the great spatial and temporal variation that historically can occur also in relatively limited sized areas and over a limited period of time. These, and other paleoecological studies, show that the historical vegetational development in an area is highly dynamic and that concepts like "baseline conditions" or "natural vegetation" lack relevance.

### 171. CONSERVING LARGE CARNIVORES IN EUROPEAN LANDSCAPES: THE CHALLENGE AND OPPORTUNITY OF COEXISTENCE

**LINNELL, JOHN D. C**., Norwegian Institute for Nature Research, Norway

It always comes as a surprise to the public, and indeed to many biologists, that the crowded continent of Europe is actually home to thousands of large carnivores – and that the populations of many are actually expanding. This represents a considerable opportunity for achieving a major conservation victory in our own backyards – a victory with a high degree of symbolism. However, there are also considerable challenges with achieving this, as the required degree of coexistence can be elusive. Carnivore conservation requires three major elements – motivation, legislation, and knowledge – elements that combine to make up the "conservation triangle". The talks in this seminar.

### 172. IS HUNTING LARGE CARNIVORES COMPATIBLE WITH THEIR CONSERVATION?

**Linnell, John D. C**., Norwegian Institute for Nature Research, Norway; **Swenson, Jon E**., Norwegian Institute for Nature Research, Norway; **Huber, Djuro**, Veterinary Faculty, University of Zagreb, Croatia; **Ozolins, Janis**, State Forest Service, Latvia

The lethal control and hunting of large carnivores is highly controversial in Europe today. On one hand it is advocated as a way of reducing conflicts and empowering local people, as well as being regarded as a source of income due to the sale of trophies and the continuation of a long time tradition. Opponents on the other hand claim that it is not sustainable or compatible with their conservation. We examine a number of case studies from Europe – the case of lynx hunting in Norway, bear hunting in Croatia and Sweden, and wolf hunting in Latvia. Our results indicate that carnivore hunting can be compatible with maintaining or increasing population density, and that it can probably reduce, or at least limit, some conflicts. However, it is also clear that unregulated, or excessive hunting can rapidly reduce population size. There is also some concern about more indirect effects of harvest on population structure, demographics and life history traits that are worthy of greater attention.

### 173. CURRENT STATUS AND MORPHOGENETIC VARIATION OF TESTUDO HERMANNI TORTOISES IN MAINLAND FRANCE

**LIVOREIL**, **BARBARA**, SOPTOM, France; **Bertorelle**, **Gorgio**, University of Ferrara, Italy; **Perälä**, **Jarmo**, University of Helsinki, Finland; **Bour**, **Roger**, Museum National dHistoire Naturelle, France

Recent research advancements have resurrected Testudo hermanni Gmelin, 1789 as a true species (Perälä, 2002a, b, Bertolero & Cheylan 2004, Bour 2004). Current genetic studies confirm this differenciation, and pinpoint the genetic specificity of French (mainland) Hermann's tortoises compared to their Spanish and Italian congeners. Although so far no genetic variability has been reported for Hermann's tortoises within France (Blanc et al. 1988, Gmira 1993), important morphometric variation has been observed among wild animals brought to rescue centres or in those kept as pets. We compared mtDNA and STR sequences between Testudo hermanni populations within mainland France. Morphometric comparisons were run following the protocol of Perälä (2001), while implementing a general inventory of the species over its French area of distribution. Results confirm that the populations at the centre of the distribution are genetically related, but that remote populations differ significantly. Important morphometric variation also exist between populations. The protection of the genetic diversity of the species must consider conserving more remote populations than the metapopulation of the centre of the distribution area. Such results have important consequences for release programs, as the risks of inbreeding or genetic bottleneck will have to be balanced against possible outbreeding risks in isolated populations.

### 174. NON-LINEAR BIOTIC RESPONSES TO MICROHABITAT AVAILABILITY: DEFINING MANAGEMENT TARGETS FOR OLD-GROWTH STRUCTURAL ELEMENTS

**LÕHMUS**, **ASKO**, University of Tartu, Estonia

In temperate and boreal forests, old-growth structures (large trees, dead wood etc.) are key-elements for a large part of biotic diversity. In intensively managed landscapes, such structures can be maintained only if purposefully retained, but the numerical targets for the retention, and even methodology to find these targets, are far from clear. We searched for landscape-scale threshold values in biotic responses to microhabitat abundance by mapping old-growth structures, and by censusing lichens, bryophytes, beetles, butterflies and moths, and birds on random transects in a typical – seminatural, but extensively managed and structurally poor forest area in Estonia. Using non-linear regression between abundance of structural elements and biotic response variables (species richness, abundance, occurrence of particular species), we found more obvious threshold responses to the abundance of dead wood than cavity trees and windthrows, and in animals than in cryptogams. Though tentative targets for the retention of legacies could be derived from these analyses, their general applicability is unlikely, notably due to the case-dependent availability of refuge sites (other old-growth structures, fine woody debris, stumps).

### 175. DISRUPTION OF NATIVE SEED DISPERSAL SYSTEMS BY THE INTRODUCED ATLANTOXERUS GETULUS (RODENTIA: SCIURIDAE) IN A SEMIDESERTIC ISLAND (FUERTEVENTURA, CANARY ISLANDS)

**LOPEZ-DARIAS**, **MARTA**, Estación Biológica de Doñana (CSIC), Spain; **Nogales**, **Manuel**, Instituto de Productos Naturales y Agrobiología (CSIC), Spain

The disruption of native seed dispersal systems by an introduced squirrel has been studied in a xeric badland of Fuerteventura Island. The dispersal effect of this squirrel with a native and legitimate seed disperser, the endemic lizard Gallotia atlantica, and a known illegitimate seed disperser, the European rabbit (Oryctolagus cuniculus), has been compared. Consumption, digestive treatment and germination rate of defecated seeds for three native fleshy-fruited plants (Lycium intricatum, Rubia fruticosa and Asparagus pastorianus), as well as two others of unclear biogeographical origin (Messembrianthemum nodiflorum and Aizoon canariense) and a non-native plant (Opuntia maxima) were evaluated. Lizards frequently consumed seeds from fleshy-fruited plants and most seeds appeared well-preserved after digestion. The above mentioned mammals consumed practically all previously cited plants, although squirrels had a less pernicious effect on Messembryanthemum, Aizoon and Opuntia plants. Lastly, seed germination confirms that native plants were favoured by the endemic lizards, while seeds digestive treatment of both mammals produced a decrease in the germination rate. Seeds from the introduced plant (Opuntia maxima) were highly favoured by the squirrels. As a general conclusion, while this invasive squirrel plays a significant negative predatory role on native seed plants, it is an effective disperser of some introduced plants.

### 176. A REVIEW OF FIELD SURVEYS OF BIODIVERSITY IMPACTS OF GM CROPS – WITH SPECIAL REFERENCE TO EUROPE

**LÖVEI**, **GABOR**, Danish Institute of Agricultural Science, Denmark; **Arpaia**, **Salvatore**, ENEA – Research Centre Trisaia, Italy; **Szentkiralyi**, **Ferenc**, Plant Protection Institute, Hungary

Sixty-nine field studies, published between 1992- 2005, reporting on the impacts on biodiversity or on arthropod natural enemies of crop pests were surveyed and evaluated. The studies involved genetically modified lines of six plant species, and were conducted in eight countries of the world, mostly in the northern temperate region. Most studies were done on insect-resistant GM crops, and were on herbicide-resistant ones. A large number of studies (57%) was conducted on one location only, and at a small scale: 83% were on less than 1 ha plots. Replication in space and time was often insufficient. Landscape- or regional scale distribution of the crop was rarely described. For diversity evaluation, mostly species richness (=no. of species collected), and the Shannon index were used. Under these limitations, the impact on biodiversity is difficult or impossible to evaluate. The recent publication of a collection of field studies on Bt-expressing cotton and corn has opened the way to a more reliable knowledge of these agro-ecosystems. Among all the non-target arthropod species sampled, a few predators showed a significantly reduced abundance, while no effects were detected in terms of the overall natural predation. Generally, local factors seem to influence diversity more than crop type. Where proper comparisons are possible (e.g. the UK Farm Scale Evaluation), different arthropod groups show different reactions to agricultural operations related to GM crops.

### 177. ULTRA-RAPID RANGE SHIFTS OF BOREAL BUTTERFLIES UNDER THE RECENT CLIMATIC WARMING

**LUOTO, MISKA**, Thule Institute, University of Oulu, Finland; **Heikkinen, Risto K.,** Finnish Environment Institute, Research Department, Research Programme for Biodiversity, Finland; **Kuussaari, Mikko**, Finnish Environment Institute, Research Department, Research Programme for Biodiversity, Finland; **Pöyry, Juha**, Finnish Environment Institute, Research Department, Research Programme for Biodiversity, Finland

During the last 15 years northern Europe has faced a period of warming climate, characterised by a marked increase in spring temperatures. The changes in range margins of 51 butterflies was analysed from national butterfly atlas survey data for a 8-year period (1992-1996 to 2000-2004) for which the occurrence was recorded in 10 x 10-km$^2$ grid cells with a minimum occurrence of at least ten cells in both atlases. The change in range margin was statistically corrected for changes in species' distribution. For all species the expected range margin shift, if their distribution would not have changed was 62.6 km. However, species representing different groups show contrasting responses. Species that have moved most effectively polewards include mobile, tree-feeding as larvae, species with high prevalence, species which overwinter as adults and species with a (first) flying period in spring. Non-threatened butterfly species have shifted their range on average 86 km northwards, whereas threatened species had little success in colonizing new areas. This suggests that the recent warming in boreal regions has benefited only common, mobile generalist species for which food resources and suitable habitats are not restricted to sporadic locations in the landscape.

### 178. DESIGNING TARGETS AND INDICATORS FOR BIODIVERSITY CONSERVATION: WHAT SHOULD WE DO FOR 2010?

**MACE, GEORGINA M.,** Institute of Zoology, Zoological Society of London, UK.

Work to develop targets and indicators for the 2010 biodiversity target has highlighted two problems; first, that of selecting appropriate indicators, and second, that of identifying data sources that can reliably inform us about progress. Unfortunately, given the time available before 2010, there are serious constraints to gathering new data. So, how big are the compromises that must be drawn? I will begin by outlining the features of some ideal indicators and the processes that should be used to derive them. I will review the indicators available against these. For certain kinds of biodiversity measures, and at certain spatial scales, current data are far from ideal. What kinds of processes and should we now put in place to ensure that post 2010 we are in a stronger position to design, measure and achieve biodiversity targets?

### 179. DISTRIBUTION AND HABITAT OF FRESHWATER LARGE BRANCHIOPODS IN PORTUGAL

**Machado**, **Margarida**, CCMAR - Center of Marine Sciences, Portugal; **Cancela Da Fonseca**, **Luis**, IMAR, Portugal; **Sala**, **Jordi**, Institute of Aquatic Ecology, Spain; **Reis**, **Joâo**, CCMAR - Center of Marine Sciences, Portugal; **Alcazar**, **Rita**, Liga para a Proteção da Natureza, Portugal; **Beja**, **Pedro**, ERENA, Portugal; **CRISTO**, **MARGARIDA**, CCMAR- Center of Marine Sciences, Portugal

Most large branchiopod species inhabit exclusively temporary lentic ecosystems, and may be used, among others, as a key faunal group to assess the value of Mediterranean temporary ponds for conservation purposes. Here we present an updated inventory and distribution of freshwater large branchiopod species of Portuguese temporary ponds and their habitat associations in Central and Southern Portugal. Of a total of 259 sites surveyed (255 by us), 127 (49.0 %) presented at least one species of a total of 10 of the 11 species that have hitherto been

recorded in the country. Four freshwater taxa were previous known in the Portuguese branchiopod fauna (Streptocephalus torvicornis, Tanymastix stagnalis, Cyzicus grubei and Triops cancriformis mauritanicus), one (Lepidurus apus) was recently recorded in the North of the country and 6 new taxa were found during our surveys (Branchipus cortesi, Branchipus schaefferi, Chirocephalus diaphanus, Maghrebestheria maroccana, Tanymastix sp. and Tanymastigites sp.). The last two are new taxa to science. Two main associations emerge from species presence in ponds: (i) B. cortesi and T. stagnalis, and (ii) C. grubei, C. diaphanus and T. c. mauritanicus; the remaining species didn't present any association pattern. The main parameters influencing the species distribution are the variation range of pH, dissolved O2, turbidity, and plant coverage.

### 180. ALLEE EFFECT AND PLANT CONSERVATION

**MACHON**, **NATHALIE**, National Museum of Natural History, France; **Le Cadre**, **Solenn**, National Museum of Natural History, France; **Stoeckel**, **Solenn**, University Paris XI, France; **Bessa-Gomez**, **Carmen**, National Agronomy Institute, France

The Allee effect, a positive relationship between density and growth rate observed in some populations, implies that small or low density populations exhibit a negative growth rate and are doomed to extinction. In contrast, above a certain threshold population size, populations can persist. Identifying Allee effects and estimating this specific threshold is thus of prime importance in conservation biology. Because Allee effect is likely to occur when conspecifics play an important role in ensuring survival or reproduction of an individual, recent research has focused mainly on animal systems. We show many examples illustrating that Allee effects are equally likely to impact plant populations, as many of the animal behavioural mechanisms involved in the Allee effect have their counter-parts in plants. For example, plants offer some of the clearest examples of Allee effect due to breeding limitation. Other processes like predator dilution, resource defence or collective improvement of the environment can also occur. In many cases, a good characterization of the Allee effect in endangered plant populations helps to the definition of efficient restoration plans.

### 181. METAPOPULATION PERSISTENCE OF FIVE THREATENED INVERTEBRATES IN A HIGHLY FRAGMENTED DUNE LANDSCAPE: A MULTISPECIES CONSERVATION APPROACH

**MAES, DIRK**, Research Institute for Nature and Forest, Belgium; **Bonte**, **Dries,** Ghent University, Department of Biology, Unit of Animal Ecology, Zoogeography and Nature Conservation, Belgium

We analyzed the metapopulation persistence of five threatened invertebrates in a highly fragmented blond and grey dune landscape. During two years (2003-2004), 133 dune patches between Nieuwpoort (Belgium) and and Bray-Dunes (France) varying in area, connectivity, eolian sand dynamics and trampling disturbance were sampled for five focal species: two spiders (*Alopecosa fabrilis* and *Xysticus sabulosus*), two butterflies (*Issoria lathonia* and *Hipparchia semele*) and one grasshopper (*Oedipoda caerulescens*). Overall diversity was highest in large and well connected patches that were characterised by high eolian sand dynamics and a low trampling intensity. Patch occupancy differed greatly among species: all species significantly occurred more often in large and connected patches. Increased trampling intensity (by cattle or tourists) negatively affected the three ground dwelling species (the two spiders and the grasshopper), but not the butterfly species. High eolian sand dynamics positively affected the presence of the spider *X. sabulosus*, the grasshopper *O. caerulescens* and the butterfly *H. semele*, but had no significant effect on both other species. Colonisation was mainly explained by connectivity and never by patch area, while extinction events in *H. semele* were explained by small patch area. We discuss the implications of using a suite of focal species for management and restoration purposes in the highly fragmented dune area in Belgium and we promote the use of a multispecies approach for evaluating and monitoring conservation efforts.

### 182. EFFECTS OF URBANISATION ON GROUND DWELLING INVERTEBRATES ALONG AN URBAN-RURAL FORESTED GRADIENT IN DEBRECEN, EASTERN HUNGARY

**MAGURA**, **TIBOR**, Hortobágy National Park Directorate, Hungary; **Tóthmérész**, **Béla**, Debrecen University, Hungary; **Horváth**, **Roland**, Debrecen University, Hungary; **Hornung**, **Erzsébet**, Szent István University, FVS, Institute for Zoology, Hungary

We investigated the effects of urbanisation on carabids, isopods and spiders along an urban-rural forest gradient representing decreasing human disturbance using pitfall traps. Overall carabid species richness was significantly higher in the rural and urban areas compared to the suburban one. Overall spider species richness was significantly the highest in the urban area. We found no significant differences in the overall species richness of isopods. These results did support neither the increased disturbance hypothesis, according to which the overall diversity should decrease under higher levels of disturbance, nor the intermediate disturbance hypothesis, which predicts the increase in diversity at intermediate level of disturbance. However, species richness of the forest specialist carabids significantly increased along the urban-rural gradient. Species richness of the forest specialist isopods were significantly higher in the suburban and rural areas compared to the urban one. Species richness of the disturbance-sensitive forest spider species hunting on the ground was significantly higher in the rural area compared to the other ones. These results are in agreement with the prediction of the habitat specialist hypothesis according to which the diversity of forest specialist species should increase from the more disturbed urban area towards the less disturbed rural one.

### 183. SPATIAL SUBTIDAL MACROBENTHIC DISTRIBUTION IN RELATION TO ABIOTIC CONDITIONS IN THE MINHO ESTUARY, NW OF PORTUGAL

**Maia-Mendes**, **Mónica**, ICBAS - Instituto de Ciências Biomédicas de Abel Salazar, Portugal; **Antunes**, **Carlos**, Ciimar - Centro Interdisciplinar de Investigação Marinha e Ambiental, Portugal

During the summer of 2003, sampling was carried out in the Minho estuary in order to compare the pattern of the macrobenthic community's distribution in relation to chemical and physical variables. A total of 51 macrozoobenthic taxa were identified. Abundance, biomass and specific diversity were determined among the twenty-three stations. Abundance ranged from 24 to 6032 ind./m2, with an average of 1731 ind./m2. Corbicula fluminea presented the highest density corresponding to 41,87 % of the total specimens gathered, followed by Corophium multisetosum with 11,50 %. Biomass of Corbicula fluminea ranged from 5,95 to 259,31 g AFDW/m2, with an average of 110,96 g AFDW/m2. This specie was a clear predominance in the total biomass. The multivariate techniques used revealed a macrobenthic community with three distinct groups, particularly related to the sedimentological characteristics and temperature. These results demonstrated significant differences in macrobenthic assemblage's composition along an estuarine gradient.

### 184. THE EFFICACY OF THE NATURA2000 NETWORK AS A CONSERVATION TOOL IN ITALY

**MAIORANO**, **LUIGI**, University of Rome La Sapienza, Italy; **Falcucci**, **Alessandra**, University of Rome La Sapienza, Italy; **Boitani**, **Luigi**, University of Rome La Sapienza, Italy

Special Protection Areas (SPA) individuated under the Habitat and Bird directive constitute the main conservation strategy

available in Europe to meet the Countdown 2010 Initiative, and at the same time one of the most important tools that the European nations have to improve their existing conservation networks. However, to be an effective conservation tool, SPAs should be integrated into the existing conservation networks and should support viable populations of the species for which they have been established. We considered SPAs in Italy (more than 3,000) as a case study to evaluate the efficacy of the Natura2000 network. We performed an irreplaceability analysis to evaluate the importance of SPAs as a complement for the existing protected areas. Moreover, we used an "order-of-magnitude approach" to asses the capacity of SPAs to conserve the species for which they have been instituted: using habitat models we estimated the number of individuals supported by each area. The results obtained outline that SPAs in Italy represent an important resource to complement the existing protected areas, but at the same time they cannot be considered the only conservation tool in the region, as not all the species for which they have been established can be considered covered.

### 185. PUBLIC PARTICIPATION IN DECISION-MAKING: A COMPARISON OF TWO APPROACHES (THE CASE OF LARGE CARNIVORE MANAGEMENT PLANS IN CROATIA)

**Majić Skrbinšek, Aleksandra**., Memorial University of Newfoundland, Canada; **Bath, A.J**., Memorial University of Newfoundland, Canada; **Huber, D**., Veterinary Faculty, University of Zagreb, Croatia

Wildlife managers increasingly recognize the importance of direct involvement of the public in the processes of planning and decision-making in wildlife management and conservation. However, when it comes to the actual implementation of public involvement, there are countless approaches that range from simply sharing information with the public, to the complete transfer of the decision-making power to the public. In Croatia, two different approaches from this "continuum" of public involvement were used in the processes of developing the management plans for the 3 large carnivore species (*Ursus arctos*, *Lynx lynx* and *Canis lupus*). The bear management plan was developed by a delegated group of eight experts in the fields of carnivore ecology, wildlife management, forestry and hunting. A baseline study of public attitudes toward brown bear management options was carried out in order to provide the experts with data that were recognized as essential. The method of choice for the development of wolf and lynx management plans was joint planning where representatives of all interested governmental and nongovernmental organizations were involved. It was carried out through a series of facilitated workshops and focus group meetings. Quantitative studies of attitudes were carried out in order to check the support of the wider public for the proposed management measures. The purpose of this paper is to present and compare the two approaches in terms of their effectiveness in reaching agreement on a final management plan, and their implications to financial resources.

### 186. NATIVE FOREST HAVE HIGHER BIODIVERSITY THAN PLANTATION FORESTS IN NW PORTUGAL

**MALHEIRO PROENÇA**, **VÂNIA**, Universidade de Lisboa, Portugal; **Pereira**, **Henrique Miguel**, Instituto Superior Técnico, Portugal; **VICENTE**, **LUÍS**, Universidade de Lisboa, Portugal

Human settlement in the Iberian Peninsula was the starting point of an extreme and ongoing alteration of the forest in this region. Oak deciduous forests (Quercus sp.), once the primary type of forest in the north of Portugal, represent nowadays less than 5% of the Portuguese forest. On the other hand maritime pine (Pinus pinaster) and eucalyptus (Eucalyptus sp.) are now the dominant species in the north of the country occurring as large monocultures. The objective this work was to understand the effects of these landscape changes on plants diversity. We visited 9 fragments of oak forest (native species), 8 fragments of eucalyptus forest (exotic species) and 9 fragments of pine forest (a native species, but still planted and regarded as a monoculture), all localized in the northwest of Portugal, the sizes of the fragments ranged from 0.22ha to 36ha. Records of plant diversity were collected at 3 scales: 1m2, 100m2 and the size of the fragment. Our results show that after controlling the effect of area, oak forests are significantly more diverse than the other two types of forest. Moreover, results from PCA, based on the floristic composition of the areas, also reveal that oak forests are significantly different from the other two types of forest, that do not differ between them. Similar results were obtained when we used data from a higher taxonomic level (Family).

### 187. HABITAT USE BY WILD BEES IN ARABLE LANDSCAPES: THE IMPORTANCE OF ABANDONED (OLD) AGRICULTURAL FIELDS

**MANDELIK**, **YAEL**, Princeton University, United States; **Winfree**, **Rachael**, Princeton University, United States; **Kremen**, **Claire**, University of California, Berkeley, United States

Wild bees provide essential pollination services to many crops and wild plants in arable landscapes. Yet little is known about the role of different habitats in providing floral resources and maintaining wild bee communities in arable landscapes. In this study we investigated the relative contribution of active agricultural fields, abandoned (old) fields and deciduous forests, in maintaining wild bee communities in arable landscapes. The study was conducted in central and northern NJ and eastern PA, USA. We established 6 blocks, each composed of a 1 hectare plot in each of the three habitats studied. Wild bees and floral resources were sampled 4 times from late spring till autumn. Bee and floral richness and abundance were highest in old fields and secondarily in agricultural fields, whereas few bees and flower species were found in the woods. Bee species composition differed between the three habitats. Abandoned agricultural fields are a prominent bee habitat in arable landscapes, providing abundant floral resources that may be critical in maintaining wild bee crop pollinators late in the season, when crops are no longer blooming. For the period sampled in this study, woods do not seem to be an important bee habitat; however, we did not sample in early spring, which is the time of peak floral resource availability for some types of woods.

### 188. WHEN SHOULD AN ENDEMIC SPECIES ON A SMALL ISLAND BE CONSIDERED ENDANGERED AND WHEN SHOULD IT NOT? CRITERIA FOR WILDLIFE CONSERVATION ON THE CANARY ISLANDS (SPAIN)

**MARTIN ESQUIVEL, JOSE L.**, Environment Planning Center of Government of Canary Islands, Spain

A classic wildlife conservation strategy consists of establishing lists of legally protected species, some of which can also be considered endangered. Endangered species are always a subset of protected species, to the extent that all endangered species are protected, but not all protected species should necessarily be considered endangered. Conservation priorities are determined by this classification and are higher for endangered species than for those that are not endangered, especially when there is a higher risk of extinction. A specie's conservation status, therefore, makes it possible to prioritize conservation urgency.
For this reason, IUCN have set criteria to help evaluate the endangered status with the least ambiguity possible. Although these criteria have been extensively applied throughout the world at the regional level, this has not occurred in the case of small-sized oceanic islands. In this study, two thousand insular endemisms were studied to ascertain whether the endangered parameters used by IUCN are applicable in isolated territories with a surface of less than 2000 $km^2$. The conclusion is that the IUCN classification is not enough consistent to prioritize conservation urgency, at least concerning its reference criteria regarding spatial distribution of the species, because these are based on very elevated thresholds inherent to extended habitats.

### 189. RECOLONIZATION HISTORY AND WOLF DEMOGRAPHIC PARAMETERS ESTIMATED WITH NONINVASIVE GENETIC TECHNIQUES IN THE ITALIAN ALPS

**MARUCCO, FRANCESCA**, Wildlife Biology Program, College of Forestry and Conservation, University of Montana, USA; **Boitani, Luigi**, Department of Human and Animal Biology, University of Roma "La Sapienza", Italy; **Pletscher, Daniel**, Wildlife Biology Program, College of Forestry and Conservation, University of Montana, USA; **Fabbri, Elena**, Laboratorio di Genetica, Istituto Nazionale della Fauna Selvativa, Italia; **Schwartz, Michael K**., USFS Rocky Mountain Research Station, Carnivore Genetics Lab, USA

Population size and survival rate estimates are fundamental for the conservation of species but are often difficult to obtain, especially for rare and elusive species. Wolves began recolonizing the south-western Alps of Italy and France in the early 1990s through dispersal from source populations in central Italy. We documented this recolonization process and the social history of wolf packs using non-invasive genetic analysis conducted on scat and tissue samples from 1999 to 2004. Winter sampling, when groups of fresh scats were collected along wolf travel routes, was the best scat sampling design to maximize the probability of identifying individuals while optimizing laboratory efforts. Ten microsatellite markers were amplified in 65% of the scat samples (n=488). We used a genetic mark-recapture framework to estimate survival and population size. Juvenile survival (0.45; 95%CI 0.22-0.70) was lower than adult survival (0.93; 95%CI 0.82-0.97). Individual heterogeneity was not a problem, although genetic recaptures were low. On our 5,000 $km^2$ study area in the western Alps, population size estimates ranged from 16 to 42 wolves from 1999 to 2004. Population estimates are fundamental for proper management of the expansion of the wolves in the Alps, however, precision must be improved.

### 190. SELECTION OF CONSERVATION PRIORITY AREAS IN GREECE: A COMPARISON AMONG RESERVE SELECTION METHODS

**MATSINOS**, **YIANNIS**, University of the Aegean, Greece; **Mazaris**, **Antonios**, University of the Aegean, Greece; **Kallimanis**, **Athanasios**, Aristotle University of Thessaloniki, Greece; **Stefanos**, **Sgardelis**, Aristotle University of Thessaloniki, Greece; **Pantis**, **John**, Aristotle University of Thessaloniki, Greece

In the present study we analyze the efficiency of various reserve selection algorithms for prioritizing areas for conservation in Greece. Biodiversity data from 297 sites throughout Greece, the whole Natura 2000 network, were used to examine which method maximizes biodiversity preservation in the minimum number of selected areas. Ranking and classification of the priority areas for conservation was based on hotspot (species richness and species rarity) and complementarity (species rarity) methods. Moreover, we applied a theoretical biodiversity index which uses information about the threat status of each species. In an attempt to combine information on species endemism and conservation status a new approach was also tested. Analysis was repeated for different species' groups: birds, amphibian and reptiles, mammals and freshwater fishes. The complementarity approach achieved the greatest cumulative representation of species within the limited number of protected sites. Even though, the new method achieved to represent the largest number of endemic and threatened species from all different taxa within the minimum number of sites, did not perform well in the representation of cumulative species number. Further we discuss how choosing 15% of the total sites is an achievable target for establishing reserve selection networks in Greece.

### 191. ECOLOGICAL DETERMINANTS OF DISTRIBUTION DECLINE AND RISK OF EXTINCTION IN MOTHS

**MATTILA**, **NIINA**, University of Jyväskylä, Finland; **Kaitala**, **Veijo**, University of Helsinki, Finland; **Komonen**, **Atte**, University of Joensuu, Finland; **Kotiaho**, **Janne**, University of Jyväskylä, Finland; **Päivinen**, **Jussi**, Metsähallitus (Finnish Forest and Park Service), Finland

For successful conservation of species, it is important to identify traits that predispose species to the risk of extinction. By identifying such traits, conservation efforts can be directed toward species that are most at risk of becoming threatened. We used data derived from the literature to determine ecological traits that affect distribution, distribution change, and the risk of extinction in Finnish noctuid moths (Lepidoptera, Noctuidae). The ecological traits we examined included body size, larval specificity, length of the flight period, and overwintering stage. In addition, in monophagous species we examined the effects of resource distribution. Larval specificity, length of the flight period, and the overwintering stage each had an independent effect on the risk of extinction when the effects of other traits were controlled by entering all traits into the same regression model. Not a single trait predicted the risk of extinction when analysis was conducted without controlling for the other traits. This discrepancy among the results suggests that a single trait may not be enough to allow prediction of the risk of extinction. Instead, it seems that for successful, predictive conservation science data on several ecological characteristics are needed.

### 192. DEN SITE SELECTION IN NORWEGIAN WOLVERINES AT DIFFERENT SPATIAL SCALES

**MAY**, **ROEL**, Norwegian Institute for Nature Research, Norway; **Gorini**, **Lucrezia**, University of Rome La Sapienza, Italy; **Van Dijk**, **Jiska**, Norwegian Institute for Nature Research, Norway; **Landa**, **Arild**, Norwegian Institute for Nature Research, Norway; **Andersen**, **Roy**, Norwegian Institute for Nature Research, Norway; **Brøseth**, **Henrik**, Norwegian Institute for Nature Research, Norway

Compared to the other northern large carnivores, wolverines Gulo gulo are thought to be most selective about habitat quality and particularly sensitive to human disturbance, especially during the natal denning period for reproductive females. The importance of den sites in the biology of wolverines not only lies in the provision of shelter for cubs from the elements, but also safety from predators during the infant period. Having slow population growth rates and low resilience indicate that the quality of these areas is likely to be an important determinant of reproduction. In this study we investigated which topographic elements were crucial to den site suitability and at which spatial scale these elements were selected. Selection was analysed for 50 den sites using discrete choice models and multinomial logistic regression. At a micro-scale, den sites were associated with north-westerly facing steep, rugged terrain away from private roads. At a macro-scale den sites were placed at 1,000 meters above sea level and away from human infrastructure. Visibility from the den site and presence of sheep also played a role. The micro-scale preferences provide for characteristic wolverine den sites dug out in deep snow. However, also avoidance of disturbance is an important prerequisite for wolverine den site selection and ultimately successful reproduction.

### 193. EXPORTING FOREST HARVEST TO NEIGHBORING COUNTRIES CAN IMPACT DOMESTIC CONSERVATION EFFORTS

**MAYER**, **AUDREY**, University of Tampere, Finland; **Kauppi**, **Pekka**, University of Helsinki, Finland; **Tikka**, **Päivi**, University of Helsinki, Finland; **Virtanen**, **Tarmo**, University of Helsinki, Finland; **Angelstam**, **Per**, Swedish University of Agricultural Sciences, Sweden

Among wealthy countries, increasing imports of natural resources to allow for unchecked consumption and greater

domestic environmental conservation has become commonplace. This practice can negatively affect biodiversity conservation planning if natural resource harvest is merely pushed across political borders. Both Finland and China began major forest protection programs in the mid-1990's, and the amount of hectares of forests protected from harvest in both countries has increased exponentially. However, consumption of wood products has increased as well. The simultaneous increase in consumption of both protected forests and forest products is made possible by forest harvesting in Russia, where the current protected areas are inadequate to preserve most of the naturally dynamic and old growth forests. While the impact of Russian forest harvest on China's protected forests is unclear, the threat to Finland's forests is more troubling. Finnish populations of some species depend upon dispersal from Russian populations, which is only possible through three increasingly impacted land corridors in the Karelia region. Thus, increased importation of wood from northwest Russia to Finland may jeopardize the long term viability of species in high diversity conservation areas in both Russia and Finland.

### 194. GENETIC CHARACTERISTICS OF WHITEFIN GUDGEON, GOBIO ALBIPINNATUS (LUKASCH, 1933) IN EUROPE

**MENDEL**, **JAN**, Institute of Vertebrate Biology, Czech Rep.; **Vasileva**, **Ekaterina D.**, Moscow State University, Russian Federation; **Luskova**, **Vera**, Institute of Vertebrate Biology, Czech Rep.; **Lusk**, **Stanislav**, Institute of Vertebrate Biology, Czech Rep.; **Kosco**, **Jan**, University of Presov, Slovakia; **Ruchin**, **Alexander**, Mordovian State University, Russian Federation; **Halacka**, **Karel**, Institute of Vertebrate Biology, Czech Rep.; **Papousek**, **Ivo**, Institute of Vertebrate Biology, Czech Rep.; **Vetesnik, Lukas**, Institute of Vertebrate Biology, Department of Ichthyology, Czech Republic

Gobio albipinnatus is among the fish species that are protected by European and national legislative norms. Recently, there appeared tendencies to define, within the species range, indigenous subspecies perhaps even populations on the grounds of their morphometric differences. We carried out genetic analyses of samples from various localities in central and Eastern Europe. The analyses involved both, the nuclear genome, represented by the intron S7 protein (632 bp), and the mitochondrial genome, with the analysed part of the control region (724 bp). The values of genetic variability obtained between the samples tested varied between 1.5 to 1.9% (control region) and 0.8 to 1.0% (S7 marker). We do not consider differences on this level to be sufficient for specific separation. Both markers appeared to be a suitable solution in difficulties connected with the differentiation of this species within the genus Gobio based solely on morphometric analyses. The results obtained have provided a basis for a revision of the structure and distribution of G. albipinnatus as well as of the proper genus Gobio. The results were obtained within project no.VaV SM/6/05 of the Ministry of Environment of the Czech Republic.

### 195. BROWN BEAR AND WOLF CONSERVATION STATUS IN THE SE BALKAN REGION. HOW TO RESPOND TO LOCAL CONDITIONS WITHIN A HOLISTIC FRAMEWORK?

**Mertzanis, Yorgos**, NGO "Callisto", Greece; **Godes, Constantinos**, NGO "Callisto", Greece

The SE Balkan region remains the only region of Southern Europe where brown bear and wolf populations still maintain a continuous distribution range, extending over a large area shared by as many as eight different contiguous countries. Maintaining transboundary connectivity between shared populations of the two species is among the key issues for a long term overall conservation policy in this region. From the legal aspect, although "umbrella" systems, such as the Bern Convention and the EU directives, allow a generalized approach, the to develop common management strategies and practices which would take into account local conditions is a growing challenge.
Over the Dinaric – Pindos bear and wolf ranges, this challenge becomes a necessity given the mosaic of the existing differences in; current status (ranging from protection to harvest) and practices, priorities set by national policies, social & cultural values regarding wildlife and conservation issues, socio-economic context, accessibility to funding tools, existing methodologies and scientific capacity levels, bureaucratic procedures and political will. Until now, several steps to meet local conditions under the overall objective have been made, with the establishment of a Balkan network of cooperation and the refinement of the CoE Action Plans as milestones.
Regarding EU policy, special emphasis should be given on conflicting funding tools which compromise biodiversity and therefore bear and wolf survival in cases such as the construction/extension of transport networks related to habitat fragmentation. This situation is illustrated by the case of the Egnatia highway in the Pindos mountain range (Greece).

### 196. STEPS ACHIEVED TOWARDS CONSERVATION OF BUTTERFLIES IN ROMANIA

**MIHUŢ, SERGIU**, Focal Centre for Biodiversity Monitoring and Conservation, Romania

Butterflies are representing key bioindicator species for nature conservation, possessing a high capacity for a swift assessment of biodiversity indexes. Designation of sites dedicated to butterfly conservation is therefore responding to complex requirements for number of associated species. Making appeal to the procedural blue-print developed under the European program for the identification of the Prime Butterfly Areas, a network of protected sites was designed for Romania, based upon 9 criteria species. The proposed network is representing a fundamental component for Natura2000 network in Romania. The associated GIS database developed in order to pinpoint the butterfly diversity hot-spots is intended to become an objective and useful tool with wide applicability in conservative management, as well as in regional durable development strategies, climate change early alarming system, long term environment assessment and trends.

### 197. THE ROLE OF ENVIRONMENTAL NGOS IN PUBLIC AWARENESS RAISING AND PROTECTION OF ENDANGERED SPECIES (STEP TOWARD THE COMMUNITY-BASED CONSERVATION)

**MIKAC**, **BARBARA**, Marine Research Centre, Ruder Boškovic Institute, Croatia

Endemic Posidonia oceanica meadows are the richest community in the Adriatic Sea. Only a few decades ago they were widely distributed along the whole Istrian coast in Croatia. Due to the human impacts they are today almost extinct. Together with them hundreds of other species are disappearing. Despite that, Croatia didnt apply any legal protection measures and people are unaware of importance and threats to Posidonia. Recognizing these problems, as well as the power of community-based conservation and role of NGOs in that process, environmental NGO Green Istria started awareness raising campaign on the importance and protection of Posidonia meadows, aimed for local inhabitants, school children and tourists. Different educational material was printed and distributed. Traveling exhibition of underwater photographies of Posidonia and its inhabitants, with following lectures, were organized in several public spaces, schools and events. 15 minutes educational underwater documentary, which was later screened and awarded on several World underwater film festivals, was made and presented. The interest and cooperation of local government, inhabitants, tourists and media was amazing. Many schools and diving clubs included film and leaflets in their regular education. This project is just the first but

very needed and unavoidable step in the process of Posidonia oceanica protection.

**198. TOWARDS SYSTEMATIC CONSERVATION PLANNING IN MANAGED FOREST LANDSCAPES OF FENNOSCANDIA**

**MIKUSIŃSKI, GRZEGORZ**, Grimsö Wildlife Research Station, Department of Conservation Biology, Swedish University of Agricultural Sciences, Sweden**; Edenius, Lars**, Department of Animal Ecology, Swedish University of Agricultural Sciences, Sweden; **Pressey, Robert L**.., The Ecology Centre, University of Queensland, St Lucia QLD 4072, Australia

Fennoscandian landscapes and regions are the most forested areas of Europe and are often perceived as European last wilderness. In reality, most of these forests are intensively managed with, until recently, the main focus being maximizing timber production. Recent developments calling for ecologically sustainable use of landscapes and production of forests goods have been backed-up by several international treaties and directives, national initiatives and sectorial agreements. The long-term goal focusing on biodiversity maintenance requires, however, the development, application, and evaluation of an approach to systematic conservation planning deals with the complexity of ecological and cultural systems in time and space. In this paper, we describe and analyse the potential for conservation planning in Fennoscandia using management of forest biodiversity in Sweden as an example. We evaluate the long-term benefits of different conservation measures in the context of the dynamic nature of ecological and cultural systems. We contrast the functions of strict reserves with other forms of forest biodiversity management in production landscapes. We discuss also the challenges linked to the problem of administrative and sectorial boundaries that dissect natural systems. Finally, we outline a possible scheme for applying systematic conservation planning in forested landscapes of Fennoscandia.

**199. INTEGRATED FUTURES FOR EUROPE'S MOUNTAIN AREAS: RESULTS OF AN INTERDISCIPLINARY RESEARCH PROJECT**

**MITCHLEY**, **JONATHAN**, imperial college, United Kingdom

The EU project BioScene investigated the biodiversity, socio-economic and sustainability implications of alternative scenarios in 6 mountain study areas in the context of agricultural restructuring. Three scenarios were evaluated: Business as Usual, Liberalisation, and Managed change for biodiversity. Ecological consequences of the scenarios were evaluated using a time series of air-photographs in each study area and recent habitat changes were identified and correlated with socio-economic drivers and trends. Integrated statistical modelling and expert knowledge was used to predict likely habitat changes under each scenario and to draw down potential impacts on biodiversity priorities. The resulting alternative mountain biodiversity futures (bioscenes) were then evaluated in terms of social acceptability, economic cost effectiveness and environmental sustainability using participatory methods, including repeated stakeholder group deliberations and a sustainability appraisal. The results of BioScene reveal Europe's mountain heritage facing an uncertain future and pave the way for a smooth transition for European mountain areas from "less-favoured" agricultural regions to "highly-valued" environmental landscapes.

**200. RAPID GENETIC DETERIORATION IN THE ENDANGERED AUSTRALIAN MOUNTAIN PYGMY-POSSUM DUE TO ANTHROPOGENIC ACTIVITIES**

**MITROVSKI, PAUL,** Centre for Environmental Stress and Adaptation Research, University of Melbourne, Australia; **Heinze, Dean**, Department of Environmental Management and Ecology, La Trobe University, Australia; **Hoffmann, Ary**, Centre for Environmental Stress and Adaptation Research, University of Melbourne, Australia; **Weeks, Andrew**, Centre for Environmental Stress and Adaptation Research, University of Melbourne, Australia

The Mountain pygmy-possum (*Burramys parvus*) is an endangered marsupial restricted to three small populations in the alpine region of Australia. Threats such as introduced predators (cats and foxes), habitat destruction, and reduced food availability have recently reduced the Mount Buller population from an estimated 200 individuals in 1996 to less than 20 in 2006. By scoring variation at eight microsatellite loci over a ten year period we found a rapid decline in genetic diversity. Heterozygosity levels fell from 0.61 in 1996 to 0.21 in 2006 and significant inbreeding was detected over this period. Ski resort development has reduced habitat by over eighty percent and in conjunction with predators and reduced food availability appear to have sent the population into a downward spiral towards extinction.

**201. CARPATHIAN SUBTERRANEAN FAUNA: FROM HISTORICAL BIOGEOGRAPHY TO PROTECTION AND EUROPEAN LEGISLATION**

**MOLDOVAN, OANA TEODORA**, Institutul De Speologie "Emil Racovita", Cluj Department, Romania; **Iepure, S**., Institutul De Speologie "Emil Racovita", Cluj Department, Romania; **Bucur, R.M**., Institutul De Speologie "Emil Racovita", Cluj Department, Romania; **Persoiu, A**., Institutul De Speologie "Emil Racovita", Cluj Department, Romania; **Tamas, T**., Institutul De Speologie "Emil Racovita", Cluj Department, Romania

Carpathians subterranean fauna is the most remoted of its kind in the eastern part of the European continent. 90% of the terrestrial and 60% of the aquatic subterranean fauna in Romanian Carpathians is endemic for relatively small areas, or even one cave or limestone massif. To explain this high biodiversity in a rather low-diversity regional context data about fauna origin and paleogeography were corroborated with present–day GIS representation of the geology, vegetation, climate and cave fauna distribution for the best represented groups, Coleoptera and Crustacea, in the Western Carpathians (Transylvania). Consequently, geographical heterogeneity (limestone areas represent continental islands separated by non-karstic areas) and a combination of various geological, ecological and climatic phenomena are among the factors that explain why Carpathians are inhabited by unique forms. The special situation of other regions and especially of Dobrogea (south-eastern Romania) is discussed. Moreover, Romanian and European legislation on subterranean fauna and habitats are presented showing effectiveness and gaps, with proposal for improving their state of protection.

**202. SPECIES-AREA RELATIONSHIP AND COST-EFFICIENT CONSERVATION PLANNING**

**MÖNKKÖNEN**, **MIKKO**, University of Jyväskylä, Finland; **Juutinen**, **Artti**, University of Oulu, Finland

Species-area-relationship (SAR) is commonly used to make predictions about species loss with habitat loss but also species gain with increasing area of conservation. In this study we used SAR together with economic considerations to get insights how cost-efficient conservation is achieved at different levels of resources allowable to conservation. With the objective to maximize species coverage within the reserve network, most efficient procedure when very little conservation area exists

would be to select the sites with low costs to maximize total area. There is a high certainty that this will result in rapid increase in the coverage of species. With increasing budget and conservation area, the certainty declines that maximizing area alone would result in a maximum increment in species richness. Species composition and complementarity of alternative sites become important. This makes conservation planning more complicated and expensive because of increased information requirements. SAR implies some species loss with habitat loss even if most area remains intact. This renders coverage all species within a conservation area network excessively expensive and further underpins the importance of relevant ecological knowledge in cost-efficient conservation planning. We exemplify these patterns with case studies from boreal forests in Finland.

### 203. COMBINING CAMERA-TRAPPING AND RADIO-TELEMETRY METHODS TO DEFINE ECOLOGICAL REQUIREMENTS FOR THE EUROPEAN WILDCAT (*F. SILVESTRIS*) IN A MEDITERRANEAN ECOSYSTEM

**MONTERROSO, PEDRO,** CIBIO, Centro de investigacao em Biodiversidade e Recursos Geneticos, Portugal; **Ferreras, Pablo,** , IREC, Instituto de Investigación en Recursos Cinegéticos (CSIC/UCLM/JCCM), Spain; **Brito, José Carlos,** CIBIO, Centro de investigacao em Biodiversidade e Recursos Geneticos, Portugal; **Alves, Paulo Célio,** CIBIO, Centro de investigacao em Biodiversidade e Recursos Geneticos, Portugal;

The European wildcat (*Felis silvetsris*) is considered vulnerable in Portugal and little information exists about the species ecology in the Mediterranean region. Thus, in order to identify the wildcat ecological requirements in Mediterranean ecosystems camera-trapping and radio-tracking was used in a study conducted in Southeast of Portugal.
Camera traps were applied to randomly selected squares of a 2 × 2 km grid and abundance indexes were used for modeling the wildcat abundance. Two males and four females were radio-tracked during one year and data was analyzed to determine habitat selection.
Ecological modeling techniques revealed that the European wildcat's abundance is positively correlated with wild-rabbit (*Oryctolagus cuniculus*) abundance and with scrubland edge density and negatively correlated with man-related disturbance factors. Radio-tracking methods showed that, although the wildcat uses a wide range of habitats during the major activity periods, scrubland is the main habitat type selected as refuge areas. Radio-tracked animals included about 40% of scrubland in their home-range and spent about 61% of the lowest activity period inside this habitat. Additionally, around 80% of this period was spent within habitats with shrub cover.
We suggest that wild-rabbit populations and scrubland habitats are of extreme importance for the wildcat. However, the edge effect should be maximized at a landscape level.

### 204. THE NATURA 2000 NETWORK. OPPORTUNITIES FOR FRESHWATER BIODIVERSITY CONSERVATION

**MORÁN LÓPEZ, R.**, Group of Investigation in Conservation (GIC), Área de Zoología, Universidad de Extremadura, Spain; **Sánchez Guzmán, Juan Manuel,** Group of Investigation in Conservation (GIC), Área de Zoología, Universidad de Extremadura, Spain

European environmental legislation pursues, amongst other goals, the conservation of biodiversity and its compatibility with the social and economic development of human societies. The most important European initiative in nature conservation is aimed at the creation o an extensive Community network known as NATURA 2000 (Council Directives 79/409/EEC and 92/43/EEC, known as Birds and Habitats, respectively). The annexes of these Directives include many aquatic habitats and taxa. This has major implications for the conservation of continental aquatic ecosystems. Nonetheless, time and monetary constraints, the lack of data and studies, ownership and economic conflicts, and unequal public and institutional support make the practical implementation of the European legislation a complex process. The Group of Investigation in Conservation (GIC) of the University of Extremadura has a long-standing experience in the study and management of aquatic systems, combining conservation and socio-economic elements. This includes the inventory of wetland zones and of the quality of their waters, the study and management of threatened species and communities in freshwater habitats, the creation of artificial habitats (islands, reefs, etc.), the restoration and management of riparian and aquatic vegetation, environmental impact studies of hydrological works (dams, channeling, gravel dredging, etc.), and the delimitation of priority areas (hotspots) and protected natural spaces. This scientific and technical experience is here presented in relation to the design of Special Protection Areas (SPAs) for birds, with particular stress on the conservation of the wetlands catalogued of International Importance in the Ramsar Convention. Practical cases of implementation of the objectives of the Birds Directive in inland aquatic media are described, and the utility and the difficulties of these approaches are discussed.

### 205. A FRAGILE RESOURCE WITH MULTIFUNCTIONAL VALUES - WET SPECIES-RICH MESOTROPHIC GRASSLAND: INSIGHTS FROM A MULTIDISCIPLINARY STUDY IN THE UK

**MOUNTFORD, J. OWEN**, NERC Centre for Ecology and Hydrology, Department of Ecological Processes and Modelling, United Kingdom; **Gowing, David**; Cranfield University, United Kingdom**; Tallowin, Jerry**; IGER, North Wyke, Behavioural and Community Ecology, Behavioural and Community Ecology, United Kingdom; **Acreman, Mike,** Centre for Ecology & Hydrology, United Kingdom

Wet species-rich mesotrophic grassland is scarce in lowland western Europe, and often highly bio-diverse. In lowland UK it is a priority habitat for nature conservation, and also has multifunctional value e.g. biodiversity, amenity and agronomy etc. Research has focussed upon defining what constitutes sustainable management for nature conservation and viable farming. The Tadham Moor experiment in Somerset (UK) was set up in 1985 to address these issues and continues as a site of eco-hydrological study. The main elements of the Tadham research were:
I. Investigation of the impact of inorganic fertilisers on wet grassland diversity and the viability of hay cutting followed by cattle grazing.
II. Assessing the efficacy of raised water-levels in restoring wet grassland, and how this affected agricultural output.
III. Detailed research of the eco-hydrological requirements of wet grassland plant communities and species.
IV. Modelling of site and catchment hydrology to estimate the effectiveness of raised water-level management and associated flood risk.
V. Study of the carbon budget of the site to assess the relationship between water-regime, vegetation and carbon sequestration/emission.
This paper reviews the projects that took place during these 20 years and assesses how they have contributed to effective management of lowland wet grassland

### 206. INDICATORS OF THE FLORISTIC INTEREST OF SITES IN URBAN ZONES. TOOLS FOR URBAN MANAGERS

**MURATET**, **AUDREY**, Muséum National dHistoire Naturelle, France; **Machon**, **Nathalie**, Muséum National dHistoire Naturelle, France; **Arnal**, **Gérard**, Muséum National dHistoire Naturelle, France; **Moret**, **Jacques**, Muséum National dHistoire Naturelle, France

We described the distribution of vegetal communities in a highly urbanized region to help managers to make the best decisions for the environment. Thus, we inventoried 1046 locations and created an index, the Index of Floristic Interest (IFI), synthesizing

information on both the quantity and quality of vegetal biodiversity of sites or habitats. We thus could classify them according to their respective contribution to biodiversity and map the zones with the highest potential or real floristic interest. We also examined the impact of the urban characteristics (collective or individual dwellings, parks, commercial zones) on the floristic diversity.

### 207. A SPECIES BETWEEN CONSERVATION AND PERSECUTION: THE COMMON HAMSTER (*CRICETUS CRICETUS, L.*)

**NECHAY, GÁBOR**, Ministry of Environment, Hungary

Population numbers of the Common hamster rise conspicuously in certain years. Reviewing all kind of available information about long-term density fluctuaton of Cricetus cricetus the followings are concluded. The hamster lives today mainly in cultivated land thus, in habitats being under essential human influence. Detection of population numbers is difficult due to various activity of man including control of hamsters and the lack of long-term series of exact large-scale data. However, the 20$^{th}$ century brought about large scale agriculture and certainly the highest expansion and population number of *Cricetus cricetus* in the history. Yet the hamster became endangered in the western part of the range to the 1990s and its population is also decreasing in Central Europe. Even in Hungary where control of hamsters is still mandatory, a downward trend in expansion and size of the population can be observed. Simultaneously, research activity and conservation efforts increased in the west. Most recently successful reintroduction and reinforcement programmes and agrar reserves have been established in the Netherlands, Germany and France. Unfortunately no research activity and no recent information exist on the situation of hamster in the vast eastern areas. The last documented high population occurred here in the 1950s. Recommendations on improved surveillance and management of *Cricetus* will be detailed, on better large scale monitoring and sustainable management instead of control where necessary.

### 208. CAN WE AFFORD TO LET THE PUBLIC VISIT PRIME HABITAT FOR RECREATION? SPATIAL AND TEMPORAL IMPACTS OF HUMAN ACTIVITY ON HABITAT USE BY BROWN BEARS.

**NEVIN**, **OWEN**, University of Central Lancashire, United Kingdom

Extreme sports, adventure- and eco-tourism are bringing more people than ever into remote backcountry areas worldwide. The number of people visiting our remaining wilderness areas is set to increase further; in fact, nature tourism is the fastest growing sector in the 2.5 trillion global annual tourism market. What impacts will this have on the conservation of these areas and the species which are found there? While Europe is not traditionally seen as an ecotourism destination, the “European Safari” is a new and growing travel market. Romania leads the way in the development of this new genre of ecotourism marketing the Carpathian Mountains as the place to see Europe’s “Big Five” - elk, bison, bear, wolf and lynx. With its focus on carnivores, European safari is often referred to as “carnivore tourism” and we can draw lessons from the management of established carnivore tourism operations in North America. This study draws on spatial data collected using high resolution satellite telemetry and direct behavioural observation of brown bears at an exploited backcountry site in British Columbia to examine the impacts of ecotourism on brown bear spatio-temporal distribution and habitat use.

### 209. RE-THINKING SUSTAINABILITY: LOCAL INVOLVEMENT AND GLOBAL STRATEGIES TO CONSERVE BIODIVERSITY

**NIEKISCH, MANFRED**, International Nature Conservation, University of Greifswald, Germany

Participation and Collaborative Management are relatively new strategies to involve local inhabitants in the management of natural resources and protected areas. The aim is to generate benefits locally, de-centralise responsibilities and reduce or avoid potential conflicts arising from restrictions. Despite all progress, there are still major problems with the application of these strategies. In addition it seems that the concept of “sustainability” needs some re-thinking and has to be developed further as it has not lead to a general change in the trends towards massive extinction of species and ecosystems.
At the contrary, as can be seen in global fisheries as well as in tropical forests, the increasing scarcity of a biological resource due to overuse has caused over the last decades mainly prospection for “alternatives” and the shift to the use of “new” species rather than to appropriate management schemes. The recognition that the components of biodiversity are limited resources and that “sustainable development” does not mean “permanent growth” must be put into the focus of concepts and strategies. Delegation of power to the local level and the implementation of global regulations for access and benefit sharing as forseen in the Convention on Biological Diversity (as opposed to the World Trade Organisation and TRIPS) and their interdependence with successful Participation and Collaborative Management will be discussed as promissing strategies for the conservation of biological diversity.

### 210. ASSESSING BIODIVERSITY ALONG THE URBAN-RURAL GRADIENT: THE GLOBENET PROJECT

**NIEMELÄ**, **JARI**, University of Helsinki, Finland

The ecological effects of urbanisation can be examined by using urban-rural gradients from densely built city cores to increasingly rural surroundings. The gradient occurs all over the world and provides a framework for comparative work. Here, I present results of an international initiative to examine how generalisable the ecological effects of urbanisation are around the world using the gradient approach. The target organisms are carabid beetles which are ecologically and taxonomically well-known in most parts of the world. The results showed that carabid communities along urban-rural gradients were distinctly separated in Helsinki (Finland) and Hiroshima (Japan), but not in Edmonton (Canada) and Sofia (Bulgaria). Studies from Japan and Hungary shed more light on the issue. The results provide some support for the specific predictions made about species responses to urbanisation. However, individual cities did display city-specific community characteristics (e.g. Edmonton was characterised by exotic species). The causes of these city-specific differences should be explored with reference to the ‘ecological’ history of the cities. Thus, some broad generalisations can be made, but the ecological effects of urbanisation are also to some degree city-specific. The study shows that carabids can be used as as indicators of urbanisation for planning and conservation purposes..

### 211. CONSERVATION VALUE OF ROADSIDE VERGES IN A HIGHLY FRAGMENTED LANDSCAPE

**NOORDIJK**, **JINZE**, Wageningen University, Netherlands; **Schaffers**, **André**, Wageningen University, Netherlands; **Raemakers**, **Ivo**, Wageningen University, Netherlands; **Sýkora**, **Karlè**, Wageningen University, Netherlands

In the Veluwe region, a central part of the Netherlands, many heathlands and driftsands harbor characteristic arthropod species. These areas are highly fragmented and isolated from each other, thereby endangering the survival of these species. We studied roadside verges all over the Netherlands. The

verges in the Veluwe region appeared to be particularly rich in arthropod species when compared to verges in other parts of the Netherlands. Some examples of rare and endangered species living in these verges will be presented. Thereupon, we sampled arthropod composition in heathlands/driftsand vegetation in roadside verges that were either isolated from or connected with large heathlands/driftsands on the Veluwe. Connected verges were richer in arthropod species then isolated verges, indicating the importance of unfragmented areas in landscape design. We artificially made corridors to connect former isolated verges and nature reserves and measured the use of the corridors both by flying and walking arthropods. By connecting roadside verges with nature reserves, the effective size of heathland/driftsand habitat can be expanded. Roadside verges may also be used as effective habitat corridors between different heathland/driftsand areas, ameliorating the fragmentation in this region.

### 212. CONNECTING METAPOPULATION DYNAMICS WITH HABITAT PATCH DYNAMICS: SOME GENERAL SCALING LAWS AND IMPLICATIONS FOR CONSERVATION

**OBORNY**, **BEÁTA**, Loránd Eötvös University (ELTE), Hungary; **Szabó**, **György**, Research Institute for Technical Physics and Material Science, Hungary; **Meszéna**, **Géza**, Loránd Eötvös University (ELTE), Hungary

We present a spatial model of a metapopulation living in a patchy environment. The species can colonize suitable, empty sites, and can go extinct from occupied sites. Meanwhile, the site qualities can change from suitable to unsuitable or vice versa. Theoretical considerations suggest that a gradual loss from the density of suitable sites leads to a sudden breakdown in habitat connectivity. This fragmentation process is a critical transition, and can be described by models of isotropic percolation. On the other hand, a dispersal-limited population can get fragmented even in a homogeneously suitable area. The transition from survival to extinction is also a critical transition, but belongs to a different universality class: directed percolation. We connect the two percolation processes, linking patch dynamics with metapopulation dynamics. Focusing on the critical parameter region near to extinction, we review the scaling laws that describe the decline of patch occupancy, and the divergence of spatial and temporal correlations. These laws can help to predict extinction, and suggest management techniques for prolonging persistence.

### 213. SEMI-NATURAL GRASSLANDS AS POPULATION SOURCES FOR BUTTERFLIES IN AGRICULTURAL LANDSCAPES

**ÖCKINGER**, **ERIK**, Lund University, Sweden; **Smith**, **Henrik G.**, Lund University, Sweden

In intensively farmed agricultural landscapes many species are confined to very small uncultivated areas, such as field margins. We tested whether butterfly populations in such small habitat elements are dependent on dispersal from adjacent semi-natural grasslands using two different approaches. First, we studied butterfly species richness and abundance in twelve independent landscapes in a region of intense agriculture in southern Sweden, using transect counts in semi-natural grasslands and in adjacent and isolated linear habitat elements. Second, using mark-recapture techniques we studied survival in, and dispersal between semi-natural grasslands and small habitat elements in the surrounding landscape for four different species. Butterfly species richness and density (individuals per unit area) was significantly higher in proximate linear habitats than in the distant ones. The isolation effect on butterfly densities was mobility-dependent, since sedentary and intermediate but not mobile species were affected. The mark-recapture data show that in general, adult survival is higher in grasslands than in the surrounding landscape, and there is also a net dispersal from grasslands. Hence, it seems like for at least some butterfly species semi-natural grasslands act as population sources and thereby contribute to higher densities and species richness in their nearest surroundings.

### 214. DIVERSITY AND COMPOSITION OF DEAD WOOD INHABITING FUNGI AND BRYOPHYTES IN SEMI-NATURAL BEECH FORESTS IN EUROPE

**ÓDOR**, **PÉTER**, Loránd Eötvös University, Hungary; **Heilmann-Clausen**, **Jacob**, HabitatVision, Denmark; **Christensen**, **Morten**, Royal Veterinary and Agricultural University, Denmark; **Aude**, **Erik**, HabitatVision, Denmark; **Piltaver**, **Andrej**, Institute for the Systematics of Higher Fungi, Slovenia; **Siller**, **Irén**, Faculty of Veterinary Science, Szent István University, Hungary; **Walleyn**, **Ruben**, Institute for Forestry and Game Management, Belgium; **Standovár**, **Tibor**, Loránd Eötvös University, Hungary

Species composition and diversity of fungi and bryophyte assemblages occurring on dead beech trees were analysed in five European countries. Species composition and diversity of fungi and bryophyte assemblages occurring on dead beech trees were analysed in five European countries. In the composition of fungi the effect of decay stage exceeded the effect of geographical difference, whereas for bryophytes it was the opposite. In the case of bryophytes in Slovenia hepatics, in Hungary and Denmark pleurocarpic mosses, and in The Netherlands and Belgium acrocarpic mosses were the most important. The species richness of both groups differed among countries but their diversity patterns deviated. Slovenian sites were a biodiversity hotspot of bryophyte diversity (high species richness, presence of threatened species), Hungarian sites had and intermediate position while the Atlantic region had deteriorate assemblages. For fungi species richness was very high in Denmark, but the Hungarian and Slovenian sites were richer in threatened and low frequent species. Tree size was better able to explain variation in tree level species richness of both organism groups than decay stage. The diversity patterns of both organism groups along the investigated geographical gradient appear to be influenced by both climatic and management related factors (forest history, dead wood availability).

### 215. BIODIVERSITY AND SHIFTING CLIMATE SPACE IN EUROPE – PRESENT-DAY PATTERNS AND FUTURE THREATS

**OHLEMÜLLER**, **RALF**, University of York, United Kingdom; **Araújo**, **Miguel B.**, Oxford University, United Kingdom; **Gritti**, **Emmanuel S.**, Lund University, Sweden; **Sykes**, **Martin T.**, Lund University, Sweden; **Thomas**, **Chris D.**, University of York, United Kingdom

Future climate change is likely to change the extent and the spatial distribution of European climatic space. Species will have to adapt to these changing conditions or will have to follow the changing climates across the continent. We present a novel approach to quantify present-day and future European climate space. Our analysis identifies areas for which analogous climate conditions will expand or disappear and for which the distance to areas with such conditions will increase or decrease. We illustrate the application of our approach for large-scale climate change risk assessments with two examples: European endemism hotspots, which are located in areas of highest climatic rarity and European tree species, which show distinct differences between levels of risk associated with loss of climatically suitable area and the distance to climatically suitable areas in the future. Mediterranean tree species will have large areas of suitable climates in the future but these areas will generally be far away; broadleaved temperate species will experience a decrease in areas with suitable climate but these areas are generally close to the species' current distribution. Our analyses provide new measures which should help to further refine biodiversity risk assessments and guide conservation prioritisation under climate change.

**216. BOTANIC GARDENS CONSERVATION INTERNATIONAL – SUPPORTING PLANT CONSERVATION AND EDUCATION PROGRAMMES IN BOTANIC GARDENS**

**OLDFIELD, SARAH**, Botanic Gardens Conservation International, UK

BGCI is the world's largest international network working for plant conservation. Linking more than 800 botanic gardens in 118 countries, BGCI is a major professional body representing botanic gardens across the world. BGCI's goal is to help conserve 50% of the world's threatened plants by 2010. With a focus on ensuring that plants are recognised as one of the world's most important natural resources, BGCI helps botanic gardens to address urgent issues of environmental protection through conservation, education, training and community programmes. A key tool to support the conservation work of botanic gardens around the world is BGCI's Plantsearch database, which records plants in cultivation in botanic gardens around the world. The Plantsearch database provides botanic garden curators with an invaluable conservation planning tool. The database is also used to monitor Target 8 of the Global Strategy for Plant Conservation (GSPC) which calls for 60 percent of threatened plant species to be in accessible ex situ collections. This paper provides details of BGCI's conservation and education programmes around the world.

**217. THE GENETIC DISTANCES BETWEEN EUROPEAN BISON HERDS ON PEDIGREE DATA BASES**

**OLECH**, **WANDA**, Warsaw Agricultural University, Poland; **Perzanowski**, **Kajetan**, Museum and Institute of Zoology, Polish Academy of Sciences, Poland

The total population size of endangered European bison (Bison bonasus) is equal to 3100 individuals; with ca. 1100 in captivity. Additionally the species is divided into two genetic groups: pure Lowland (B. b. bonasus) and Lowland-Caucasian mixture with (B. b. caucasicus). Very serious threats for European bison are its population fragmentation, isolation and inbreeding. The transfer of animals between captive and free living herds is a very important part of conservation strategy for saving the genetic variability within the species. The knowledge of genetic value of particular animals and every herd is an important tool for organizing such transfer. The source of information for this study was pedigree records of animals from large herds of LC line distributed all over the Europe. The contribution of founders and inbreeding coefficient were calculated within every group as well as distances between groups. The genetic structure of animals kept in Germany and Austria is much better than in other herds. In gene poll of some herds not all 12 founders are represented. According to obtained results, animals that carry the most interesting founders genes will be translocated among herds and used in breeding programs.

**218. MOLECULAR ANALYSIS OF HYBRIDISATION BETWEEN WILD AND DOMESTIC CATS IN PORTUGAL: IMPLICATIONS FOR CONSERVATION**

**OLIVEIRA**, **RITA**, CIBIO, Centro de investigação em Biodiversidade e Recursos Genéticos, Portugal; **Godinho**, **Raquel**, CIBIO, Centro de investigação em Biodiversidade e Recursos Genéticos, **Randi**, **Ettore**, INFS, Istituto Nazionale per la Fauna Selvatica, Italy; **Ferrand**, **Nuno**, CIBIO, Centro de investigação em Biodiversidade e Recursos Genéticos, Portugal; **Alves**, **Paulo Célio**, CIBIO, Centro de investigação em Biodiversidade e Recursos Genéticos, Portugal

The endangered European Wildcat is represented, nowadays, by fragmented and declining populations particularly threatened by crossbreeding with widespread domestic cats. In Portugal, the wildcat has a central importance in wildlife protection, since it might be the only resident wild feline after the probable extinction of reproductive populations of Iberian-lynx. Although listed as VULNERABLE, genetic diversity of Portuguese wildcats and effects of interbreeding with their domestic counterparts remain undisclosed. In this study, we served genetic variation at 12 microsatellites for 64 domestic and 34 morphologically identified wildcats collected across Portugal. We observed a significant genetic differentiation between wild and domestic cats, with FST and RST values of 0.11 and 0.18, respectively ($P<0.001$), reflecting distinct gene pools for both groups. Population structure and admixture analysis performed using innovative Bayesian approaches also showed evidence of two distinct clusters. A consensus analysis of different Bayesian model-based software identified four individuals with admixed ancestry among wildcat population. Accordingly, more than 14% of wildcats were identified as hybrids suggesting that hybridisation has a crucial role in conservation strategies and highlighting the immediate necessity to enforce wildcat protection in Portugal.

**219. GENETIC ORIGIN DETERMINES SUCCESS OF REINTRODUCED WHITE STORKS**

**OLSSON**, **OLA**, Lund University, Sweden

White storks (Ciconia ciconia) are reintroduced to Sweden since 1989, after their local extinction in 1954. The founder population for the reintroduced birds originates in North Africa, rather than from the closest breeding population in Northeast Europe (here defined as native). A number of wild storks have immigrated spontaneously and a few others of native origin have been acquired for captive breeding. Over the 17 years 103 of the 241 breeding events have been by pairs where at least one parent had some native ancestry. The pedigree for all birds is known and from this I have calculated the proportion of native genes for each individual, the inbreeding coefficient, and the relatedness between parents. I find that, together with weather and supplementary feeding during the breeding period, the genetic origin strongly affects breeding performance. Pairs with entirely native ancestry get on average twice as many chicks as those of entirely African descent. Inbreeding and relatedness between parents are less important. In addition, birds with some native ancestry were more likely to migrate from Sweden than those with entirely African ancestry.

**220. THE TRANSBOUNDARY NATURE OF EUROPEAN LARGE CARNIVORE CONSERVATION**

**OLSZANSKA, AGNIESZKA**, Institute of Nature Conservation, Poland

Large carnivores occur at very low densities and as such their populations stretch over wide areas. In a European context this implies that many populations are transboundary in nature. This creates many challenges for management. There are two sets of Pan-European conservation legislation relevant for large carnivores; the Bern Convention ratified by 45 countries and the Habitats Directive implemented in 25 countries. However, individual countries have sometimes made rservations (to the Bern Convention) or have argued to have certain species included on different annexes (Habitats Directive). Also there are several key countries in Europe that are not a party to either agreement (Russia, Serbia & Montenegro, Bosnia & Herzegovina, Belarus). As a result many populations may experience very different management systems in different parts of their range. For example, on the Polish, Slovak, Ukraine border wolves are exposed to protection, regulated harvest and bounty supported control management systems. In this paper we summarise the diversity of management systems applying to single large carnivore populations, and calculate the extent to which populations occur along, or close to borders. The objective is to illustrate the need for international cooperation in the management of transboundary populations.

### 221. LOCAL ADAPTATION AND OUTBREEDING DEPRESSION IN (THREATENED) PLANTS: AN INTRODUCTION TO THE SYMPOSIUM

**OOSTERMEIJER, GERARD**, University of Amsterdam, Institute for Biodiversity and Ecosystem Dynamics, Netherlands

Due to their sessile nature and limited dispersal, plants tend to show strong genetic adaptation to their local environment. In Europe, the diversity of land-use and management has led to a relatively high occurrence of local adaptation. Moreover, the landscape has deteriorated to such an extent that ecological restoration is common practice. Bringing plants from different source populations into ecologically restored habitats, or adding these to existing populations for reinforcement theoretically introduces the risk of *outbreeding depression*, a low performance of offspring from outcrossing between different populations by dilution of genetically based local adaptation or disruption of coadapted gene complexes in recombining future generations. This risk is important for the choice of source material for plant (re)introduction programs. Many papers elaborate on sources for introduction or reinforcement programs, and most recognize the potential risk of outbreeding depression. Nevertheless, very few studies have thoroughly tested whether it will significantly affect establishment success, growth or evolutionary potential of populations. Most studies don't go beyond the F1-generation and can only detect *heterosis*. Furthermore, the majority is performed in a glasshouse or experimental garden, in which good tests of local adaptation are impossible. Hence, we need a general discussion to improve our knowledge and plan our research efforts.

### 222. ISSUES ASSOCIATED WITH THE USE OF REMOTE SENSING DATA IN PREDICTIVE MODELS OF SPECIES DISTRIBUTIONS

**OSBORNE**, **PATRICK**, University of Southampton, United Kingdom; **Leitao**, **Pedro**, University of Southampton, United Kingdom

Models predicting the distributions of wildlife have become a popular tool in conservation biology and ecology. Their uses are many and varied, including insights into competition theory, predicting the impacts of climate change, and identifying the best locations for protected sites. Predictive modelling requires well-distributed data sets and it is no surprise that researchers are increasing turning to remote sensing as a source of predictor variables. Remotely sensed data are well-suited to this application, the full grid of numerical reflectance values or derived indices providing an apparently ideal input to statistical models. The enthusiastic uptake of remotely sensed data in distribution models is not without problems, however, and little attention has been paid to the problems associated with using such data. In this paper, we briefly review the many remote sensing products that are available to distribution modellers and provide examples of their use. We then examine in more detail the assumptions made in using satellite and airborne imagery and the impact the choice of spatial resolution has on the collection of associated field data and the analyses that may be performed. A point of major concern is the mis-registration of data from different sources and we explore the interactions between co-registration, spatial scale and model performance.

### 223. EXTINCTION DEBT IN FORESTS - CONSEQUENCES FOR RESERVE DESIGN?

**OVASKAINEN**, **OTSO**, Helsinki University, Finland

Theory predicts that once the amount of suitable habitat falls below the extinction threshold, a species is doomed to go extinct in the long-term. However, extinction is not immediate, but there is a transient period. At a community level, the transient generates an extinction debt, meaning that there is a number of species that will eventually go extinct though they have not yet had time to do so. I review recent developments of this theory and relate it to data from forests. As a large fraction of boreal and tropical forests have fragmented relatively recently and are still fragmenting, accounting for the transient has important consequences for conservation. First, survey data may give an optimistic view of the current state, as the distribution of a species may partly reflect the distribution of the habitat in the past. Second, even conserving all remaining habitat does not necessarily stop extinctions, as species that are currently below the extinction threshold may be saved only by active restoration measures. Third, often legislation leads to protecting small fragments around the present occurrences of a species. This is not cost-effective, as instead of ensuring the long-term persistence of a species this strategy actually maximizes the amount of extinction debt in a landscape.

### 224. MANAGEMENT AND DEVELOPMENT OF ECOTOURISM IN GALLIPOLI PENNINSULA HISTORICAL NATIONAL PARK

**Ozturk**, **Munir**, Ege University, Turkey; **CELIK**, **SEZGIN**, Canakkale Onsekiz Mart University, Turkey; **Kelkit**, **Abdullah**, Canakkale Onsekiz Mart University, Turkey

Gallipoli Penninsula Historical National Park with an area of 33.500 ha. has been included in the Category V (protected landscape/Seascape) by IUCN during the meeting held in Buenos Aires-Brasil in 1994. It is situated on one of the major migration flyways of Western Palaearctic. The park is of national and international importance due to its landscape characteristics, history, archeology and socio-cultural features, displaying typical characteristics of the Mediterranen phytogeographical region in terms of plant diversity, which includes three categories of vegetation; forest, maquis and phrygana represented by 520 taxa belonging to 80 families and 313 genera. The dominting taxa are Pinus brutia, Olea europae var. oleaster, Phillyrea latifolia, Quercus coccifera Arbutus andrachne, Cistus creticus, Cardamine impatiens, Cappars spinosa,Silene otites,Salicornia europae,Amaranthus albus,Medicago coronata and Hedysarum spinossissimum. There are also many wildanimals and birds such as; Erinaceus concolor, Talpa europea, Lepus capensis, Sciurus vulgaris, Myomimus roachi, Meles meles, Sus crofa, Ardeola ralloides, Earetla garzetla, Lainus collurio, amphibians like Cyrtopodion kotschyi, Hemidactylus turcicus, Ophisaurus apodus, Lacerta praticola, Podarcis muralis, Podarcis taurica, Eryx jaculus, Coluber caspius, Telescopus fallax, fishes like Dentex dentex, Obloda melanura, Sparus auratus, Clupea pilchardus, Mugil saliens and Scorpeana porcus. The forests, sandy beaches, valleys and hill tops embody a great ecotourism potential, which can be evaluated for trecking, bird watching, horse riding, swimming, diving, water skating, slope gliding, in addition to the beach facilities. However, there is a great need for an integrative landscape planning in order to develope ecotourism in this area. The aim of this paper is to enlighten the suggestions in this connection.

### 225. LANDSCAPE METRICS TO ASSESS SPECIES RICHNESS IN PROTECTED AREAS OF GREECE

**PANTIS**, **JOHN D.**, Aristotle University, Greece; **Ragia**, **Vaia**, Aristotle University, Greece; **Kallimanis**, **Athanasios S.**, Aristotle University, Greece; **Sgardelis**, **Stefanos P.**, Aristotle University, Greece

Species-environment models are important tools for ecology and conservation. Our research aim was to predict local species richness using geographical, topographical and habitat landscape metrics. For this analysis we used data collected under the Natura 2000 directive in Greece. More specifically, we analyzed plant species richness (per constant sampling area) measured at 12 different habitat types (4 types of coniferous forests, 4 types of deciduous forests and 4 types of shrubland). For each sample we had geographic information (longitude, latitude and altitude), and topographic information. Each habitat in each site has been mapped and so we describe habitat spatial

pattern using landscape metrics. We used two modeling techniques: multiple regression and classification trees. We compared the efficiency of the different models when trying to predict samples from different areas, areas that were not used when building the models. We found that multiple regression models were successful in only few cases and even then, their predictions for new areas were unsatisfactory. Classification trees made better predictions for new areas. In general, geographical and topographical factors had lower predictive ability than the characteristics of the habitat's spatial pattern.

**226. DIVERSITY AND COLLABORATION IN THE PRESPA LAKES REGION**

**PAPAYANNIS, THYMIO**, Med-INA (Mediterranean Institute for Nature and Anthropos), Greece

The two Prespa lakes, shared by Albania, Greece and the FYR of Macedonia, have a rich biodiversity, culminating in the largest Dalmatian Pelican nesting colony in Europe, while Wolves and Brown Bears roam the surrounding mountains. This biodiversity though depends critically on water conditions in the lakes, which is also critical for local fishermen and farmers. The need for sensitive water management for both nature and people has let to the collaboration of the three countries that have established in February 2000 the transboundary Prespa Park. Six years later, considerable progress has been made, leading to specific interventions (such as the extension of wet meadows mainly by buffalo grazing, the determination of the optimum level variation for the two lakes, the regulation of the flow from Mikri to Megali Prespa and the study of the impact from the diversion of Devolli River to Mikri Prespa. A new 12.5 million dollar GEF project – that has just been approved– will address these issues in greater depth during the next five years and will contribute to greater solidarity among the three countries involved.

**227. A CONTRIBUTION TO KNOWLEDGE OF GENETIC DIVERSITY OF CARASSIUS AURATUS COMPLEX IN THE CENTRAL EUROPE**

**PAPOUSEK**, **IVO**, Institute of Vertebrate Biology, Academy of Sciences of the Czech Republic, Czech Rep.; **Vetesnik**, **Lukas**, Institute of Vertebrate Biology, Academy of Sciences of the Czech Republic, Czech Rep.; **Luskova**, **Vera**, Institute of Vertebrate Biology, Academy of Sciences of the Czech Republic, Czech Rep.; **Mendel**, **Jan**, Institute of Vertebrate Biology, Academy of Sciences of the Czech Republic, Czech Rep.

Carassius auratus is the most successful non-indigenous invasive species in Europe. Despite its negative impact on biodiversity of indigenous species, C. auratus is an object of local production cultures and sport angling. Genetic analyses of various C. auratus populations in Czech waters have shown, besides the prevailing haplotype group C, the occasional occurrence of another haplotype group, B. Phylogenetic analyses of cytochrome B (1132 bp) and mitochondrial D-loop (490-493 bp) proved existence of two maternal lineages in haplotype group B. Both lineages correspond with the form denoted as C. a. langsdorfii, which is sometimes considered a separate species. The presence of this form in central Europe has not yet been recorded. Besides the occasional occurrence of B2 line in males, we also identified a population consisting exclusively of triploid B1 line females. Simultaneously, a population of C. a. gibelio, also consisting exclusively of triploid females, occurs in that locality. We also found significant differences in number of gill rakers and maximum body height between the two forms. The genetic variability of C. auratus complex can be expected to contribute to considerable invasive properties of C. auratus. This project was supported by GA CR no. 206/05/2159.

**228. USING NOVEL WEAPONS TO CONTROL EXOTIC SPECIES**

**PASCHKE**, **MARK**, Colorado State University, United States; **Perry**, **Laura**, Colorado State University, United States; **Cronin**, **Spencer**, Colorado State University, United States; **Rieder**, **Julie**, Colorado State University, United States; **Vivanco**, **Jorge**, Colorado State University, United States; **Callaway**, **Ragan**, University of Montana, United States; **Szitár**, **Katalin**, Eötvös University, Hungary; **Török**, **Katalin**, Hungarian Academy of Sciences, Hungary

Effective methods of weed control are lacking for many destructive weeds. Finding economical and ecologically sound methods to control these plants is imperative for conservation of native species globally. Recently it has been shown that some exotic weeds in North America (NA) produce potent phytotoxins that displace native plants. Further, several European weeds of NA origin have been reported to have allelopathic properties in Europe. Allelopathy may be particularly important in invasions, where native plants are unlikely to have resistance to chemicals introduced by invaders. We are investigating whether exotic weeds, by the same mechanism, are particularly sensitive to chemicals of native allelopathic species. If so, then allelopathic seed mixes could be an effective tool for controlling exotic weeds. We used a series of experiments to examine the potential for native allelopathic species to act as selective "smother crops" to eliminate exotic weeds. NA native species were grown in mixture with weeds of European origin, with and without NA allelopathic species, to determine whether the allelopathic species can control the weeds and favor native species. Activated carbon was applied to soils to test for allelopathic effects. Results from these studies provide insights into the potential efficacy of a novel approach to controlling exotic invasive species.

**229. A NEW METHODOLOGY TO INTEGRATE LANDSCAPE CONNECTIVITY IN CONSERVATION PLANNING: APPLICATION TO CAPERCAILLIE (TETRAO UROGALLUS) HABITAT IN CATALONIA (SPAIN)**

**Pascual-Hortal**, **Lucía**, University of Lleida - ETSEA, Spain; **SAURA**, **SANTIAGO**, University of Lleida - ETSEA, Spain

The loss of connectivity of natural areas is a major threat for wildlife dispersal and survival and for the conservation of biodiversity. This has led to an increasing interest in considering connectivity in conservation and landscape planning. For this purpose, we present a new methodology based on graph structures and new habitat availability indices that overcomes several limitations of previous approaches. Graph structures are a powerful and effective way of overcoming computational limitations that appear when dealing with large data sets and performing complex analysis regarding connectivity. The new habitat availability concept considers a habitat patch itself as a space where connectivity exists, integrating habitat abundance and connectivity between patches in a single measure. We suggest that the connectivity problem should be considered within the wider concept of habitat availability in order to be useful for conservation planning. We present a new version of the software Sensinode where the methodology and new indices have been implemented. We apply it to determine the forest areas that are more critical for the maintenance of overall landscape connectivity for the capercaillie in Catalonia (NE Spain). We conclude by highlighting the potential and practical interest of this methodology for successfully integrating landscape connectivity in conservation planning.

**230. PROTECTING THE SCOTTISH COASTLINE: CONSERVATION, DEVELOPMENT AND SUSTAINABILITY**

**PATERSON**, **DAVID**, University of St Andrews, United Kingdom

Scotland has 11,000 km of coastline and one of the largest and most exploited areas of inshore waters in Europe. It is

recognised that this exploitation brings an accompanying responsibility for sustainability. Scotland has an international reputation in aspects of estuarine, coastal and marine research but the complexity of the coastal region requires that these disciplines be brought together to provide a framework under which the challenge of coastal sustainability can be met. The EU and the Scottish Executive have noted the decline in the quality of the coastal zone and recognized the requirement to protect these systems (Water Framework Directive, Bathing Waters Directive, UK Marine Bill) and have also identified failures in terms of previous management strategies (EU 2000, Scottish Executive, 2004). Global change will increase the threat to coastal zones in the future. The challenge is to bring together the parties responsible for protecting and exploiting the coastal zone to consider, approve and manage the best ways of protecting wealth and coastal system health. Strategies being considered include the implementation of marine protection areas and the use of holistic system assessment. This paper will introduce aspects of issues and the challenges for conservation.

### 231. BIODIVERSITY AND CONSERVATION OF AMPHIBIANS AND REPTILES OF THE REPUBLIC OF SERBIA

**PAUNOVIĆ, ANA**, Natural History Museum, Serbia & Montenegro; **Džukić, Georg**, Institute for Biology "Siniša Stanković", Serbia & Montenegro

Among 44 species of Amphibians and Reptiles inhabiting Serbia, including a potential species *Rana arvalis*, 32 are considered as internationally important. Most of these 44 species, 75% (19 Amphibians and 14 Reptiles) are protected by the Act on Protection of Natural Rarities of the Republic of Serbia, while *Rana esculenta* complex, *Testudo hermanni*, and *Vipera ammodytes* are included in the Act on Control of Collecting and Trade of Wild Flora and Fauna. Among the herpetofauna of Serbia there are 13 endemic taxa (species and subspecies) and 10 sub endemic taxa. Red list categories for Serbia do exist, but the Red book are planned to be finished during 2008. The most threatened areas with high biodiversety and rates of endemism "hotspots" are near the south border of Serbia with FYROM, in Central Serbia and the province of Kosovo. Among the 401 protected areas in Serbia, there is not any species specific one for Amphibians and Reptiles. Until these days detail studies are only carried out for *Rana esculenta* complex and *Testudo hermanni.* Action plans are not done for any amphibian or reptil yet, even though there are very large and important populations of *Ablepharus kitaibelii*, *Lacerta viridis* and *Elaphe longissima* in Serbia, probably the strongest ones in Europe.

### 232. EXAMPLES OF GOOD AND BAD PRACTICE FROM AGRI-ENVIRONMENT SCHEMES IN OLD EU MEMBER STATES, AND THEIR RELEVANCE FOR NEW MEMBER STATES

**PEACH**, **WILL**, Royal Society for the Protection of Birds, United Kingdom; **Báldi**, **András**, Hungarian Natural History Museum, Hungary

Large amounts of agri-environment expenditure across old EU member states have delivered highly variable benefits for biodiversity. We present examples of agri-environment measures that have had substantial and limited benefits for biodiversity, and highlight traits associated with success and failure. Success traits include (1) prior research of factors limiting the abundance of biodiversity, (2) the development and field testing of measures to provide limiting resources for biodiversity without seriously compromising agricultural objectives and (3) careful geographic targeting of tested measures. Failure traits include an absence of clearly defined target biological outcomes. We highlight promising new potential agri-environment measures developed in old member states that may have applicability in new member states. These include (a) the leaving of unsown patches in cereal fields for ground-nesting birds, (b) the growing of spring-sown cereals with minimal herbicide applications to provide seed-rich winter stubbles, (c) reduced intensity grazing to promote invertebrate abundance on grassland and (d) allowing late summer cuts of silage grass to set seed and remain in situ over winter as a seed resource for birds. Given the different biogeographical conditions and land management histories of many new member states, we emphasize the need for thorough local testing of measures developed elsewhere.

### 233. ASSESSING PREDICTIONS OF FUTURE HABITAT DISTRIBUTION USING ANCIENT PLANT DISTRIBUTIONS

**PEARMAN**, **PETER B.**, University of Lausanne, Switzerland; **Randin**, **Christophe F.**, University of Lausanne, Switzerland; **Czaka**, **Thomas**, University of Lausanne, Switzerland; **Guisan**, **Antoine**, University of Lausanne, Switzerland

The vast extent of anthropogenic habitat destruction and low current rates of restoration suggest that many species will be forced to rely on adequate reserve systems for their continued long-term existence. Reserve networks are designed to provide adequate habitat for species, currently and for the future. Rapid global warming is expected to cause uneven changes in both average temperature and precipitation at regional scales. Currently, the impacts of these changes on the distribution of plants and the habitat they create can be estimated by application of predictive distribution models to describe the environmental niche of species, and to predict how changes in abiotic conditions will influence species distribution. While models of current species distribution can be validated with independent datasets, models of future distribution predict beyond existing data. We evaluate the reliability of these predictions by using fossil pollen data and paleoclimate maps to evaluate climate-based models for the distribution of forest species during the middle and recent Holocene. Our analysis show that modeling future plant distribution is a risky business and that conservation planning should accomodate substantial uncertainty in the anticipated effects of climate change on species potential future distributions.

### 234. BUTTERFLY DIVERSITY AND CONSERVATION IN AGRICULTURAL LANDSCAPES: INCORPORATING BEHAVIORAL MECHANISMS

**PEER**, **GUY**, The Hebrew University of Jerusalem, Israel; **Kark**, **Salit**, The Hebrew University of Jerusalem, Israel

An important goal in biodiversity and conservation studies in human-dominated landscapes is to unveil the processes underlying spatial patterns. In this study we examined the effect of animal movement and dispersal behavior on biodiversity patterns in agricultural landscapes across a sharp climate gradient in Israel, ranging from 100-700 mm mean annual rainfall. We focused on butterflies in wheat fields and olive groves bordering natural habitats. Within each field we established three transects 100m into the field and 50m into the natural area. We recorded the behavior, movement direction and speed of each individual observed, and analyzed both diversity patterns and behavioral patterns as a function of distance into the fields. We found that (a) olive groves are richer in species due to their structural heterogeneity; (b) field edges serve as unique habitats; (c) changes in biodiversity into fields are associated with changes in the butterflies' movement behavior; and (d) both behavior and biodiversity patterns depend on the location of fields along the climatic gradient. Our approach enables portraying a picture of biodiversity which combines behavioral and functional responses with empirical correlations between landscape type and species diversity. Thereby, it allows us to improve predictive models for conservation.

### 235. FLOATER DISPERSAL DYNAMICS AND SURVIVAL AFFECTS BREEDING POPULATION PERSISTENCE: A CASE STUDY WITH THE EAGLE OWL

**PENTERIANI**, **VINCENZO**, Estación Biológica de Doñana, Spain; **Delgado**, **María Del Mar**, Estación Biológica de Doñana, Spain

The temporary settling zones used during dispersal by non-breeders are usually unknown for most species and the dynamics of dispersers within them poorly studied. Therefore, the effects of habitat loss, mortality rates, extinction probability and environmental stochasticity have been considered as less important or ignored for settlement areas. As a consequence, such sites are typically less protected than breeding territories, which may lead to increased risk of mortality for dispersing individuals. As a result, habitat destruction and decline in survival rates within settlement areas could be critical factors affecting the persistence of the whole population. We previously showed that: (1) factors affecting floater survival influence the dynamics of the breeding segments of populations; and (2) increases in floater mortality can explain puzzling decreases or extinctions of breeding populations. Continuous radiotracking of 50 juveniles of Eagle Owl (Bubo bubo) during three years allow us to show now that specific dispersal patterns can be responsible of low occupancy rates of breeding territories affected by stochastic mortality of breeders. Moreover, because many floaters can share the same settlement area during dispersal, environmental stochasticity within settling zone may seriously reduce the available stocks of new mates able to occupy vacancies in breeding areas.

### 236. LANDSCAPE EFFECTS ON THREATENED POLYPORE SPECIES

**PENTTILÄ**, **REIJO**, Finnish Environment Institute, Finland; **Hanski**, **Ilkka**, University of Helsinki, Finland; **Kotiranta**, **Heikki**, Finnish Environment Institute, Finland; **Lindgren**, **Mariko**, University of Helsinki, Finland; **Miettinen**, **Otto**, University of Helsinki, Finland; **Punttila**, **Pekka**, Finnish Environment Institute, Finland; **Siitonen**, **Juha**, Finnish Forest Research Institute, Finland; **Virkkala**, **Raimo**, Finnish Environment Institute, Finland

Fragmentation of old-growth forests and scarcity of dead wood in managed forests have caused a marked decline in populations of saproxylic species in Fennoscandia. For example in Finland 37 % of the polypore species have been classified as threatened or near-threatened. However, due to regional differences in forestry history and in the amount of old-growth forests and dead wood threatened polypore species are expected to show regional variation in their occurrence. Here we present data on the occurrence of threatened polypore species from three different study areas – Russian Karelia, eastern Finland, south-western Finland – which show a gradient of increasing forestry use and decreasing amount of old-growth forests and dead wood from east to west. Our data, which is mainly collected from spruce-dominated old-growth forests, clearly shows that the species number, incidence of occurrence and abundance of threatened polypore species declines strongly from east to west according to the increasing forestry use. In the old-growth forests of south-western Finland threatened polypore species seem to either lack totally or they occur in so low abundances that they have a high risk of regional extinction unless the amount of dead wood and old-growth forests is substantially raised in the near future.

### 237. THE FUTURE OF BIODIVERSITY AND ECOSYSTEM SERVICES: AN ANALYSIS ACROSS SCALES

**PEREIRA**, **HENRIQUE MIGUEL**, Instituto Superior Técnico, Portugal

Four global socio-ecological scenarios for the 21th century have been developed by the Scenarios Working Group of the Millennium Ecosystem Assessment. Here I show how the scenarios can be scaled down from the Global to the National scale for Portugal, and then to the Local scale, for a rural community. Distributional and equity issues become apparent when comparing scenarios at different scales, illustrating the dangers of regional averages for analysing the consequences of changes of ecosystems services for human well-being. The importance of the drivers differs across scales. At the global scale, land-use change, climate change and nutrient loading will become an increasingly severe problem. At the national and local scale, the changes associated with agricultural abandonment and the management of fire frequency dominate. Responses targeting a driver should be implemented at the scale where that driver is most important. I conclude with an analysis of the biodiversity monitoring data needed to improve scenarios development.

### 238. GENETIC RESCUE, SELF-INCOMPATIBILITY ALLELES AND OUTBREEDING DEPRESSION IN FRAGMENTED POPULATIONS OF RUTIDOSIS LEPTORRHYNCHOIDES (ASTERACEAE)

**PICKUP**, **MELINDA**, CSIRO, Australia; **Young**, **Andrew**, CSIRO, Australia; **Rowell**, **David**, Australian National University, Australia

The potential for outbreeding depression is an important genetic consideration in the restoration of threatened plant species. However, for many species with self-incompatibility (SI) systems, the introduction of new self-incompatibility alleles (S alleles) into small populations is crucial to increase mate availability and long term population viability. This study aims to examine patterns of outbreeding depression and the fitness trade off of introducing new S alleles into populations of Rutidosis leptorrhynchoides (Asteraceae), an endangered perennial herb endemic to south-eastern Australia. We examine how differences in environment, and molecular (AFLP markers) and quantitative genetic variation between populations relate to outbreeding depression and investigate population differentiation at the SI locus. To examine outbreeding depression, F1, F2, F3 and control (within population) offspring were generated for 12 population pairs separated by distances from 1-600 km. Heterosis was observed in the F2 and F3 generations for germination, growth and reproductive characteristics, particularly in population pairs separated by 10-100km. Results from this study suggest that populations may benefit from the introduction of new genetic material, and that to ensure the introduction of new S alleles into small populations, material should be sourced from greater geographical distances

### 239. EPIKARST - A PROMISING AND VULNERABLE HABITAT

**PIPAN**, **TANJA**, Scientific Research Centre SAZU, Slovenia; **Culver**, **David C.**, American University, United States

The uppermost layer of karst is an ecotone between surface and subsurface water, the site of significant water storage, and the site of a highly diverse and specialized fauna. The habitat is not directly accessible but water dripping from epikarst into caves provides a means of quantitative sampling. In a study of six caves in the Dinaric region of Slovenia 37 species of copepods were found, 12 were previously unknown and 25 species were obligate subterranean-dwelling species (stygobionts). The Chao2 estimate of total copepod diversity for these caves was 44. Based on preliminary studies of epikarst communities in other parts of the world, the Dinaric region of Slovenia appears to be a global hotspot of epikarst diversity. Ranges of individual populations are often on the order of hundreds of meters and their vertical extent is at most tens of meters. The highly localized nature of these populations combined with the frequent use in many regions of sinkholes for dumping and waste disposal often puts epikarst communities at risk. Increased education about this fauna is an important tool in its protection.

### 240. SPATIAL DETERMINANTS OF CABRERA VOLE'S PERSISTENCE IN MEDITERRANEAN AGRO-ECOSYSTEMS: IMPLICATIONS FOR CONSERVATION

**PITA**, **RICARDO**, Conservation Biology Unit - University of Évora, Portugal; **Beja**, **Pedro**, Erena - Ordenamento e Gestão de Recursos Naturais Lda., Portugal; **Mira**, **António**, Conservation Biology Unit - University of Évora, Portugal

In intensive agro-ecosystems, species of conservation concern are often known to persist in marginal habitat-patches amid an inhospitable matrix. This is the case of the Cabrera vole (Microtus cabrerae), a habitat specialist, which is threatened by the cumulative loss and fragmentation of humid perennial tall-herb communities. This study aimed to assess the relationship between patch use by the Cabrera vole and a set of variables describing local and landscape attributes in a south-west Portugal agro-ecosystem. Results indicated that patch isolation had a negative effect in determining voles' presences. Considering the landscape context around habitat-patches, grazed croplands and improved pasturelands showed a negative effect on occupancy status by voles, whereas natural pastures seemed to favour occurrences. Patch size and its distance to the nearest stream had, respectively, a positive and negative influence upon the frequency by which each patch was used. These results point out the importance of spatial processes in determining the regional persistence of the Cabrera vole in agricultural landscapes, suggesting that key metapopulation processes might be at play. Conservation of this species in agro-ecosystems requires the maintenance of high connectivity between habitat-patches, thereby decreasing the probability of local extinctions and increasing the likelihood of colonization of empty patches.

### 241. CURRENT AND FUTURE TRENDS IN HUNGARIAN AGRICULTURE AND THE ROLE OF AGRI-ENVIRONMENT SCHEMES

**PODMANICZKY**, **LÁSZLÓ**, Szent Istvan Universiy, Institute of Environment- and Landscape Managament, Hungary; **Ángyán**, **József**, Szent Istvan University, Institute of Environment- and Landscape Management, Hungary

The future of the countryside is more problematic in Hungary than in other countries, because in Hungary the good ecological conditions are present along with natural and social problems. Half of the country's territory can be characterized as favourable for agroproduction. On the other hand, service-like activities – like sustaining the environment, and preserving the nature – have strong territorial base as well. We need to apply different strategies to the different ecological, environmental conditions, which have to be harmonized – whether it is a farm-level, or a national-level strategy. The harmonization is ment to be implemented by a truly integrated agricultural strategy, which would be based on the dual system of market-related and not market-related activities. In the presentation, first we give an overview of the way land-use and farm-structure have changed in Hungary in the last decade, and the ecological, economical, social problems that derive from that change. Then, we examine what kind of changes in cropping and livestock practices are needed that are suitable for the country's agricultural conditions and environmental problems. We would give a special attention to the role of the agri-environmental schemes in order to harmonize the Hungarian agriculture with the 2$^{nd}$ pillar of CAP.

### 242. PROCEDURAL BLUEPRINT FOR CARPATHIAN ALPINE HABITATS BIODIVERSITY INVENTORY. A MODEL DEVELOPED UNDER LIFE NATURA PROGRAM

**POP, LIANA-NICOLETA**, Focal Centre for Biodiversity Monitoring and Conservation, Romania; **Sergiu, Mihut**, Focal Centre for Biodiversity Monitoring and Conservation, Romania; **Calin, Hodor**, Focal Centre for Biodiversity Monitoring and Conservation, Romania

The project is focusing on the implementation of an improved conservative management set of actions targeting Carpathians alpine habitats. A pilot project funded under LIFE Nature program targeting Retezat National Park (Romania), is intending to implement innovative comparative biodiversity inventory studies in order to pinpoint potential impacts and to identify key bioindicator species. A GIS database linked to national Biodiversity Information Management System will open the way for a procedural blue-print for the identification and designation of Natura2000 sites. All scientific data will be gathered within an individual manual for the conservative management of alpine habitats to be integrated into the Management Plan of the Park. This instrument will be proposed to responsible national and international authorities in order to be included in their specific policies and strategic plans.

### 243. SPRING FENS AS IMPORTANT CENTRES FOR MAINTAINING ALGAL BIODIVERSITY IN THE WEST CARPATHIANS

**POULICKOVA**, **ALOISIE**, Faculty of Science, Palacky University Olomouc, Czech Rep.; **Hajek**, **Michal**, Faculty of Science, Masaryk University Brno, Czech Rep.

Epiphytic cyanobacteria and algae inhabiting bryophytes and their relation to water chemistry, bryophyte species composition, light and moisture characteristics were studied in spring fens of the West Carpathians (Czech and Slovak Republics). Algae were washed out from the bryophytes, concentrated by sedimentation, fixed, counted and identified. The total abundance of algae reached millions per 1g of dry bryophyte matter. Algal assemblages were mostly represented by diatoms, Desmidiales were common at acidic fens, cyanobacteria were found in neutral and alkaline springs. Altogether, 368 algal taxa were found. The most important factors influencing algal abundance, species diversity and richness were found to be base saturation (measured as pH and conductivity) that determined species composition on the landscape scale and moisture that determined variation within fens. The same pattern was detected also for higher plants. Vertical distribution of epiphytes on bryophyte plants and their seasonal dynamics were influenced by moisture and light. Spring fens represent one of the most important sources of biodiversity in the current landscape. They are unique for their vegetation, specific water chemistry and specific assemblages of algae, fungi and invertebrates. All well-preserved remnants of spring-fen vegetation should be protected and extensively managed.

### 244. URBAN ENVIRONMENTAL EFFECTS ON FOREST FRAGMENTS IN THE EASTERN USA

**POUYAT**, **RICHARD**, USDA Forest Service, United States; **Zipperer**, **Wayne**, USDA Forest Service, United States

Many remote and rural landscapes have been, and continue to be, extensively modified and fragmented by urbanization as the human population continues to grow. Further, as these areas are rapidly developed, many national and state forests and parks now share a boundary with residential development. The remaining forest in these urbanizing landscapes may require different management practices than traditionally applied to forests in non-urbanizing landscapes. Results from 10 years of research in the New York Metropolitan area and recently from the Baltimore Ecosystem Study suggest that these remnant forest patches are being indirectly altered by urban effects. These effects include modified meso-climates ("urban heat island effect"), increased concentrations of atmospheric pollutants (e.g., nitrogen, sulfur, heavy metals, ozone), modified disturbance regimes (e.g., both increases and decreases in fire frequency), and compositional changes of plant and animal species due to introductions of non-native species. To maintain or enhance the ecosystem benefits of remnant forests, these environmental modifications must be considered when developing management strategies for site, landscape, and regional scales. We present approaches to meet these strategies.

**245. AGRI-ENVIRONMENTAL SCHEMES IN THE NEW MEMBER STATES**

**PRAZAN**, **JAROSLAV**, European Environment Agency, Denmark

The New Member States (NMS) territory represents a significant natural and landscape diversity and hosts several species and habitats which were lost in the Western part of Europe. The EU accession process was accompanied by major changes in the policy framework and economies in NMSs. The NMSs implemented agri-environmental schemes (AES) as a part of CAP. This step was quite a challenge for the NMS for several reasons. The issues behind were for example different political priorities, lack of data and scientific evidence for design of the schemes and lack of capacities in an implementation stage. Therefore it could be expected current AES are far from reaching of their full potential in conservation of natural resources in the NMSs. This implies there are challenges for research and development in near future. These range from the scientific evidence for design of the schemes to political arguments for implementation of well targeted schemes. This presentation will contain: overview of types of farming, environmental issues and agri-environmental schemes in NMSs, the second part will focus on the major issues for the development of AES in NMSs.

**246. TAKING SYSTEMATIC CONSERVATION PLANNING FORWARD: DATA AND METHODS NEEDED FOR COUNTDOWN 2010**

**PRESSEY**, **ROBERT**, University of Queensland, Australia

Recent advances in conservation planning promise to contribute substantially to Countdown 2010. Among these are four changes that warrant particular attention. The first is from targets to continuous benefit functions. Continuous benefit functions acknowledge that gain in benefit for biodiversity is continuous with increasing conservation investment and does not plateau at the target value. The functions might resemble species-area curves, or be asymptotic, sigmoidal, or linear. Importantly, they give some value to all parts of the landscape retaining biodiversity. The second change is from maximizing gain in biodiversity within protected areas to minimizing loss of biodiversity across entire landscapes. This recognizes that areas outside strict reserves vary in their likelihood of losing biodiversity values and focuses conservation resources on the most valuable and threatened, not the easiest to protect. The third change is from seeing areas in a binary way (protected or not; natural or not) to recognizing gradients of management mechanisms and “condition” relating to differences in species composition. The fourth change is from plans to alternative futures for regions and landscapes. With information on land use dynamics and management responses, new tools can depict plausible future trajectories of biodiversity corresponding to different policy or funding decisions.

**247. EXOTIC PETS RELEASED IN THE WILD: DECISION-MAKING PROCESS REVISITED**

**PREVOT-JULLIARD**, **ANNE-CAROLINE**, UMR 8079 Laboratory Ecology, Systematics and Evolution, France; **Lorrilliere**, **Romain**, UMR 8079 Laboratory Ecology, Systematics and Evolution, France; **Teillac-Deschamps**, **Pauline**, UMR 8079 Laboratory Ecology, Systematics and Evolution, France; **Cadi**, **Antoine**, UMR 8079 Laboratory Ecology, Systematics and Evolution, France; **Servais**, **Veronique**, Anthropology of Nature, Belgium

Exotic pets released in the wild occupy a particular position among human-driven introductions since, in addition to being potential invaders, these species are well known and appreciated by the general public. These contradictory arguments may lead to potential conflicts between stakeholders in decision-making process concerning management actions. In this talk, we describe a research-action program built on the case of exotic Slider turtles Trachemys scripta elegans introduced in France. We show how biological questions (colonisation properties and impact on local ecosystems) can be mixed with anthropo-social questions (perception of slider turtles in French ecosystems) through companion modelling and multi-agent system. We propose how this research process can be used as a guideline for decision-making, in order to integrate all points of view and sensibilities, in other conservation programs in urban areas

**248. EUROPE’S LITTLE-KNOWN BIODIVERSITY HOTSPOT: INVENTORY OF THE TRANSCARPATHIAN FLOODPLAIN ECOSYSTEMS**

**PROTS, B**.˙ National Academy of Sciences of Ukraine, State Museum of Natural History, Ukraine; **Drescher, A**., University of Graz, Institute of Botany, Karl-Franzens Austria; **Bashta, T**., National Academy of Sciences of Ukraine, Institute of Ecology of the Carpathians, Ukraine; **Danylyk, I**., National Academy of Sciences of Ukraine, Institute of Ecology of the Carpathians, Ukraine; **Godunko, R**., National Academy of Sciences of Ukraine, State Museum of Natural History, Ukraine; **Inkin, E**., Academy of Sciences of Ukraine, State Museum of Natural History, National Ukraine; **Julius, E**., University of Applied Science Eberswalde, Germany; **Kichura, V**., Transcarpathian Provincial Department for Forestry, Ukraine; **Kish, R**., Uzhgorod National University, Ukraine; **Lugovoy, O**., Uzhgorod National University, Ukraine; **Meteleshko, S**., Uzhgorod National University, Ukraine; **Mirutenko, V**., Uzhgorod National University, Ukraine; **Mountford, O**., NERC Centre for Ecology and Hydrology, United Kingdom; **Myhaly, A**., Uzhgorod National University, Ukraine; **Orlov, O**., National Academy of Sciences of Ukraine, State Museum of Natural History, Ukraine; **Polyanovsky, A**., State Department for Ecology and Natural Resources in the Transcarpathian Region, Ukraine; **Popov, S**., “Science and Consulting” Ltd., Ukraine; **Potish, L**., Uzhgorod National University, Ukraine; **Rizun, V**., National Academy of Sciences of Ukraine, State Museum of Natural History, Ukraine; **Sabadosh, V**., Uzhgorod National University, Ukraine; **Sverlova, N**., National Academy of Sciences of Ukraine, State Museum of Natural History, Ukraine; **Vovk, O**., National Academy of Sciences of Ukraine, State Museum of Natural History, Ukraine

The ancient riverine forests of Central Europe are amongst the "most diverse, structurally, floristically and faunistically, of all European ecosystems" (Moss et al. 1991). The Transcarpathian floodplain examples are one of the largest surviving refugia of this forest, and a largely overlooked biodiversity hotspot, with until now no effective conservation. The territory has been poorly studied despite its location close to the borders of Slovakia, Hungary and Romania. The study purpose was to inventory the basic diversity of vascular plants, beetles, butterflies, mayflies, molluscs, fish, amphibians, reptiles, birds, mammals, vegetation communities, habitats and soils. A database (GIS) of threatened biota has been developed. The floodplain comprises a diverse combination of riverine forests, wet meadows, oxbows and man-made channels. The unique but fragmented old growth forests (~150-250 years old; ~2500 ha) are dominated by stands of *Fraxino pannonicae-Ulmetum* and associations of the order *Salicion albae* and *Fraxino-Populetum*. The high number of nationally and internationally threatened species and communities and an exceptional diversity of EU priority habitats known to be present, together with the imminent threat of large scale destruction, provide an urgent need to work towards the establishment of a major protected area for these forests.

**249. CONSERVATION STRATEGIES AND TARGET GROUPS IN CRAYFISH CONSERVATION ACROSS EUROPE**

**PUKY**, **MIKLÓS**, Institute of Ecology and Botany of the Hungarian Academy of Sciences, Hungary; **Reynolds**, **Julian**, Trinity College, Ireland

All species of European crayfish are in decline across much of their range, for a complex of reasons including disease

(especially crayfish plague) and widespread environmental deterioration. Strategies for their conservation need to reflect the different biology and distribution of each species. They include: - Make crayfish more visible. Protection renders them uncatchable, and their diminution or loss may go un-noticed. - Encourage their adoption by youth groups, schools etc. Children are natural enthusiasts, and will educate their parents and communities, while crayfish are robust enough to be handled safely. - Target fishing clubs directly and through their regulatory bodies who can feature crayfish in their information. - Use media creatively, when the opportunity arises (e.g. special supplements about our environment, about water, and about crayfish fishing in Scandinavia). - Emphasise history and heritage - art, old books, carvings, folklore. - Publicise problems and dangers - e.g. the need to identify American crayfish and the dangers of crayfish plague and precautions needed.

### 250. DEVELOPING AN EVIDENCE-BASE TO SUPPORT CONSERVATION DECISION-MAKING

**PULLIN**, **ANDREW**, Centre for Evidence-Based Conservation, United Kingdom

The case for developing an evidence-based framework to support conservation decision making has now been established in the literature. The methodology to deliver it has also been published and is discussed elsewhere in this symposium. The current challenge is how to achieve sufficient engagement across the conservation community to ensure that sufficient resources are made available for the framework to flourish. Taking the medical model of the 'Cochrane Collaboration', the central accumulated asset is the Cochrane Library of systematic reviews. This talk considers the key players in establishing the library and discusses their equivalents in conservation. Managers and policy formers have a dual role as both question generators and end-users of reviews. Review and Dissemination Centres act as co-ordinators and drivers of the methodology as well as being managers and disseminators of information. Both groups have performed well in pilot programmes. To generate an adequate number of reviews requires the wider scientific community to organise Review Groups around key subjects and for the funding community to provide resources for to take on review activity. Finally, to develop a global collaboration that feeds reviews into a central library requires an international steering group and/or a global conservation organisation.

### 251. LIFE NATURE, THE HABITAT DIRECTIVE, AND THE NATURA 2000 NETWORK: AN ITALIAN EXPERIENCE IN FISH CONSERVATION

**PUZZI**, **CESARE MARIO**, G.R.A.I.A. Srl, Italy; **Trasforini**, **Stefania**, G.R.A.I.A. Srl, Italy; **Bellani**, **Adriano**, Parco Lombardo della Valle del Ticino, Italy; **Furlanetto**, **Dario**, Parco Lombardo della Valle del Ticino, Italy

The Life-Nature Project of conservation of two freshwater fish, pigo (Rutilus pigus) and marble trout (Salmo marmoratus), concluded in September 2004. Both the species are subendemic in the North Italy and included in Annex II of the Habitats Directive (92/43/EEC). The project, realized by the Ticino Park in the Ticino River, one of the greatest and best preserved Italian rivers, has lasted three years and it involved many corporate bodies of management and local associations of fishermen and volunteers. The project aimed to increase the living populations of the two species, through the elimination or the control of the causes of their decline and of the limiting factors to their resumption. Different activities have been carried out to pursue these objectives: artificial reproduction of wild reproducers, breeding in semi-natural environment, repopulation of the river with autochtonous yearlings and environmental education. The limiting factors have been contrasted through activities like the containment of the exotic and invasive sheatfish (Silurus glanis), the planning of fish passes and the acquisition of the fishing management in strategic areas. In this article, the results of the project are summarized, focusing the attention on those aspects important to restore the equilibrium of the Ticino fish community.

### 252. CALCAREOUS GRASSLAND RESTORATION: A MULTI-SITE EVALUATION OF METHODS IN ENGLAND

**Pywell**, **Richard**, CEH Monks Wood, United Kingdom; **Bullock**, **James**, CEH Dorset, United Kingdom; **Marrs**, **Rob**, University of Liverpool, United Kingdom; **FAGAN**, **KATE**, CEH Monks Wood, United Kingdom

The calcareous grassland ecosystem is highly biodiverse and one of the highest priorities for nature conservation in Europe. There is, however, little evidence that the target ecosystem can be obtained by the restoration techniques and management practices currently used. Using a chronosequence approach we compared 40 restored sites (aged 2-60 and of different seeding strategies) each paired with a nearby, comparable site of good quality ancient grassland. We used multivariate analysis to assess the similarity of sites. Sites that regenerated naturally appeared to be moving towards the target, although success was limited by the distance to ancient grassland vegetation. Seeded sites, particularly with a low diversity mix, were less successful, and a high soil phosphorus concentration hindered progress. Plant community attributes (e.g. seed dispersal mechanism and perenniality) became more like those of reference sites with increasing site age. To conclude, the restoration of calcareous grasslands takes more than 60 years, but it is achievable. Seeding is expensive but not generally advantageous, and low-diversity seed mixtures are detrimental. We advise natural regeneration and a focus on sites close to ancient calcareous grassland for future restoration, but hypothesise that restoration will never be entirely successful until the system returns to nitrogen-limitation.

### 253. THE TALE OF ANCHUSA CRISPA (BORAGINACEAE) : NEW PERSPECTIVES IN CONSERVATION BIOLOGY - HOW UNEXPECTED OUTBREEDING DEPRESSION SET BACK ADAPTED MANAGEMENT

**QUILICHINI**, **ANGÉLIQUE**, University Paul Sabatier, France

In Biological Conservation, and more precisely in Restoration Genetics, appropriate management of endangered species depends on the choice of genetic material. Genetic pollution or maladapted genes can set back restoration trials. In this context, outbreeding depression is an important phenomenon to evaluate. Several studies suggest that small populations often self and develop floral morphologies adapted to selfing whereas widespread congeners outcross. So, mating system of rare species must be attentively studied to conserve efficiently their populations. We tested this assumption in the genus Anchusa, where widespread species, well studied, present distyly (i.e. floral morphology avoiding selfing) whereas endemic species, not studied, grow in small populations needing management. To estimate the mating system of these late species, we measured floral traits and bagged cymes to study the selfing potential. In the endemic A. crispa, which populations are subject to restoration, we also estimate the fitness of 2 generations of selfing and outcrossing in one population. All those species showed homostyly and high selfing potential. In A. crispa, the fitness estimation revealed outbreeding depression, proving a long history of rarity and co-adapted genes. Whereas management have often developed failures, careful attention must be made on the restoration processes for this species

### 254. IS IT POSSIBLE TO USE INDIRECT DATA ON POPULATIONS TO PREDICT THE OCCURRENCE OF OUTBREEDING DEPRESSION?

**RAABOVÁ**, **JANA**, Cahrles University, Czech Rep.; **Munzbergova**, **Zuzana**, Charles University, Czech Rep.

Many recent studies showed negative effects of lower population size on plant fitness. One possibility to increase population size

is to transfer individuals from other populations. While this approach has many advantages, it can also have negative effects in case of strong local adaptation. If such adaptations exist, crossing between individuals from different populations may lead to reduction of fitness of their offsprings due to outbreeding depression. Studies on local adaptations and outbreeding depression are rather time consuming since they require transplant experiments and experimental crosses between individuals. It would thus be useful if it was possible to detect these possible dangers of transfers using indirect data. In this study performed transplant and crossing experiment using Aster amellus, a rare dry grassland species. We use these experiments to estimate differentiation of the populations. Then we use other data on the populations – their habitat conditions and genetic diversity – to explore the relationship between results of the experiments and similarity of the different populations. We ask to what extend can these indirect data help us to estimate the expected differences between populations estimated in the experiment.

### 255. ENVIRONMENTAL EDUCATION AND PROMOTION OF CONSERVATION MESSAGES IN HUNGARIAN BOTANIC GARDENS

**RADVÁNSZKY, ANTAL,** University of Szeged Botanic Garden, Hungary; **Zsigmond, Vince,** Budapest Zoo and Botanical Garden, Hungary

Botanic gardens have been involved in developing educational programmes to communicate the importance of plant conservation using the facilities and resources avaible.
The long practice of handling ex situ collecions brings the experience of maintenance and the result of research to support in situ conservation not only directly through fieldwork but also providing basis for education without often endangered habitats exploited. From individuals and single species to populations displayed several ways have been used to achieve the goals of conserving biodiversity through education and raising public awareness.
The presentation provides an overwiev on the present state and prospects of the activities of Hungarian botanic gardens in this field.

### 256. EX SITU CONSERVATION AND RE-ESTABLISHMENT OF THREATENED UK ORCHIDS AND BRYOPHYTES

**RAMSAY**, **MARGARET M.**, Royal Botanic Gardens, Kew, United Kingdom

The Sainsbury Orchid Conservation Project aims to investigate techniques for in vitro mycorrhizal –assisted germination, asymbiotic propagation and planting methods for threatened orchids and to provide plants for re-establishment and other conservation purposes. Seeds of most British orchids have been collected, stored and germination techniques developed. Cryopreservation of mycorrhizal fungal associates and orchid protocorms is underway. Experimental re-establishment trials are taking place for Fen Orchid Liparis loeselii: reintroduced plants have survived and set seed. Several thousand seedlings of Lady's Slipper Orchid Cypripedium calceolus were grown at Kew and planted out with re-established plants flowering.
Of the UK's estimated 900 bryophyte species, over 50 are included in the UK Biodiversity Action Plan (BAP). An innovative 6 year collaborative project for the ex situ conservation of UK bryophytes has developed and evaluated protocols for the collection, in vitro propagation and cryostorage of threatened bryophytes. 24 species are now in culture. Initial trials on re-establishment of stored material have taken place with further ones planned for Orthodontium gracile.
These two projects are helping to deliver targets 7and 8 of Plant Diversity Challenge: the UK's response to the Global Strategy for Plant Conservation.

### 257. BARN OWLS AND MAJOR ROADS: RESULTS AND RECOMMENDATIONS FROM A 15-YEAR RESEARCH PROJECT

**RAMSDEN**, **DAVID**, Barn Owl Trust, United Kingdom

The study objective was to determine the effects of roads on Barn Owl populations and make appropriate recommendations. Barn Owl Tyto alba has declined significantly and at the same time the proportion of recorded deaths attributed to road traffic has increased dramatically. However, the relative importance of road deaths as a cause of population decline was unknown. The study included a literature review and various investigations using extensive Barn Owl datasets (live bird sightings, casualties, nesting, roosting, ringing and recoveries) accumulated by the Barn Owl Trust over a 15-year period in SW England. Live sightings were mainly on minor roads and casualties mainly on major roads. Most individuals that encountered a major roads were killed by traffic very quickly. Major roads caused localised declines soon after construction and ongoing mortality resulted in the absence of local resident birds. Most road casualties were juvenile birds that should have survived rather than birds which were likely to die anyway. Major roads acted as partial barriers to Barn Owl dispersal and it is suggested that the major road network is a cause of wider population decline. The study provided the UK government with road design recommendations aimed at reducing major road mortality.

### 258. THE CORRELATION OF RICHNESS OF RARE AND COMMON SPECIES WITHIN THREE TAXA: BIRDS, BUTTERFLIES, AND PLANTS

**RAMSEIER**, **PETRA**, Hintermann & Weber AG, Switzerland; **Pearman**, **Peter B.**, University of Lausanne - Biophore, Switzerland; **Weber**, **Darius**, Ecological consulting, Switzerland

The identification of spatial patterns of species occurrence and richness are essential components of the design of reserve networks and biodiversity conservation. We use data on birds, butterflies and plants from the Swiss Biodiversity Monitoring Program to determine the contributions of rare and common species to variability in species richness on a landscape scale. We also analysed whether the richness of red-listed species is correlated with the richness of other species or of common species. The spatial pattern of species richness of common species was correlated more strongly with overall species richness than is the spatial pattern of rare species. In birds and plants, the spatial patterns of species richness of rare and common species were not strongly correlated. The richness of rare butterfly species was correlated with the richness of common butterfly species. Similarly, the richness of red-listed butterfly species generally followed the same spatial pattern as the richness of common species and non-red-listed species. These pattens suggest that the way in which rare and common species contribute to overall species richness differs between butterflies and other taxa. In conclusion, spatial variation in species richness is largely due to widely distributed common species. Thus, these patterns do not predict well the distribution of rare species.

### 259. REPLACING TEMPORAL DATA WITH SPATIAL DATA IN THE POPULATION VIABILITY ANALYSIS OF PLANTS

**RAMULA**, **SATU**, Sodertorn University College, Sweden; **Dinnétz**, **Patrik**, Kalmar University, Sweden; **Lehtila**, **Kari**, Sodertorn University College, Sweden

Due to the lack of long-term demographic data in population viability analysis (PVA) of plants, it is often impossible to predict future population performance. Using literature data on ten different plant species, we examined whether demographic data collected from several consecutive years in a study population (temporal data) can be replaced with data collected during two

years in many populations (spatial data) to predict population viability. We found that stochastic population growth rates estimated from the temporal data differed from those estimated from the spatial data in some species but not in others. The coefficients of variation calculated for the demographic transitions and for the elasticities of population growth rates revealed that spatial variation significantly differed from temporal variation in 70% of the species. These different amounts of variation make it difficult to use spatial data as a substitute for temporal data in demographic analyses. Nevertheless, for plant species with equal temporal and spatial variation, future population viability might be predicted by replacing long-term temporal data with spatial data collected from different populations.

### 260. EXTINCTION RISK OF WOOD-LIVING MODEL SPECIES IN FOREST LANDSCAPES AS RELATED TO FOREST HISTORY AND CONSERVATION STRATEGY

**RANIUS**, **THOMAS**, Swedish University of Agricultural Sciences, Sweden; **Kindvall**, **Oskar**, Swedish Species Information Centre, Sweden

We analysed the persistence of five model species inhabiting dead wood by a metapopulation model. The amount of habitat (= dead wood) in each patch (= 5 ha forest stands) was obtained from models of dead wood dynamics of Norway spruce in central Sweden. Dead wood generated by altered management over the entire landscape was found to be less efficient in reducing extinction risks in comparison to the same amount generated by protecting reserves. Because generation of dead wood by altered management is often less expensive than setting aside reserves, it is difficult to determine which conservation measure is most cost-efficient. In a landscape subjected to forestry for the first time, it was better to preserve a few large reserves than many small ones. However, in a managed, highly fragmented forest landscape it was better to set aside many small reserves. The reason for this was that small plots with high habitat quality could be selected, while large reserves originally contained habitats both of high and low quality, and the rate of habitat quality increase was low. A strategy for biodiversity conservation in a managed forest landscape should include information about the history of the landscape, the current amount and spatial distribution of forest habitats, and the potential for rapid restoration of forest habitats, both in managed and unmanaged forest land.

### 261. DECLINE OF THE NATTERJACK TOAD (BUFO CALAMITA) AT THE NORTHERN ADGE OF ITS DISTRIBUTION RANGE ALONG WITH THE DEGRADATION OF COASTAL MEADOWS

**RANNAP**, **RIINU**, Institute of Zoology and Hydrobiology, Centre of Basic and Applied Ecology, University of Tartu, Estonia

Habitat degradation is among the major threats to amphibians but its long-term impacts are almost unexplored, particularly for nonforest species. We related the history of the endangered Estonian natterjack toad population since the 1930s to changes in its threatened habitat – Baltic coastal meadows. Between the 1930s and 2005, the total number of local populations of the toad declined by 73%, whereas the decline was 91% on coastal meadows. Since the 1980s, and particularly in the 1990s, coastal grasslands lost their value as the main habitat for the species, but the occupation rate of secondary habitats (e.g. sandpits) did not balance the gradual loss of the primary habitat. According to aerial photographs from 1950–1951; 1970–1971 and 1996–2000, 60–83% of the coastal meadow habitats had been lost in four West-Estonian counties by the year 2000, the natterjack toad had gone extinct in 80–100% of its historical sites at the same time. Extinction rates exceeded habitat loss rates, especially in their advanced stage after 1970. The most plausible explanations to that are the additional effects of habitat fragmentation and complete loss of critical habitat components. Determining habitat changes is of utmost importance in terms of habitat restoration and species preservation.

### 262. LINKING GLOBAL WARMING TO AMPHIBIAN DECLINES

**READING**, **CHRISTOPHER J.,** Centre for Ecology & Hydrology, Winfrith Technology Centre, UK.

Currently there is a consensus that mean annual global temperatures have increased significantly over recent years and that there is a continuing worldwide decline in many amphibian species and extinctions in some others. There is less agreement about the causes of this decline and though a link with global warming is suspected, the mechanism of any such link has not been clearly demonstrated. The results of an ongoing long-term study (1983-2006) of common toads (*Bufo bufo*) in the UK, has revealed two pathways by which amphibian populations are adversely affected by rising environmental temperatures. First, there is a clear relationship between a decline in the body condition of female toads and the occurrence of warmer than average years, particularly winters, since 1983. This has been paralleled by a decline in their annual survival rates. Second, there is a significant relationship between the occurrence of mild winters and a reduction in female body size resulting in fewer eggs being laid annually. The effects of partial hibernation, resulting from mild winters, on female toad physiology appear to be an important factor linking the observed decreases in both body condition and survival rates.

### 263. THE AMERICAN RED CRAYFISH, PROCAMBARUS CLARKII IS A THREAT TO SW IBERIAN AMPHIBIANS

**REBELO**, **RUI**, Centro de Biologia Ambiental, Portugal; **Cruz**, **Maria João**, Centro de Biologia Ambiental, Portugal; **Crespo**, **Eduardo**, Centro de Biologia Ambiental, Portugal

The introduction of exotic species in freshwater habitats is one of the causes for the amphibian declines observed worldwide. Procambarus clarkii, an American crayfish is now abundant in SW Iberian Peninsula, a region with no native crayfish and 13 amphibians. We predicted that these species would differ in their vulnerability to P. clarkii, and that that vulnerability would be dependent on the overlap between amphibian breeding habitats and crayfish distribution, as well as on the different behavioral responses of amphibian larvae to P. clarkii. We performed predation experiments in order to rank embryos and larvae according to their vulnerability to P. clarkii. This crayfish reduced embryo survival of all species except Bufo bufo, and larval survival of all species. Most larvae altered their behavior in the presence of P. clarkii, but that did not lead to a low vulnerability to predation. In order to evaluate the overlap between crayfish and amphibian habitats, we monitored 129 freshwater locations for two years in a 1500 km2 area in SW Portugal. After accounting for habitat variables and for the presence of fish, crayfish presence was a negative predictor of amphibian breeding in a given point for all four urodeles and two anurans. The majority of the species affected usually breed in temporary ponds without fish, which may be colonized by the crayfish.

### 264. A CALL FOR A FLEXIBLE APPROACH TO ECOSYSTEM MANAGEMENT, WITH PARTICULAR EMPHASIS ON IRISH SEASONAL WETLANDS (TURLOUGHS)

**REGAN, EUGENIE C**., Department of Zoology, Trinity College Dublin, Ireland; **Moran, James**, Department of Zoology, Trinity College Dublin, Ireland; **Visser, Marjolein**, Department of Zoology, Trinity College Dublin, Ireland; **Gormally, Mike**, Department of Zoology, Trinity College Dublin, Ireland; **Skeffington¸ Micheline Sheehy**, Department of Botany, National University of Ireland, Galway, Ireland

Turloughs are groundwater-dependent, seasonal wetlands that occur in karst limestone areas in Ireland. These habitats are

listed as priority habitats under the EU Habitats Directive and many are designated as Special Areas of Conservation. There is currently one general set of recommendations for the management of these sites. This paper brings together the results of two studies by the authors, which examine the current approach to turlough conservation management in Ireland. The first study collated previous data on turlough hydrology, geology, and ecology and analysed these using multivariate methods. The results showed that there was large variation in hydrological regime between sites which affected many aspects of turlough ecology. The second study was on the management practices on a number of turlough sites. Analysis of the management data revealed large variation in grazing practices, both between and within sites. These data suggest that the development of such a wide range of grazing practices on turloughs is in response to the physical variation both between and within sites. The authors conclude that maintaining the diversity of management practices is key to conserving turlough diversity. Maintenance of a diverse range of management regimes in a highly variable ecosystem requires conservation and management recommendations to be drawn up on a site by site basis.

### 265. SIZE MATTERS – CONSERVATION PLANNING AT DIFFERENT SCALES

**REICHLE, STEFFEN,** Science Coordinator, Southern Andes Conservation Program, The Nature Conservancy, Bolfor Office, Bolivia; **Ibisch**, **Pierre L.,** Faculty of Forestry, University of Applied Sciences Eberswalde, Germany

The parties of the Convention on Biological Diversity marked the end of 2006 as deadline to complete GAP analysis of national protected area systems, bringing large-scale conservation planning in the focus of attention of many governments. In many cases this is a challenging task as for the coherent data availability at national level, and for landscape sizes rarely used before in conservation planning at the level of data depth required. Planning at larger scales, such as countries, is not only a roll-up of existing planning efforts at smaller scales, but actually an important opportunity to do integral planning of the whole landscape and also include functional conservation targets rarely used in typical conservation planning efforts. Using South America as an example we are showing planning experiences at different scales (site, ecoregional, country and continental), their overall similarities and differences and suggest how functionality targets can actually be part of all of them. As well we are pointing out lessons learnt at different planning scales and how they could be applied in other planning exercises, for instance, in Europe.

### 266. AFFORESTATION EFFECTS ON GRASSLAND BIRDS IN SOUTHERN PORTUGAL

**REINO**, **LUÍS**, Centro de Estudos Florestais, Portugal; **Beja**, **Pedro**, ERENA, Lda, Portugal; **Morgado**, **Rui**, Centro de Ecologia Aplicada Prof. Baeta Neves, Portugal; **Osborne**, **Patrick E.**, University of Southampton, United Kingdom; **Rotenberry**, **John T.**, University of California, United States

This study evaluates the potential influence of afforestation on the distribution of grassland breeding birds in the extensive agricultural landscapes of Southern Portugal. In the last 16 years ongoing afforestation has tripled forest cover. We selected a total of 52 forest patches (of three types: eucalyptus, pinewoods and oakwoods) with surrounding fallow land. Censuses were conducted using a transect-point count method, starting at border of each forest stand on distance and progressing into the fallow area with point counts located at 100, 200 and 300 m distance. Preliminary results show that some species (e.g. calandra lark) are sensitive to edge effects, being significantly more abundant further away from the forest edge. This suggests that the afforestation process can affect their distribution, not only by directly destroying their habitat but also by reducing habitat suitability in the forest patch vicinity. Moreover, the results also suggest that the reduction of grassland bird abundances near edges is influenced by stand type, with increasingly strong negative effects for oak, pine and eucalyptus plantations. Simulation results also show that an increased of 25% in forest area could affect bird distribution on about 70% of whole area.

### 267. EXTREME HIDROLOGICAL CONDITIONS DETERMINE THE PATTERNS OF OCCURRENCE OF FRESHWATER MUSSELS (UNIONIDAE) IN TEMPORARY MEDITERRANEAN-TYPE STREAMS

**REIS**, **JOAQUIM**, Centro de Biologia Ambiental, Universidade de Lisboa and Instituto Portugues de Malacologia, Portugal; **Collares-Pereira**, **Maria Joao**, Centro de Biologia Ambiental, Portugal

The objective of this study was to evaluate the role of different factors on the occurrence patterns of freshwater mussels in temporary streams. Some areas in Portugal suffered in 2005 the worst draught in 100 years. Rivers and streams at the Guadiana River basin, a Mediterranean-type drainage, usually stop running and are reduced to variable sized pools, but many dried out completely this year. This exposed the streams' beds allowing us to characterize the patterns of occurrence and distribution of freshwater mussels. A detailed study was carried out at the S. Pedro stream at its driest period: We characterized all remaining pools and all exposed mussel beds, noting size, depths, water quality parameters and mussel population and community parameters (species composition, abundances, length distribution). Data were maped using ArcView 3.2®. Fish community, water quality and mussel locations were also monitored following the draught. The observed patterns of occurrence of freshwater mussels reflect the effects of extreme draughts that happen at some irregular time interval and are also affected by high flow events that significantly contribute to dispersal downstream. Fish hosts are vital for upstream recolonization. All other habitat factors seem to have minor impacts. Conservation measures should attend on the management of water extraction and stream regulation to avoid natural disturbance agravation.

### 268. IMPORTANCE OF WOODPECKERS FOR SECONDARY CAVITY-NESTERS: EFFECTS OF FOREST AGE, COMPOSITION AND MANAGEMENT IN TEMPERATE AND BOREAL FORESTS

**REMM**, **JAANUS**, University of Tartu, Estonia

By protecting keystone species, the ecosystems would maintain many other species as well. Woodpeckers that excavate cavities into trees are commonly regarded keystone species in temperate forests for numerous secondary cavity-nesters, which cannot excavate cavities themselves. However, the importance of woodpeckers may vary in different forests because of the occurrence of decay cavities. I studied cavity abundance and characteristics as well as nest-site selection by cavity-nesting passerines in different managed and protected forests, and I meta-analysed published studies about tree cavities as nest sites. There were >25 woodpecker cavities per nesting woodpecker pair in Estonian forests, woodpecker density correlated significantly with the density of cavities suitable for secondary cavity-nesters, and the number of cavities limited secondary cavity-nesters even in cavity-rich habitats. This suggests that higher density of woodpeckers should increase the density of secondary cavity-nesters. However, many vertebrates avoided nesting in woodpecker cavities, there is relatively more decay-cavities in natural forest and the density of cavities is several times higher in natural forests than in managed forests. In conclusion, importance of woodpeckers as keystones appears mainly in intensively managed stands, where trees are too young for the formation of decay-cavities.

### 269. MANAGEMENT OF INDIGENOUS AND NON INDIGENOUS CRAYFISH SPECIES IN SOUTHERN EUROPE

**RENAI, BARBARA**, University of Florence, Dipartimento di Biologia Animale e Genetica “Leo Pardi”, Italy; **Aquiloni, Laura**, University of Florence, Dipartimento di Biologia Animale e Genetica “Leo Pardi”, Italy; **Bertocchi, Silvia**, University of Florence, Dipartimento di Biologia Animale e Genetica “Leo Pardi”, Italy; **Brusconi, Sara**, University of Florence, Dipartimento di Biologia Animale e Genetica “Leo Pardi”, Italy; **Gherardi, Francesca**, University of Florence, Dipartimento di Biologia Animale e Genetica “Leo Pardi”, Italy; **Tricarico, Elena**, University of Florence, Dipartimento di Biologia Animale e Genetica “Leo Pardi”, Italy;

The most widespread indigenous crayfish species in southern Europe belong to the *Austropotamobius pallipes* complex. Since the end of the XIX century, many populations of these species underwent a dramatic reduction in their distribution and size due to human-mediated causes, such as habitat degradation and loss, overexploitation, and invasion of allochthonous crayfish. The introduction of American species (i.e. *Orconectes limosus*, *Pacifastacus leniusculus*, and *Procambarus clarkii*) induced a significant alteration of the trophic chains in native ecosystems and the decimation of the indigenous species due to competition and parasite transmission.
In recent years, several actions have been undertaken to conserve and restore indigenous crayfish, including measures to preserve habitats and programs to reintroduce native populations. Much attention should be also devoted to manage non indigenous species. Eradication is certainly recommended in the early stages of invasion. But when allochthonous populations have become widespread, as in the most parts of southern Europe, the only sound strategy seems to be the development and implementation of techniques for their biological control. However, the success of any action requires the strict and constant cooperation among European countries, since fragmented policies may produce only limited and short-term results.

### 270. CONCEPTUAL FRAMEWORK AND APPROACH TO PRIORITY SETTING FOR CONSERVATION AT THE GLOBAL SCALE

**REVENGA, CARMEN**, The Nature Conservancy, Arlington, Virginia, USA; **Molnar, Jennifer**, The Nature Conservancy, Seattle, Washington, USA; **Hoekstra, Jon**, The Nature Conservancy, Seattle, Washington, USA

In order to focus organizational priorities and to motivate progress toward our global conservation mission, The Nature Conservancy adopted a goal to conserve places that represent at least 10% of every biome and biogeographic realm by 2015, and made a commitment to pursue this goal in collaboration with others. TNC is presently conducting a set of global habitat assessments designed to document what is known -- and not known -- about the state of biodiversity across the world's terrestrial, freshwater and marine habitats. This information is being used by the organization to define conservation goals and priorities based on considerations of biological significance, habitat condition, threats to biodiversity, and socio-political "enabling conditions" for conservation. This effort is helping TNC to gain a more global perspective, and challenging the organization to seek collaborative partnerships with people and organizations in parts of the world that are new to us.

### 271. CONSERVATION OF THE WHITE-CLAWED CRAYFISH, IMPORTANCE OF WATER QUALITY AND HABITAT REQUIREMENTS

**REYNOLDS**, **JULIAN,** Zoology Department, Trinity College Dublin, Ireland; **Trouilhé, Marie Cécile**, Universite de Poitiers, Génétique et Biologie des Populations de Crustacés, UMR CNRS 6556, FRANCE; **Demers, Andreanne**, Universite de Poitiers, Génétique et Biologie des Populations de Crustacés, UMR CNRS 6556, France; **Grandjean, Frederic**, Universite de Poitiers, Génétique et Biologie des Populations de Crustacés, UMR CNRS 6556, France; **Parinet, Bernard**, Ecole Supérieure d’Ingénieurs de Poitiers, Laboratoire de Chimie de l’Eau et de l’Environnement, UMR CNRS 6008, France; **Souty-Grosset, Catherine**, Universite de Poitiers, Génétique et Biologie des Populations de Crustacés, UMR CNRS 6556, France;

The protected white-clawed crayfish is in decline across most of its range, in parallel with widespread degradation of catchments and water quality. In many countries, e.g. Spain, France and Great Britain, crayfish plague is a clear correlate to the decline. Baseline studies in Ireland, where plague-related declines are limited, show that white-clawed crayfish can tolerate slight to moderate levels of pollution, and so cannot be seen as strict bioindicators of water quality. Habitat features are important: different life stages have different environmental requirements, with shelter a primary one. However, studies of osmotic balance in the haemolymph show that in polluted environments, crayfish experience osmotic stress, which may reduce their survival prospects. Recent studies in Western France also show that crayfish seem to tolerate moderate physical and chemical water pollution. Nevertheless, these investigations also indicate that organic matter concentration in water may affect crayfish distribution.

### 272. A SYSTEMATIC REVIEW OF THE EFFECTIVENESS OF AGRI-ENVIRONMENT SCHEMES AT CONSERVING FARMLAND BIRD DENSITIES IN THE U.K.

**ROBERTS**, **PHILIP**, Centre for Evidence-Based Conservation, United Kingdom; **Pullin**, **Andrew**, Centre for Evidence-Based Conservation, United Kingdom

Population declines of farmland bird species have been highlighted as a conservation issue of growing concern, not just in U.K., but also in many western European countries. Over the past couple of decades numerous studies have focused on the problems facing these bird species. However, it was not until the 1990s that the scale and primary cause (agricultural intensification) of this problem became fully apparent. Through the use of systematic review methodology, evidence from primary research investigating the effects of agri-environment schemes on farmland bird species was collated and synthesised. Meta-analysis and meta-regression were used to examine the effectiveness of six agri-environment schemes. All were effective at increasing bird densities compared to conventional agriculture, while only 15 of 24 bird species, mainly granivorous passerines, showed significant increases. However, Yellow Wagtail showed significant preference for conventionally managed fields, especially root and salad crops, compared to agri-environment options. Overall, wild bird cover was the best management prescription of modern agri-environment schemes, especially for granivorous passerine species, while Corvids (Jackdaw & Rook) showed a preference for stubble fields. Systematic review has effectively identified knowledge gaps and enabled future research priorities to be identified.

### 273. RAMAT HANADIV NATURE PARK – A FIELD LABORATORY FOR TEACHER TRAINING

**RON**, **SALEIT**, RAMAT HANADIV NATURE PARK, Israel

For many years, biology teachers in Israel are required to conduct field research with their students as part of the curriculum. Many teachers have been avoiding this issue by seeking professional help for outdoors activities. The Israeli

Center for Biology Teachers together with the educational team at Ramat Hanadiv Nature Park, by creating an in-service training course on practical ecology for teachers, have been facing this challenge.
The course leans on the research infrastructure at Ramat Hanadiv Nature Park and the conservation biology research methods used in the park are the learning materials. A group of twenty five teachers join researchers and learn from them how to prepare research proposals on subjects of their choice, to formulate research questions, seek suitable ways to examine these questions, gather data from experiments, and analyze it to formulate conclusions. The educational team assists the teachers to draw from their own experience and to create educational programs suitable for their students.
The response of the teachers is immensely positive. All report that they have improved their skills and are more capable of leading their students in outdoor activities, and many of them practice what they learned with their students.

### 274. PLANNING FOR CONSERVATION IN CONFLICTING AREAS BY INTEGRATING HUMAN ACTIVITY INTO HABITAT SUITABILITY MODELS

**RONDININI**, **CARLO**, Università di Roma La Sapienza, Italy; **Boitani**, **Luigi**, Università di Roma La Sapienza, Italy; **Maiorano**, **Luigi**, Istituto di Ecologia Applicata, Italy; **Falcucci**, **Alessandra**, Istituto di Ecologia Applicata, Italy

In the human-dominated European landscape, species distribution is the result of a balance between habitat suitability and human pressure. For species that adversely impact human activities, conservation is achieved through conflict resolution. For two Italian species of large carnivores, wolf and brown bear, we generated distribution models that explicitly incorporate both habitat suitability and the potential negative impact of human pressure (which can be compensated by conservation measures aimed at conflict resolution). We classified the sites where human pressure affects suitability based on the cost of the measures that would be needed to counteract pressure. Wolf geographic range in Italy overlaps the rural area where conflicts potentially arise. The improvement of habitat suitability inside wolf range would include sites where the cost of conflict resolution is high. The potential for conflict for brown bear is relatively low in northern Italy, and in central Italy where the species is confined to protected areas. Bear range expansion in central Italy would affect areas of high conflict potential and would imply high costs. Our analysis framework allows to identify conflict areas and the sites where conflict resolution is less problematic.

### 275. INFLUENCE OF ORGANIC FARMING AND LANDSCAPE CONTEXT ON BIODIVERSITY

**RUNDLÖF**, **MAJ**, Lund University, Sweden; **Smith**, **Henrik G.**, Lund University, Sweden

Recent declines in biodiversity associated with farmland have been attributed to agricultural intensification. One explicit goal of organic farming is to preserve and develop biodiversity in the agricultural landscape. The aim of our research project is to evaluate the consequences of organic farming on biodiversity in relation to landscape context. We have established a study system consisting of 8 landscape-pairs, each pair includes one landscape with high proportion of organic arable land matched with one dominated by conventional arable land. Data on vascular plants, butterflies, bumblebees and habitat quality has been collected in both organic and conventional field and margins within the selected 16 landscapes. The results indicate a significant effect of farm practice on both local and landscape scales, with organic farming more beneficial than conventional. The effect of organic farming seems to be stronger on the local scale. However, the landscape effect of organic farming indicates that, from a landscape perspective, it is more favorable to aggregate organically managed field than disperse them evenly.

### 276. IMPROVING CONSERVATION EFFECTIVENESS THROUGH ADAPTIVE MANAGEMENT: THE EXPERIENCE OF THE CONSERVATION MEASURES PARTNERSHIP

**SALAFSKY**, **NICK**, Foundations of Success/Conservation Measures Partnership, United States

A key question facing all conservation practitioners and organizations is: “Are our actions effective in achieving our conservation goals?” We must answer this question in order to be able to adapt and change our actions over time, learn about which actions work and do not work, and convince our donors and society that conservation is a worthy investment. Over the past few decades, there has been growing convergence in many fields of human endeavor towards project-cycle based adaptive management as the primary method for answering this question. The conservation organizations involved in the Conservation Measures Partnership (CMP) all apply some form of project cycle management to their work. The CMP took these different systems and created a common version, the CMP Open Standards for the Practice of Conservation. These standards are organized in a series of steps in the project management cycle: conceptualization, planning, implementation, analysis, adaptation, communication, and iteration. In this presentation I provide an introduction to the Open Standards, illustrate how they have been used around the world, and provide an introduction to a new software program being developed to help implement these standards. We believe that widespread prospective use of these standards will provide the foundation for true evidence-based conservation to occur.

### 277. USE AND LIMITATIONS OF STRUCTURAL BIODIVERSITY FOR EVALUATING LANDSCAPES

**SALTZ**, **DAVID**, Ben Gurion University, Israel

The concept and application of structural (genetic, species, and ecosystems) biodiversity is often misconstrued in one of two ways: a. The notion that the goal of conservation is diversity rather than retention of evolutionary opportunities. b. The notion that one of the three types of biodiversity (usually species diversity), or worse, a surrogate of it, is sufficient to evaluate landscapes for conservation. The three types of structural biodiversity are merely indices of evolutionary opportunities, and as such contain all the inherent flaws of indices. They reflect vastly different elements of evolution that, presently, we do not know how to combine quantitatively. Yet, they are nested within each other and cannot be considered independently. Thus, it is impractical to give any weight to genetic diversity in terms of evolutionary opportunities without any information on species diversity (especially biodisparity), nor is it possible to give any weight to species diversity with no information of ecosystem diversity. When evaluating landscapes for conservation, excepting pre- vs. post-event comparisons in a given area, species diversity cannot be disengaged from the other types of biodiversity; all three types must be considered, and the proximate goal of conservation (i.e. evolutionary opportunities) must be pondered at all times.

### 278. GIS MODELS: A TOOL FOR LARGE CARNIVORES CONSERVATION PLANNING OR JUST GARBAGE IN AND GARBAGE OUT?

**Salvatori , Valeria**, Institute of Applied Ecology, Italy; **Zimmermann, Fridolin**, KORA, Switzerland

The applications of GIS modelling to large carnivore conservation during the last two decades are reviewed, focussing on different aspects, from technical to applied management. The published papers were categorised according to species, purpose, methodology, spatial scale, type of response variables and environmental predictors used, validation, as well as conservation and management measures driven from the modelling approach. Follow-up investigation on how measures suggested from modelling results were

implemented in conservation planning was conducted in order to estimate the impact of GIS applications for the practice of management and conservation. Questions such as: what should specifically be looked at, which problems can be encountered and which pitfalls should be avoided when conducting habitat modelling analyses are furthermore discussed and solutions are proposed. Finally, a general framework on how habitat modelling can successfully be used to develop a recovery strategy for large carnivores is elaborated and illustrated by means of a few examples taken from the literature.

**279. PUTTING ADAPTIVE MANAGEMENT INTO PRACTICE: THE NATURE CONSERVANCY'S CONSERVATION ACTION PLANNING PROCESS**

**SALZER**, **DANIEL**, The Nature Conservancy, United States; **Baumgartner**, **Jeff**, The Nature Conservancy, United States; **Salafsky**, **Nick**, Foundations of Success, United States

Numerous authors have drawn attention to three barriers that inhibit effective conservation practice: (1) inadequate frameworks to guide conservation planning and action; (2) poor monitoring and evaluation practices; and (3) inconsistent and unreliable learning from past practice. Adaptive management is often cited as a solution for overcoming these barriers but examples of applied adaptive management practices are rare. We report on efforts of The Nature Conservancy to implement an adaptive management process designed to overcome the three barriers and better integrate conservation science with conservation practice. The Conservation Action Planning (CAP) process provides an objective, consistent and transparent accounting of conservation actions and the intended and actual outcomes of conservation projects and adheres to the Open Standards for the Practice of Conservation developed by the Conservation Measures Partnership. The CAP process is supported by software tools that facilitate application of the process and the sharing of conservation practices and lessons learned via a web database. Results from over 400 CAP projects in North and South America and the Asia Pacific region demonstrate widespread adoption of CAP. Time, resource, and technical skill limitations, especially for monitoring and evaluation, remain obstacles to full implementation of the CAP process.

**280. LONG TERM SPECIES HOLDING POWER OF A SMALL NATURE RESERVE ENCLOSED IN A CITY**

**Samu**, **Ferenc**, Hungarian Academy of Sciences, Hungary; **Szinetár**, **Csaba**, Berzsenyi College, Hungary

We compare two studies of spiders 65 years apart from grasslands and black pine canopy of the Sas-hegy, a hill embedded in Budapest, a city of 2 million inhabitants. The small dolomitic hill rises by 180 m from the surrounding living quarters. Some of its steep slopes still preserve the original dolomitic grassland vegetation, while other parts had been more influenced by human activities. A 30 ha core area of the hill is strictly protected since 1958. Here we compare our spider survey between 1994 and 1998 with that of Prof. János Balogh made between 1930 and 1934. The comparison - based on very similar methods and sampling efforts - showed that spider species richness and community structure virtually did not change, while species turnover was considerable. We could recover one quarter of the very rare species caught by Balogh, and could show the presence of 3 out of the 4 species that were new for the science, and described from the Hill by Balogh. Overall we conclude, that over the 65 spider generations Sas-hegy showed a remarkable species holding power. The results show that the preservation of a diverse arthropod community under urban conditions is not necessarily a futile attempt, and a long term monitoring can give insight into the dynamics of small populations and their interaction with environmental changes.

**281. POACHING OF LARGE CARNIVORES – THE SWEDISH PERSPECTIVE**

**Samuelson, Lotta**, WWF Sweden, Sweden; **Korsell, Lars**, Swedish Council for Crime Prevention, Sweden

Poaching is the major cause of death for adult lynx, wolf and wolverine in Sweden. Wildlife scientists estimate that 10-25% of the annual mortality can be derived from poaching. Poaching limits the population increase in Swedish large carnivore populations, most of all for the wolf population that also suffers from severe genetic depredation. If poaching is not dealt with, it risks expanding both in proportion and range.
A pre-study made by the Swedish Council for Crime Prevention (SCCP) concludes that several motivations underly poaching. Some are economic incentives related to lifestyle, e.g. to prevent depredation on domestic animals, hunting dogs or due to competition for game species. Direct economic incentives like selling skins or trophies also exist. Some offences are clearly based on hatred. Incorrect interpretations of the legal paragraphs on how and when it is allowed to protect domestic animals represent a small proportion of the total. The largest threat to large carnivores is the crimes conducted in silence, often without any other indicators than a lost research animal – a silenced radio transmitter. The police work that follows is difficult, as there is no crime screen, no witnesses and no animal body.
WWF and researchers from SCCP conclude that to stop poaching, the following measures needs to be taken in Sweden:

1. Better state support of mitigation measures to prevent depredation of large carnivores on domestic animal.
2. Hunter's organisations need to work against the acceptance of poaching within hunters' societies.
3. Better co-operation between national agencies responsible for detecting and investigating poaching and prosecuting poachers.

**282. THE ROLE OF ARTIFICIAL FRESHWATER HABITATS IN CONSERVING EUROPEAN VERTEBRATE BIODIVERSITY: BIRDS AND INLAND RICEFIELDS**

**SÁNCHEZ GUZMÁN, J.M**., Group of Investigation in Conservation (GIC), Área de Zoología, Universidad de Extremadura, Spain; **Masero, J.A**., Group of Investigation in Conservation (GIC), Área de Zoología, Universidad de Extremadura, Spain; **Morán, R**., Group of Investigation in Conservation (GIC), Área de Zoología, Universidad de Extremadura, Spain; **Corbacho, C**., Group of Investigation in Conservation (GIC), Área de Zoología, Universidad de Extremadura, Spain; **Santiago, F**, Group of Investigation in Conservation (GIC), Área de Zoología, Universidad de Extremadura, Spain;

The Water Framework Directive (2000/60/EC) establish that Member States must protect and even improve the quality of all water masses, including artificial ones, with the objective of achieving a good ecological potential. This Directive considers the protection of the habitat and species included in other EC regulations – particularly the Habitats (92/43/EC) and Birds (79/409/EC) Directives – by including them both in the programmes of measures and in the register of protected areas. In this study, it is shown that completely artificial water masses (flooded rice fields) can support high vertebrate biodiversity, partially replacing the loss of natural wetland habitat that has historically taken place. An important (i.e. population size, community diversity, biogeographical origin, conservation status) waterbird community is revealed, using inland rice fields. The importance of the anthropogenic freshwater habitat for biodiversity conservation in relation to water and agricultural management is discussed. In short, the effects of wetlands loss on waterbirds can be buffered by the appearance of anthropogenic habitats such as rice fields. In the Mediterranean basin, wetlands have been drained and altered to such a degree that their very existence is threatened, so to identify key buffer areas in the basin is essential to develop conservation strategies for waterbirds. In Extremadura, continental Southwest Spain, 30 000 ha of rice fields have emerged from 1960s. This study

assess for first time the waterbird community associated to these inland rice fields, and address the question about the potential value of this area in biodiversity conservation. The waterbird community consisted of 45 species, with population levels reaching values of international importance (>1% of the biogeographical population) for Common Crane *Grus grus* (19%), Black-tailed Godwit *Limosa limosa* (1.2%), Black-winged Stilt *Himantopus himantopus* (1.2%), and Cattle Egret *Bubulcus ibis* (1%). The structure of the waterbird community is discussed according to some characteristics that differentiate these continental rice fields from more typical coastal rice fields. We propose the inclusion of these artificial freshwater habitats in the European Natura 2000 Network (Habitats Directive), through the figure of Special Protection Area (Birds Directive), and its particular consideration in the programmes of measures (Water Framework Directive) of the Guadiana river basin.

**283. PREDICTING THE EFFECTS OF CHANGES IN AGRICULTURAL MANAGEMENT ON FARMLAND BIRD COMMUNITIES IN POLAND**

**SANDERSON**, **FIONA**, Royal Society for the Protection of Birds, United Kingdom; **Kloch**, **Agnieszka**, OTOP (Polish Society for the Protection of Birds), Poland; **Sachanowicz**, **Konrad**, OTOP (Polish Society for the Protection of Birds), Poland; **Donald**, **Paul**, Royal Society for the Protection of Birds, United Kingdom

Farmland bird populations in the old European Union have undergone a major decline as a result of policy-driven agricultural intensification. Understanding the relationship between agricultural management and avian species richness and abundance in the new member states is vital in order to inform agri-environment schemes to protect their important farmland bird populations. In this study, we surveyed 180 1 km farmland squares across Poland, modelling the relationships between species richness and habitat using information theoretic methods. Species richness increased linearly with increasing wood-farmland edge habitat and curvi-linearly with proportion of land under cereal cultivation, indicating that species richness is likely to be higher in areas of mixed farming. Length of wood-farmland edge habitat was the most important variable in explaining species richness, followed by area of cereal and presence of ponds or ditches. An increase in length of wood edge of 4 km per 1 km square is likely to increase species richness by up to 10 species. Our work indicates that retaining widespread non-crop habitats such as small woods and water features is likely to be the single most important factor in retaining high farmland bird diversity in Poland, but maintaining mixed farming is also important.

**284. THREATS TO DEEP-SEA ECOSYSTEMS AND TRENDS FOR THEIR CONSERVATION**

**SANTOS, RICARDO SERRÃO**, University of the Azores, Department of Oceanography and Fisheries, Portugal

The oceans represent the bulk of living space on Earth with a rich and incomparable diversity of species and ecosystems. The deep oceans of the planet must be one of the most difficult areas to perceive and to study. Highly invisible the deep seas and wider oceans have been thought to be significantly less impacted by human use. The ability to perceive damages only now begins to be alerted. Over fishing, even depletion, of the often slow-growing and late-reproducing fish populations, and the destructive impact of trawling activities on the benthic communities of the deep-sea, mainly seamounts, pose an immediate risk to these isolated ecosystems. Seamounts, and associated deep-sea species, like cold corals, require urgent conservation actions. Deep sea hydrothermal vents represent an exceptional offshore feature in the world oceans. These ecosystems provide support for an exceptional faunal community with many species being endemic to vent systems in general or even to one particular vent field. As vent sites become the focus of intensive, long-term investigation, oversight organizations are introducing new measures to combine preservation of habitat and scientific interference such as sampling. The understanding that deep-sea is under increase threat calls for new spatially based management instruments. In the next 10 years it is expected that a series of MPAs are established in all oceans both in EEZ and in offshore seas.

**285. FIRE AS A MEANS OF DRY GRASSLAND CONSERVATION: EFFECTS ON GRASSHOPPERS AND PLANTS**

**SAUBERER**, **NORBERT**, V.I.N.C.A. - Vienna Institute for Nature Conservation and Analyses, Austria

The effects of fire on vascular plant and Orthoptera assemblages were assessed in a 1500 ha dry grassland area in eastern Austria where fires are frequently triggered by military training activities. Twenty-five sampling plots with a postburn age of 1 to >20 years after burning were considered. Both plant and Orthoptera species richness were highest in the first few years after burning and significantly decreased during postburn succession, mainly due to the accumulation of litter which reduced germination gaps for forbs and led to a cooler microclimate unfavourable to most Orthoptera species. The average mobility of the Orthoptera assemblage was highest at sites recently burnt and decreased during postburn succession. While fires had positive general effects on both vascular plant and Orthoptera species richness, effects of fire season significantly altered plant species composition. Burning during the growing season permanently reduced the coverage of chamaephytes typical for this vegetation type. Since the grassland under study is part of a Natura 2000 site but cannot be managed otherwise, due to military training activities, prescribed burning can be recommended as a tool for conservation management. However, prescribed burning must be adequately timed to avoid adverse effects on flora and vegetation.

**286. URBAN BROWNFIELDS AS TEMPORARY HABITATS: STRATEGIES OF PLANTS TO SURVIVE IN A CHANGING ENVIRONMENT**

**SCHADEK, UTE**; University of Oldenburg, Germany; **Kleyer, Michael**, University of Oldenburg, Germany

Urban brownfields often carry most of a city's biodiversity. Because urban brownfields are fast changing environments in both space and time, traditional concepts of conservation biology do not match for these sites. A purpose for conservation of urban brownfields' biodiversity must thus be the regional sustainment of the species pool while accepting local extinction of species. But which factors are crucial for species occurrence and which strategies of plants sustain their regional survival?
Environmental factors that influence species' survival in urban brownfields are various. Field studies on urban brownfields in Bremen and Berlin, Germany, show that besides pH and soil water, successional state plays the major role. Plant traits respond differential to these environmental conditions to ensure reproductive success. By habitat models, responsive traits can be separated from non-responsive ones. Similar response of species with similar trait attributes allows to form plant functional groups. That way, information can be given not only for single traits but even for response trait groups.
Results show that dispersal in space and time as well as vegetative plant persistence on site are driving factors for plant species' survival in urban brownfields. Thus, for conservation of urban brownfields' biodiversity, a suitable spatio-temporal mosaic of sites is needed.

**287. INSECT ASSEMBLAGES ARE BEST PREDICTED BY VEGETATION COMPOSITION, NOT VEGETATION STRUCTURE**

**SCHAFFERS**, **ANDRE**, Wageningen University and Research Centre, Netherlands; **Raemakers**, **Ivo**, Wageningen University and Research Centre, Netherlands; **Sykora**, **Karle**, Wageningen University and Research Centre, Netherlands; **Ter Braak**, **Cajo**, Wageningen University and Research Centre, Netherlands

For effective conservation planning it is vital to obtain an efficient assessment of the current or expected species composition. Conservationists and land managers therefore need methods that provide acceptable bio-indicators on characteristic insect species when recourses do not permit exhaustive ground surveys. Predicting insect species composition is no easy task. A wide range of biotic and abiotic factors affect insect communities, both on the landscape scale as well as on the level of individual sites. Although the vegetation is recognized as an important factor, the main focus has always been on its physical structure, not on its species composition. In this study we show that the plant species composition of the local vegetation invariably acts as the best predictor of arthropod species composition, for all of seven investigated groups (epigeic spiders, grass¬hoppers, carabids, weevils, hoppers, hoverflies and bees). Vegetation composition outperforms both vegetation structure and environmental conditions (even when these two are combined), and also performs better than the surrounding landscape. These results run against the common entomological expectation of vegetation structure as the decisive factor. We suggest that efforts to conserve or restore arthropod assemblages will profit from a plant community approach.

**288. DETERMINANTS OF THE DISTRIBUTION OF TICKS AND TICK-BORNE DISEASES IN BRITAIN**

**SCHARLEMANN**, **JÖRN**, University of Oxford, United Kingdom; **Randolph**, **Sarah**, University of Oxford, United Kingdom

Ticks are the most important vectors of human and livestock diseases in the northern Europe, with dramatic increases in tick-borne diseases of medical and veterinary importance over recent decades (Lyme borreliosis, tick-borne encephalitis throughout Europe and louping ill in Britain). These increases might be due to recent increases in tick abundance or to increased exposure of humans and livestock to ticks through social change. Factors driving the change in tick abundance might be abiotic, such as climate or land-use changes, or biotic, such as host density changes. Using discriminant analysis and Fourier-processed satellite imagery as explanatory variables, we explore the abiotic determinants of the distribution of the sheep tick, Ixodes ricinus, and louping ill virus. We also explore the impact of biotic factors, particularly the increasing density of deer, that provide blood meals for the majority of reproductive adult females and therefore support tick populations. Landscape structure, specifically the availability of woodlands of large enough area to house deer, has also proved to be an important predictor. This intensive study in the UK will help to distinguish whether abiotic or biotic factors are the more important determinants of changing tick and tick-borne disease distributions, applicable to similar systems throughout Europe.

**289. HOW TO MAKE EFFICIENT USE FROM LIMITED DATA TO ESTIMATE DEMOGRAPHIC PARAMETERS? AN ILLUSTRATION OF AN INTEGRATED POPULATION MODEL ON HORSESHOE BATS**

**SCHAUB**, **MICHAEL**, University Bern, Switzerland; **Gimenez**, **Olivier**, University of St Andrews, United Kingdom; **Sierro**, **Antoine**, Valais Bat Conservation Group, Switzerland; **Arlettaz**, **Raphael**, University Bern, Switzerland

Obtaining basic demographic information such as estimates of survival and fecundity is of paramount importance for understanding population dynamics and for conducting population viability analyses. However, in rare and endangered species, which are of highest conservation concern, we often face the problem that data are too sparse to estimate the demographic parameters with enough precision using conventional methods. The combination of different sources of available data into one statistical model may be promising to overcome this difficulty. Here we illustrate the use of an integrated population modelling approach applied in the Bayesian framework to demographic data from a colony of the endangered greater horseshoe bat (Rhinolophus ferrumequinum). The available data were population counts (number of subadults and adults at emergence) from 1991-2005, the total number of individually marked newborn in each year and recapture data of adults from the last two years. From these data we were able to estimate age- and sex-specific survival rates, the fecundity rate and population growth rate with fairly high precision. This exercise shows that integrated models have a great potential for obtaining demographic information from limited data, and are supposed to become an important element in the conservationist toolbox in the future.

**290. ANALYZING AND MAPPING THE LANDSCAPE STRUCTURE OF DADIA NATIONAL PARK, A MEDITERRANEAN FOREST OF HIGH BIODIVERSITY**

**SCHINDLER, STEFAN,** Dadia project, WWF Greece, Greece; **Poirazidis, Kostas,** Dadia project, WWF Greece, Greece

Spatial heterogeneity has an important influence on a wide range of ecological patterns and processes, and landscape metrics in GIS environment have been used to facilitate the investigation of this relation. In this study we analyzed the landscape structure of the Dadia National Park, Greece, a Mediterranean forest of high biodiversity, characterized by pine, oak and mixed woods. Using nine land cover classes we computed a total of 119 landscape metrics and applied factor analyses to detect the dimensions of landscape structure at landscape and class level. The two most important dimensions of landscape structure were diversity and fragmentation at landscape level and dominance of mixed forest and the gradient from one pure forest to another at class level. The patterns of landscape structure of Dadia National Park were strongly related to dominating habitat types, land use and level of protection. Previous studies indicate that the most heterogeneous habitats host many endangered species of vertebrates, invertebrates and plants. We expect that the encountered dimensions and patterns of landscape structure will be useful to establish a landscape monitoring, to relate landscape structure with biodiversity, to improve management and conservation, and to compare the situation in Dadia NP with other Mediterranean forests.

**291. ACCOUNTING FOR NONDETECTION WHEN ASSESSING RED LIST STATUS: A CASE STUDY OF AMPHIBIANS AND REPTILES**

**SCHMIDT**, **BENEDIKT**, KARCH, Switzerland; **Zumbach**, **Silvia**, KARCH, Switzerland; **Andreas**, **Meyer**, KARCH, Switzerland; **Monney**, **Jean-Claude**, KARCH, Switzerland

Red lists are an important conservation tool. The World Conservation Union/IUCN red lists methodology can be used to assign a red list category to a species based on recent changes in abundance or distribution. Clearly defined thresholds of declines must be used and hence red list assessors should have high quality data to correctly assess red list status. However, species are often not detected during field surveys, especially if there are time, manpower and financial constraints. Hence, the magnitude of declines is overestimated and species likely assigned to a wrong category that exaggerates extinction risk. We use data from the update of the Swiss amphibian and reptile red lists to show that species are often missed and that this can result in substantial overestimation of declines. Without accounting for nondetection, species would have been assigned to wrong red list categories. We show how nondetection can be quantified and how estimates of decline can be adjusted for

nondetection. These methods are likely to improve the reliability of red list assessments substantially.

### 292. ESTIMATING DISTRIBUTION AND HABITAT ASSOCIATIONS OF THE ENDANGERED ADERS´ DUIKER: IMPLICATIONS FOR RESEARCH AND CONSERVATION OF ELUSIVE SPECIES

**SCHRODT**, **FRANZISKA**, Paignton Zoo Environmental Park, Germany

Conservation of mammals is often hampered by lack of funding and information on their ecology and habitat requirements. Habitat characteristics of Aders´ Duiker (Cephalophus adersi) were examined at 40 localities in the Arabuko-Sokoke Forest, Kenya, in 8 of which sightings of this semi-endemic and endangered antelope were reported. Disturbance levels of human and elephant activities, duiker pellet piles and antelope tracks were quantified. Uni- and multivariate analysis was combined to overcome limitations of this study and the methods used. Nonmetric multidimensional scaling and correlation analysis showed significant differences in areas with signs of duiker and Aders' duiker sightings, as well as between the individual forest types. Of the 17 variables quantified, visibility, number of duiker food plants and elephant induced disturbance showed highest correlations with the number of duiker signs (pellet piles and paths) and the individual forest types. Indirect methods like pellet pile and antelope track counts, as well as habitat analysis (visibility, canopy cover, vegetation and disturbance), morning walks and hair traps are proposed as fast and economic methods to obtain basic information on small secretive forest mammal abundance and distribution in order to increase effectiveness of conservation strategies.

### 293. MONITORING AND CONSERVATION OF THE ENDANGERED NOBLE CRAYFISH (ASTACUS ASTACUS) BASED ON HABITAT ASSESSMENT AND POPULATION GENETICS

**SCHULZ**, **HOLGER**, University of Koblenz-Landau, Germany; **SMIETANA**, **PRZEMYSLAW**, University of Szczecin, Poland; **Schulz**, **Ralf**, University of Koblenz-Landau, Germany

Freshwater crayfish constitute an important part of the aquatic communities in Europe. The distribution of the different species was in particular influenced by human activities. The noble crayfish (Astacus astacus L.), indigenous to Europe, shows a patchy geographical distribution of relict populations in Germany and Poland and is regarded to be endangered in Europe. The objective of this study is to describe the current situation of the noble crayfish in central Europe to provide a knowledge basis for the conservation of genetic resources and the conservation and restoration of suitable habitats. Therefore, the impact of human utilization of waters and of land use, effects of the expansion of non-indigenous crayfish species and the genetic differentiation of noble crayfish stocks have been analysed on different scales by means of a Geographic Information system (GIS), direct population assessments and molecular markers (ISSR). The results indicate the importance of land use and other human activities nearby the lakes leading to extinction of native crayfish stocks and propagation of aquatic alien species. Relict populations of the noble crayfish showed a structuring of genetic variability into geographically distinct groups. Genetic variation within stocks was associated with low population size or past stocking measurements. An active species recovery plan is proposed.

### 294. AVIAN EXTINCTIONS: INTERACTIONS OF CLIMATE CHANGE WITH ELEVATION

**SEKERCIOGLU, CAGAN H**., Stanford University, Department of Biological Sciences, USA; **Schneider, Stephen H.,** Stanford University, Department of Biological Sciences, USA

Turkey has unequalled biodiversity for a European country and is covered by three of the world's 34 biodiversity hotspots. However, due to rapid population growth, unsustainable land use, extensive poaching, and one of the lowest percentages of protected areas of any country, this biodiversity is being lost rapidly. Since over 20 million people live in rural areas, the success of any Turkish conservation project depends greatly on local participation. In return, conservation projects can ease the problems of declining rural incomes and increasing migration to cities, via education, capacity building, and generating income through biodiversity research, conservation payments, and eco-tourism. In 2005, we started a biodiversity learning initiative based on these principles in Kars, eastern Turkey. Consisting of sub-projects covering a wide range of taxa and issues, our framework emphasizes dialogue, traditional knowledge, local empowerment, public outreach, and teaching students how to conduct their own projects. Even though we had some initial setbacks, support has been growing and there has been extensive local, regional, and national interest, particularly from young people and the local government. I will outline our integrated biodiversity conservation, education, and research agenda in Kars and summarize the challenges, successes, lessons, and implications for similar initiatives.

### 295. TOWARDS THE PROTECTION OF ECOLOGICAL PROCESSES: THE KEY ROLE OF UNGULATE CARRION IN NORTHERN FOREST ECOSYSTEMS

**SELVA**, **NURIA**, Institute of Nature Conservation, Polish Academy of Science, Poland; **Jedrzejewska**, **Bogumila**, Mammal Research Institute, Polish Academy of Science, Poland; **Jedrzejewski**, **Wlodzimierz**, Mammal Research Institute, Polish Academy of Scienc, Poland

The role of carrion in ecosystems has been largely ignored, in spite of its prevalence and the fact that all predators are scavengers to a certain extent. In undisturbed forests, now exemplified in Bialowieza Forest (E Poland), ungulate carcasses constitute the bulk of the total carrion supply. There are three main suppliers of ungulate carrion: (1) large predators, namely wolves Canis lupus and lynx Lynx lynx, subsidize scavengers constantly with the remains of their kills; (2) disease, cold and starvation provide scavengers generously in big pulses; and (3) human activities, mainly hunting, can be an important and predictable carrion supplier in many areas, specially where large predators are absent. On average, 75 kg/km² of ungulate carrion were annually removed by scavengers. In terms of biomass, ungulate carrion was the most abundant food resource during the cold season. It was also the only food available when the other trophic resources were depleted. More than 30 species of birds and mammals utilised carrion, mainly in winter. We discuss the possible consequences of the implementation of EU law regarding the eradication of dead animals in the field. In northern fluctuating environments, where winters are periods of hard conditions and lack of prey, carrion represents an essential food resource for the predator-scavenger community.

### 296. SPATIAL ESTIMATES OF ABUNDANCE IN CONSERVATION BIOLOGY: A REVIEW OF THE TECHNIQUE AND SOME RECENT EXAMPLES

**SEOANE, JAVIER**, Dep. de Ecología, Universidad Autónoma de Madrid, Spain; **Illera, Juan C**., University of East Anglia, Centre for Ecology, Evolution and Conservation, UK; **Carrascal, Luis M.**, Dep. Biodiversidad y Biología Evolutiva, Museo Nacional de Ciencias Naturales, CSIC. Spain; **Palomino, David**, Dep. Biodiversidad y Biología Evolutiva, Museo Nacional de Ciencias Naturales, CSIC. Spain; **Alonso, César L**., Dep. Ciencias Ambientales, Universidad de Castilla-La Mancha, Spain

It is already acknowledged that habitat suitability modelling can help conservation biologists in several ways, quite often to generate predictive cartography to be interpreted either as potential distribution or as maps of relative abundances. A further progress can be made by combining these two pieces of information to obtain maps of absolute abundances and, subsequently, spatial estimates of population sizes. However,

this combined estimate is subjected to the problem of propagation of errors and can suffer from imprecision and inaccuracy. To avoid this situation the input data or the results should normally be sensibly edited. Aiming to promote the use of these techniques in conservation biology, we review here some recent experiences to get spatial estimates for abundance. First, the detection of spatial population trends and seasonal variation in abundance of bottlenose (*Tursiops truncatus*) and common dolphins (*Delphinus delphis*) in southern Spain have added information to the proposal of marine protected areas. Second, the models have been used to forecast the potential consequences of the development of a road on the population sizes of several endangered shrub-steppe species in the eastern Canary Island, and to identify gaps in the network of reserves for the endemic Canary Island Stonechat (*Saxicola dacotiae*).

### 297. MANAGING BIODIVERSITY AND LANDSCAPE VALUES IN THE ESTONIAN AGRI-ENVIRONMENTAL SCHEMES – METHODOLOGICAL ASPECTS OF EVALUATION AND MONITORING

**SEPP, KALEV**, Department of Landscape Management and Nature Conservation, Institute of Agricultural and Environmental Sciences, Estonian University of Life Sciences, Estonia; **Koorberg, Pille**, Agri-environmental Monitoring Bureau, Estonian Agricultural Research Centre, Estonia; **Mikk, Merit**, Center for Ecological Engineering, Estonia

In Estonia the development of the Agri-environmental Program (AEP) began in 1997 with implementation in pilot areas starting in 2001. By this time, draft evaluation and monitoring methodologies had been elaborated for AEP. During 2001-2003, several of these indicators have been tested in two pilot areas of the AEP (Palamuse, representing a municipality with intensive agriculture, and Kihelkonna-Lümanda, representing extensive agriculture). The monitoring methodology was finalised during an EU Phare Twinning Project “Development of administrative capacity for monitoring and evaluation system of the agri-environment measures” and subsequently applied in 2004 and 2005 with the study of indicators related to landscapes. Landscape structure was described in terms of point, linear and areal elements and evaluation of visual appearance of farm and biodiversity (plant species, birds, insects)
We present an overview of Estonian agri-environment schemes related to biodiversity and landscape, analysing criteria and driving forces as well as barriers and problems with establishing these schemes (funds, farmer attitudes, knowledge of suitable low cost measures, bureaucracy). We also discuss landscape and biodiversity monitoring methodology and present initial results of studies of selected landscape indicators and biodiversity assessments.

### 298. THE DANUBE DELTA AS AN IMPORTANT WETLAND TO BE PROTECTED FOR BIODIVERSITY CONSERVATION

**SEREBRYAKOV**, **VALENTIN**, National Nature Park “Gutsulshchina”, Ukraine

The Danube delta is the most biggest transboundary delta in Europe. This wetland plays an important role in biodiversity conservation especially wetland species. There are 39 fungi, 950 vascular plant, 1937 insect and 398 vertebrate species. The most part of the delta is protected by national legislation and Ramsar convention. Great majority of wetland species are under the protection of Bern convention and many agreements within Bonn convention. In spite of this there are a lot of problems of political, economical, ecological and cultural meaning to be solved for biodiversity conservation.

### 299. BOTANIC GARDENS AND THE CBD GLOBAL STRATEGY FOR PLANT CONSERVATION

**SHARROCK, SUZANNE**, Botanic Gardens Conservation International, UK

The Global Strategy for Plant Conservation (GSPC) was agreed unanimously by Parties to CBD in 2002. The Strategy has 16 outcome-orientated targets to be achieved by 2010. Its development and means of implementation have been innovative within the CBD context and have led to increased and coordinated action for plant conservation and sustainable use around the world. Botanic gardens have played a key role in taking forward the GSPC since the outset. An in-depth review of the GSPC will soon be carried out by the CBD Secretariat. This paper will assess the impact of the GSPC on plant conservation in Europe and globally, highlighting the contributions made by botanic gardens.

### 300. BIOLOGICAL CONTROL OF INVASIVE PLANT

**SHAW, RICHARD**, CABI Bioscience, Principal Investigator, Invasive Species Management, UK

Invasive alien species are recognised as being serious threats to biodiversity and economies alike and plants are increasingly proving to be the most damaging taxon especially in non-agricultural settings where they can completely alter whole habitats and the native species that rely upon them. The one factor that is common to all alien invasive species is that they have lost the natural enemies that keep them in check in their native ranges and this can prove to be their Achiles heel. Environmental weeds are highly appropriate targets for classical biological control normally using arthropods and/or fungi. This paper examines the principles, processes and potential of biological control against alien weeds in Europe as well as addressing the challenges that face this tried and tested technique.

### 301. MILITARY ECOLOGY - AN EMERGING DISCIPLINE

**SHAW**, **ROBERT**, Colorado State University, United States

Ecology was originally defined by Ernst Haeckel in 1869 as the relationship of organisms to their organic and inorganic environments; thus, human ecology would be the relationship of humans to their environment. I argue that a distinct subset of human ecology is the emerging field of military ecology, or the scientific study of the relationship of the military to the environment. Because the military functions globally, all extremes of the global organic and inorganic environment must be considered. Three service branches (army, navy, air force) are typically associated with the military. Thus terrestrial, oceanic and atmospheric ecosystems are directly and indirectly impacted. Terrestrially, army training, testing and direct operations would be the major impacts spread across global environments from the arctic to the tropics, and communities from deserts to rain forests. Large scale environmental inventorying and monitoring of military lands have been developed and implemented. Carrying capacity estimates for military vehicles, training activities, and chemical capacity of soils have been developed and implemented over the last several decades. Greater biodiversity and concentrations of endangered organisms have been found on military training lands in Europe and North America. Why? Research results from various two continents will be discussed.

### 302. ASSESSING SPATIAL ABUNDANCE AND SPATIAL TRENDS FROM MONITORING DATA

**SIERDSEMA**, **HENK**, SOVON Dutch Centre for Field Ornithology / IBED-University of Amsterdam / Alterra, Netherlands; **Brotons**, **Lluís**, CTFC, Spain; **Newson**, **Stuart**, British Trust for Ornithology, United Kingdom

Detailed and up-to-date information on the distribution, abundance and trends of wild bird populations are essential for conservation purposes. However, only a small number of rare or localised species can be monitored on a national scale every year. For all other species we have to rely on information obtained at sample sites, where it is necessary to fill in the gaps between sites to examine distributions over the area of interest and how these have changed over time. Spatial statistics are

very suitable to perform this task. We will illustrate this with a national and a European example. The national example concerns the threatened Black-tailed Godwit Limosa limosa. Approximately 30% of the European population of this species breeds in The Netherlands. Based on data of 7 data sources and covering 10 years, a map of predicted abundance with a grid of 250 meters was created for the year 2004. The result was a very detailed distribution map and a much better estimate of national population size than was previously available. At a European scale the breeding bird monitoring programme of the EBCC offers possibilities to create abundance maps for most European countries and to identify those areas for which there has been a significant increase or decline. This will allow an improved insight into large scale changes of bird populations and measures needed to reverse declines.

### 303. EFFECTS OF STAND CHARACTERISTICS ON SPECIES DIVERSITY IN WOODLAND KEY HABITATS AND ORDINARY MANAGED FORESTS

**SIITONEN**, **JUHA**, Finnish Forest Research Station, Finland

Preservation of small habitat patches, so-called woodland key habitats, has become one of the cornerstones of maintaining biodiversity in managed forests in the Nordic countries. Key habitats belong to defined habitat types, are supposed to have near-natural stand characteristics, and expected to host threatened or uncommon species. However, very little is known about the actual species composition in key habitats. We measured stand characteristics and surveyed three species groups, epiphytic lichens, polypores and beetles, in 70 brook-side key habitats and 70 ordinary managed forests as controls in seven separate study areas in southern Finland. All the studied taxa had different occurrence patterns. The species richness of polypores and beetles was higher in key habitats than controls, whereas in lichens there was no difference. The number of red-listed species (lichens 4, polypores 25, beetles 10) was relatively low, and key habitats did not differ significantly from the controls. Stand characteristics that best explained species richness and the occurrence of red-listed and rare species were the volume and diversity of dead wood and stand age. At the moment, key habitats can help in maintaining species diversity, but are not likely to have a significant role in protecting threatened species.

### 304. MODELLING BIOGEOGRAPHIC PATTERNS AND SPECIES DENSITY OF IBERIAN AMPHIBIANS AND REPTILES WITH REMOTE SENSED DATA

**SILLERO**, **NEFTALÍ**, CIBIO, Centro de investigação em Biodiversidade e Recursos Geneticos, Portugal; **Brito**, **José Carlos**, CIBIO, Centro de investigação em Biodiversidade e Recursos Geneticos, Portugal; **García-Meléndez**, **Eduardo**, Facultad de Ciencias Biológicas y Ambientales, Universidad de León, Spain

Modelling biodiversity allows to found areas of high diversity and diversity loss with a lower sampling effort either in time or cost. The hardest stage of modelling is obtaining ecogeographic data, but with Remote Sensing technics it is possible to produce ecogeographic data with the same methodology and an adequate spatial resolution for large areas. This work aims to analyse biogeographic patterns of amphibians and reptiles species richness in the Iberian Peninsula, evaluating at the same time if Remote Sensing is a useful data source for biogeographic studies in large areas. Ecological Niche Factor Analysis (ENFA) was used to produce species density maps from individual-species models. Using the Jaccard' index and ordination of ENFA's coefficients of these models, two major biogeographic groups were identified for both taxonomic groups: Atlantic and Mediterranean. Maps of potential and observed species density were subtracted to determine regions of low herpetological knowledge. These were common to both taxonomic groups and were for Atlantic species: eastern Galicia region, western León province and western Asturias region; and for Mediterranean species: Iberian mountain range, Extremadura region, and southern plateau. Satellite imagery is a useful tool because it can be applied over political borders and study total biogeographic areas.

### 305. LAND USE CHANGE, FIRE AND PLANT CONSERVATION IN THE SERRA DE MONCHIQUE, PORTUGAL

**SIMONSON**, **WILL**, A Rocha Portugal, Portugal; **Mitchell**, **Ruth**, Centre for Ecology and Hydrology, United Kingdom

Land-use changes can have direct local impacts on biodiversity as well as indirect and less predictable effects at the landscape level, as demonstrated by our vegetation studies undertaken in the "eucalyptised" Serra de Monchique of south Portugal. Phytosociological sampling methods were used to compare plant richness, diversity and a floristic index in ten plots in each of ten habitat types including eucalyptus plantations. The latter showed significant reductions in these three measures compared to semi-natural habitats including cork oak woodland and rocky slopes. These plantations have been linked to a recent increase in forest fires; the Monchique mountains were badly affected by fires in 2003. Surveys of plant communities in plots within a range of habitats were taken immediately prior to the fires, and two years afterwards. This allowed an early assessment of the resilience (1/time to recovery) of their plant communities following fire. The resilience of some of the rarer habitats (e.g. rhododendron shrubland) was found to be comparatively low, while that of the commoner dry heathlands was higher. The community composition of heathland plots in areas of different fire history over the last 14 years varied, with potential implications for the conservation of this European priority habitat.

### 306. WINTER FOOD RESOURCES AND BREEDING BIRDS: WILL AGRI-ENVIRONMENT SCHEMES DELIVER POPULATION INCREASES?

**SIRIWARDENA**, **GAVIN**, British Trust for Ornithology, United Kingdom; **Calbrade**, **Neil**, British Trust for Ornithology, United Kingdom; **Vickery**, **Juliet**, British Trust for Ornithology, United Kingdom

Several UK agri-environment scheme options aim to enhance winter food resources for farmland birds in order to reverse long-term declines in abundance. We tested whether this is likely to succeed with a three-year, large-scale experiment in eastern England, in which birds in 40 study areas were provided with supplementary seed. Bird-use of the food was monitored weekly, considering granivores like Emberiza citrinella and Fringilla coelebs and other species that fed on it (e.g. Prunella modularis). Standardized surveys then compared breeding abundance in 1km squares around winter feeding sites with that in control squares. There was little difference in changes in abundance over time between fed and control areas, i.e. no effect of feeding on numbers. However, each species used different food patches to different extents, weakening the fed/control dichotomy. Among fed areas, a four-fold difference in the amount of food provided was positively associated with breeding population change. Further, considering winter food use as a predictor of population change revealed that the effective supply of seed was associated with significant improvements in several species' population trends. The results suggest that enhancing winter food can turn population declines into increases, but that it is critical that food provision is effective, i.e. that key species are actually fed.

### 307. SURVIVAL OF CAPERCAILLIE LEKS REQUIRES CONTINUOUS FOREST AREAS

**Sirkiä**, **Saija**, Finnish Game and Fisheries Research Institute, Finland; **LINDÉN**, **HARTO**, Finnish Game and Fisheries Research Institute, Finland

The smallest reproductive unit of the promiscuous capercaillie Tetrao urogallus is not a breeding pair, but an extensive lek, 300 ha minimum. Lekking area includes both the central displaying

site and daytime home ranges. Viable capercaillie populations require several leks functionally connected with each other. Capercaillie is a very poor disperser, so isolation of single leks is a continuous threat in fragmented surroundings. We have collected exact site information of hundreds of leks in Finland. In abundant forests of northern and central Finland lek requirements extend up to one kilometer from the lek centre. Within this radius there is a lot of forests, and very little fields and lakes. In southern parts of Finland the importance of scale is emphasized: when comparing different radii (200, 1000 and 3000 meters) with AIC-parameters we found the largest (3000 m) scale the most parsimonous. Especially the forests with high timber volume are needed. The model predicts that 30% of such forests equals with 50% survival probability. This might be interpreted as an extinction debt, especially if large-scale conservation efforts, e.g. increasing connectivity between leks, are not accomplished. Therefore, succesful conservation actions presuppose close cooperation with forest planning and management.

### 308. NATIONAL SPECIES ACTION PLANS AND ENVIRONMENTAL QUALITY OBJECTIVES IN SWEDEN

**SJÖGREN-GULVE, PER**, The Swedish Environmental Protection Agency, Nautral resources, Sweden

Sweden has 16 environmental quality objectives (EQOs) adopted by the Swedish parliament. Of these, 7 have interim targets involving national action plans (NAPs) for threatened species. The most recent target states that through improved conservation status, the fraction of red-listed species classified as threatened in 2015 is at least 30% smaller than in yr 2000. Five of the interim targets addressed NAPs to be introduced no later than 2005. Three of them were achieved for species in limnic environments (12 species), wetlands (13 spp + rich fens), and forests (52). Two were not achieved: only 4 out of 8 NAPs existed for threatened species in montaneous environments, and 12 out of 17 in marine or coastal habitats. The interim target of the agricultural landscape EQO will be achieved (2006). Including NAPs in the EQOs is a winning concept because it increases the awareness of policymakers, governments and other important actors. It increased resources from 0.86 to 9.12 million EUR 2002-2006 that allowed the work to be re-organized using a national network of NAP co-ordinators. Of 27 species subject to NAPs, the red-list situation 2000-2005 has improved for 9 of them, remains unchanged for 16, and 2 species have declined further.

### 309. DIVERSITY OF GROUND BEETLES (COLEOPTERA, CARABIDAE) ALONG A GRADIENT OF HEAVY METALS

**SKALSKI**, **TOMASZ**, Jagiellonian University, Poland; **Rybski**, **Witold**, Jagiellonian University, Poland; **Laskowski**, **Ryszard**, Jagiellonian University, Poland

Responses of Carabidae to heavy metal concentrations were investigated in four industrial regions of Great Britain and Poland. Beetles were collected by pitfall traps in five forest and meadow localities along pollution gradient of the zinc smelter in the Olkusz District (southern Poland), copper smelter in Glogów (western Poland), Clydach Nickel Refinery (South Wales) and lead-zinc smelter in Avonmouth (South-west England). The overall 30 000 of specimens belonging to 136 species were recorded. Canonical Correspondence Analysis was utilized to identify groups of sites based on similarity of composition. Three distinct groups of sites were recognized: (1) Polish forests, (2) Polish meadows and surprisingly (3) British forest and meadow localities. Habitat type and nitrogen concentration strongly correlated with the first two ordination axes. Heavy metal contamination effect was significant when we analyzed each assemblage gradient separately. Redundancy analysis revealed that most forest assemblage structure parameters (total biomass and diversity indices) were negatively correlated with concentration of lead and cadmium. In meadow gradients however, in spite of reduction of total biomass of the assemblages, all tested diversity indices and richness increased with pollution level. Different adaptations to stress disturbances of particular species and assemblages are presented

### 310. CARABIDS DIVERSITY ALONG ANTHROPOGENIC GRADIENT – FROM PRIMEVAL BIALOWIEZA FOREST TO OPEN AREA

**SKLODOWSKI**, **JAROSLAW**, SGGW, Warsaw Agricultural University, Poland

The indicator taxon selected for our study was the family Carabidae, which has been thoroughly studied in Europe with respect to both its taxonomy and ecological requirements. The field work was carried out in Bialowieza Primeval Forest, the last extant primeval forest in Europe, characteristic of the Central European Lowlands. Bialowieza Primeval Forest was legally protected as late as 1920. At present only part of it remains a protected area and the rest is variously managed with minor or large-scale felling, changes in the composition of the forest stand resulting in pine-only and spruce-only stands, felling to make way for paths and roads, clear-cutting of stands to build settlements or timber stockpiles or years of agricultural management of the soil following clear-cutting. The hypothesis was put forward that a decrease in forest species with an increasing share of non-forest species accompanies increasing disturbance of the primeval forest habitat. That hypothesis was proved true with the additional observation that there is often an increase in the number of carabid beetles in communities inhabiting managed stands, accompanied by an increase in the Margalef index. These changes are due to the appearance in managed stands of generalist species, which prevail numerically over forest specialists among the Polish Carabidae.

### 311. A COMPARISON OF GENETIC DIVERSITY ESTIMATED FROM 3 TYPES OF MARKERS: ARE NEUTRAL LOCI APPROPRIATE SURROGATES FOR FITNESS RELATED DIVERSITY?

**SMITH**, **STEVE**, Griffith University, Australia; **Hughes**, **Jane**, Griffith University, Australia

The vast majority of conservation genetic studies to date have employed neutral genetic loci as surrogates to assess levels of fitness-related diversity in endangered populations. While this strategy is attractive due to the relative ease of obtaining such estimates for non-model organisms that are invariably the focus of conservation studies, there are doubts as to whether this type of data is directly related to a population's long-term viability.
We investigate diversity levels in two highly endangered species of Australian marsupials across 3 types of markers: microsatellites, mitochondrial D-loop and MHC sequence data. Our findings show that for each species the diversity estimates obtained from the neutral regions of the genome (microsatellites, mtDNA) are significantly higher than those obtained from the functional region (MHC). This result is surprising as balancing selection is thought to maintain high levels of diversity at MHC loci. Our data indicates that previous diversity estimates may have been overestimated for these populations and that they are severely compromised in terms of fitness-related diversity. We recommend that projects aimed at maximising diversity in re-introduced or captive bred colonies of endangered species may improve their chances of success by incorporating information from loci directly related to individual fitness.

### 312. DEVELOPING METAPOPULATION MODELS FOR SPECIES LIVING IN DYNAMIC LANDSCAPES

**SNÄLL**, **TORD**, Swedish University of Agricultural Sciences, Sweden

We lack methods to parameterize metapopulation models for species living in changing landscapes when only snapshot data are available. This is the usual case – very rarely are data on the

dynamics of both the species and its patches available, and it is important that we can extract the most out of data at hand. The objective of the study is to develop a method to parameterize metapopulation models for species living in dynamic landscapes when only such data are at available. Snapshot data of the epiphytic lichen Lobaria pulmonaria and its host trees in a 2000 ha landscape is used. First, the forest landscape model is parameterized by repeatedly running simulations of the past forest history and selecting the set of parameters for tree ecology and fire regime that reproduce the tree snapshot data. Second, the metapopulation model is parameterized by repeatedly running simulations of the epiphyte dynamics across the landscape scenario that reproduced the tree snapshot data. The parameter set of the metapopulation model that reproduced the epiphyte snapshot data is chosen. The approach is feasible. However, data on the landscape history is required to provide information on when and where local extinctions of the epiphyte most probably occurred.

### 313. BUSINESS PARK HABITATS AND THEIR POTENTIAL ROLE FOR THE CONSERVATION OF (URBAN) BIODIVERSITY

**SNEP**, **ROBBERT**, Alterra - Wageningen UR, Netherlands; **Timmermans**, **Wim**, Alterra - Wageningen UR, Netherlands; **Kuypers**, **Vincent**, Alterra - Wageningen UR, Netherlands

Within nature conservation strategies business & office parks and industrial areas are until now neglected as land use forms that could potentially contribute to the long-term survival of (endangered) plants and animal species. However, since urbanization has become a major threat to biodiversity worldwide, nature conservationists should include also this opportunity within their strategies to preserve wildlife. In my talk I will argue that business areas should be one of those areas to be explored much better for its nature conservations value. There are several arguments to do so. First, due to their often peri-urban location business areas could be excellent stepping-stones between rural and urban nature. Secondly, the characteristics of business areas (e.g. flat roofs) provide excellent opportunities for specific plant and animal species. For example, coastal birds such as Sterns and Gulls already use gravel roofs in Dutch harbor areas as breeding sites: close to fishing waters, ideal 'soil' and no disturbance by ground-dwelling predators such as foxes. In my talk I will present the results of a breeding bird survey at business areas, some case-studies and a MCA-tool in which different spatial scenario's for green business parks can be assessed for their contribution to People-, Planet- and Profit-values.

### 314. AQUATIC NONINDIGENOUS FAUNAL SPECIES IN THE MINHO AND LIMA ESTUARIES, NW OF IBERIAN PENINSULA

**SOUSA**, **RONALDO**, CIIMAR – Centro Interdisciplinar de Investigação Marinha e Ambiental, Portugal; **Dias**, **Sergia**, CIIMAR – Centro Interdisciplinar de Investigação Marinha e Ambiental, Portugal; **Antunes**, **Carlos**, CIIMAR – Centro Interdisciplinar de Investigação Marinha e Ambiental, Portugal; **Guilhermino**, **Lúcia**, CIIMAR – Centro Interdisciplinar de Investigação Marinha e Ambiental, Qatar

Introduction of nonindigenous invasive species (NIS) is one of the most important threats to species conservation. This study documents the presence of various nonindigenous animal species in two of the most important Portuguese estuarine ecosystems: Minho and Lima estuaries. These estuaries, located in the NW of Portugal, were in the last decades subjected to several biological introductions. In this study, which is a result of a compilation of data gathered in the last 15 years, we reported the presence of 18 aquatic animal species distributed by the two estuaries that have self-sustaining populations. Of these NIS, should be pointed out the presence of the Asiatic clam Corbicula fluminea with a spectacular invasive behaviour in the Minho estuary (e. g. mean abundance and biomass of 1100 ind./m² and 97 g AFDW/m², respectively). A special attention is drawn to the introduction vectors, origin of the species introduced and to the ecologic and economic damages that may be caused by these introductions. Potential future NIS introductions in these two estuarine ecosystems are also predicted and discussed.

### 315. CRAYNET - ACHIEVEMENTS IN SCIENTIFIC MANAGEMENT OF EUROPEAN CRAYFISH, THE WAY FORWARD AND FUTURE CHALLENGES

**SOUTY-GROSSET, CATHERINE,** UMR 6556, Génétique et Biologie des Populations de Crustacés, Université de Poitiers, France; **Reynolds, Julian,** University of Dublin, Trinity College, Ireland; **Gherardi, Francesca,** Dipartimento di Biologia Animale e Genetica, Leo Pardi, University of Firenze, Italy; **Schulz, Ralf,** Institute of Environmental Sciences, University Koblenz-Landau, Germany; **Edsman, Lennart,** National Board of Fisheries, Institute of Freshwater Research, Sweden; **Füreder, Leopold,** Institute of Zoology and Limnology, University of Innsbruck, Austria; **Taugbol, Trond,** Norwegian Institute for Nature Research, Fakkelgarden, Norway; **Noël, Pierre,** Biologie des Invertébrés marins, Museum national d'histoire naturelle, France; **Holdich, David,** Aquatic consultant, England; **Smietana, Przemyslaw,** Faculty of Natural Science, Department of Ecology, University of Szczecin, Poland; **Mannonen, Ari,** Finnish Game and Fisheries Research Institute, Evo Fisheries Research and aquaculture, Finland; **Carral, Jose,** Dept Produccion Animal II, Faculdad de Veterinaria, Universidad de Leon, Campus de Vegazana, Spain

Born in 2002 under the auspices of the European Commission, the European thematic network CRAYNET *"European Crayfish as keystone species-linking science, management and economics with sustainable environmental quality"* started with the following topics: Monitoring in conservation and management of indigenous crayfish species (ICS); interaction between ICS and non-indigenous crayfish species (NICS); control and management of NICS; habitat restoration; reintroduction and restocking; legislation; education. The network is continually developing links between researchers and managers and encouraging sustainable policies for development, through rural agencies and regional programmes. CRAYNET aims to establish - for the first time for crayfish - a network of crayfish researchers and water managers and users ("stakeholders") to:

1) Identify European trends in land use with consequent effects on water quality, and their probable impact on biodiversity, as assessed by bio-indicators (crayfish are bioindicators for water quality and are also keystone species controlling ecosystems);

2) Discuss ways to harmonise national and regional legislation and to improve it at European level;

3) Identify research needed to solve management problems in crayfish survival and habitat and water quality protection;

4) Produce documents on crayfish biology and population management aimed at stakeholders and the general public.

### 316. PRIORITY SETTING IN BIRD CONSERVATION: THE SWISS RECOVERY PROGRAMME FOR BIRDS

**SPAAR**, **RETO**, Swiss Ornithological Institute, Switzerland; **Rehsteiner**, **Ueli**, Schweizer Vogelschutz SVS/BirdLife Switzerland, Switzerland; **Keller**, **Verena**, Swiss Ornithological Institute, Switzerland; **Müller**, **Werner**, Schweizer Vogelschutz SVS/BirdLife Switzerland, Switzerland

The national Red-List status of the species (extinction risk) and the significance of the national population in relation to the size of the European population (national responsibility) were used to select the Species of National Conservation Concern. In a second step, we evaluated the need for (a) species action plans, protection of (b) sites and (c) habitats. Of the 195 bird species

regularly breeding in Switzerland, 120 are of national conservation concern, among them 50 which need specific action plans.
In 2003, the Swiss Ornithological Institute Sempach and SVS/BirdLife Switzerland launched the Swiss Recovery Programme for Birds, to stimulate specific conservation actions for these 50 species. Up to now, national action plans have been established for seven species of national conservation concern, and conservation projects are in progress for many others. The main aim of the programme is to reduce the factors limiting the species' survival. We aim to stop the negative population trends, but on a longer term, we hope that the Recovery Programme will help the bird species to establish viable population sizes in Switzerland.

### 317. THE ROLE OF INDUSTRY AND LOCAL COMMUNITIES IN LONG-EARED OWL CONSERVATION

**SPERRING, CHRIS**, Hawk and Owl Trust, United Kingdom

In the UK, the Long-eared Owl, *Asio otus*, is estimated to have declined by around 50% between 1950 and 1997. The secretive nature of this species has resulted in their being overlooked by both bird recorders and conservationists. The number of breeding pairs is currently thought to be around 2000 and yet it is offered no special protection. The Long-eared Owl Conservation Project makes use of public knowledge in order to improve our understanding of Long-eared Owl distribution and habitat utilisation. There is a particular focus on education and involvement of local communities. Because of the bird's common association with commercial forest plantations, we also assist in producing management plans with foresters in order to improve habitat opportunities while not impeding the commercial activities on the site.

### 318. TOOLS FOR BIODIVERSITY CONSERVATION IN EUROPEAN BEECH FORESTS

**STANDOVÁR**, **TIBOR**, Eötvös University, Hungary; **Angelstam**, **Per**, Swedish University of Agricultural Sciences, Sweden

This presentation is aimed at setting up the frame for successful conservation of European beech forest biodiversity and to review the management tools for this. We concentrate on providing a scientific background of how past and contemporary land use have affected different elements of biodiversity. To assess continental scale loss and conversion of beech forests we performed a GIS-based comparison of potential beech and mixed beech forests (>92 million hectares in Europe) with contemporary forest cover (based on satellite image interpretation) and with national forest inventory data. Presently, beech-dominated forests cover roughly 14 million hectares. This means an average 84% loss of beech-dominated forests at the European scale. However, the estimated loss varies between 25% and 99% in different European countries. Forest loss and conversion to conifers show clear geographical patterns. Based on these data we discuss the realistic target levels (maintaining species' occupancy, viable population of naturally occurring species, ecosystem integrity and health, or long-term ecological sustainability) in each major European region. We also show the relative importance of different management tools (conservation, management and restoration) that are based on the two main visions (natural disturbance paradigm; pre-industrial cultural landscape) of maintaining biodiversity.

### 319. USE OF HABITAT MONITORING IN SPECIES THREAT ASSESSMENTS: EXAMPLES FROM MADAGASCAR

**STEININGER, MARC**, Center for Applied Biodiversity Science, Conservation International, USA

Species threat assessments such as the IUCN Red List increasingly use quantitative data on parameters related to the status of individual species. These include estimates of changes in population and habitat extent. In parallel, satellite monitoring of habitats is increasing in coverage, precision and accuracy. This presents an opportunity to improve estimates of the extent of occurrence of individual species and to consistently track changes over time. This requires affordable, quality satellite data, efficient methods to monitor changes in habitat, and definitions of species habitat requirements. Examples are provided for forest-obligate mammals, birds and amphibians of Madagascar. This includes modified estimates of extent of occurrence, and estimates of habitat fragmentation and change over time. These analyses are possible globally for many non-forest taxa as well, representing a cost-effective contribution to the regular delivery of several criteria used in Red List assessments.

### 320. DEVELOPING SYSTEMATIC REVIEW METHODOLOGY FOR CRITICAL APPRAISAL AND SYNTHESIS OF ECOLOGICAL DATA

**STEWART**, **GAVIN**, Centre for Evidence-Based Conservation, United Kingdom; **Pullin**, **Andrew**, Centre for Evidence-Based Conservation, United Kingdom

Systematic review is the central methodology in developing an evidence-based framework to support decision making. Systematic reviews synthesise large volumes of diverse data, whilst minimizing bias and increasing transparency and repeatability. They are widely used in human health care but how applicable is the methodology for the synthesis of ecological data? We have undertaken a number of systematic reviews on a broad range of conservation topics and find that ecological data present significant but soluble challenges for the systematic review process. Key challenges will be discussed using case study examples. Derivation of hypotheses from initial areas of interest is a complex and time consuming process involving multiple conservation stakeholders. The quantity and accessibility of ecological data preclude the use of high specificity searches. The diverse nature of available data is difficult to assess in terms of the internal validity of individual studies, necessitating the use of review specific data quality instruments. Meta analysis is often constrained by small sample sizes and lack of standardisation. We conclude that ecological systematic reviews are possible and necessary if we are to identify our current limits of knowledge and develop a robust evidence base for decision making in conservation.

### 321. ENGAGING LOCAL ACTORS IN CONSERVATION THROUGH USE OF BLUEBELL AS AN INDICATOR OF MUNTJAC DAMAGE TO WOODLAND GROUND FLORA

**STOATE**, **CHRIS**, The Game Conservancy Trust, United Kingdom; **Aebischer**, **Nicholas**, The Game Conservancy Trust, United Kingdom; **Berry**, **Alex**, University of Salford, United Kingdom

Leighfield Forest comprises remnant woods of a medieval hunting forest, many of which are designated as high conservation status because of rare ground flora. Muntjac deer were introduced to England in the 1880s and have been present in Leighfield Forest since the 1970s. They can cause considerable damage to herbaceous plants, and to regenerating shrubs coppiced as part of ground flora management. Although deer stalking is an established recreational activity in England, motivation for Muntjac control is low as carcass size is small and damage to economically important crops is low. Bluebell is a widespread woodland plant which is highly valued by the general public for aesthetic reasons. We used GIS mapping of damage to bluebells as a way of communicating the conservation issue to local people. GIS maps provided a focus for discussion, encouraging dialogue between stakeholders. Although there were differences in plant damage between woods, requiring some targeting of management, the statistically significant influence was shrub cover. Recent increased coppice management intended to benefit ground flora, increases shrub cover within the coppice rotation, improving habitat for Muntjac.

There is therefore an interaction between woodland structural management for rare plants and socio-economic issues associated with Muntjac control.

### 322. ADAPTATIONS OF WOOD-DECAYING FUNGI AND THEIR NEED FOR CONSERVATION MEASURES

**STOKLAND**, **JOGEIR N.**, Norwegian Forest and Landscape Institute, Norway

The amount of dead wood in Scandinavian boreal forests has declined by about 90 % since economic use of timber started some 500 years ago. Even tough the amount of dead wood is currently increasing; substrate availability appears to be below critical levels for several polypore and corticoid species. A common feature for these species appears to be a strong association with large-diameter logs. On the other hand, the current clear-felling practice produces more sun-exposed wood that favours some species adapted to decompose wood at high temperatures. Species inhabiting spruce forests appear to be more sensitive to reduced substrate availability than those inhabiting pine forests. This is probably an effect of different dispersal abilities that have evolved under contrasting stand dynamic patterns in natural spruce and pine forests. These findings have several management implications: it is more important to increase substrate abundance in spruce forests compared to pine forests; and retention trees, prolonged rotation time, and preservation of woodland key habitats are necessary to increase the input of dead wood with large dimensions. The latter conservation measures are needed both in spruce and pine forests, but mostly in spruce forest.

### 323. OPTIMAL RESERVE SELECTION IN A DYNAMIC WORLD

**Strange**, **Niels**, Forest & Landscape, The Royal Veterinary and Agricultural University, Denmark, Denmark; **Thorsen**, **Bo Jellesmark**, Forest & Landscape, The Royal Veterinary and Agricultural University, Denmark, Denmark; **BLADT**, **JESPER**, Institute of Biological Sciences, University of Aarhus, Denmark, Denmark

In this study we perform a novel expansion of the problem of optimal reserve site selection over time. We explore a case where areas with valuable biodiversity cannot all be protected immediately due to budget restrictions and there is a probability of species extinction on reserved as well as non-reserved sites. Add to this the risk of land-use conversion facing all non-reserved areas. We furthermore introduce a new type of control by making the planning authorities have the option to sell reserved land on which biodiversity value has decreased. We formulate and solve this problem through stochastic dynamic integer-programming. The current study shows that, due to the dynamic and stochastic nature of biodiversity evolution, the inclusion of a swapping option may increase overall efficiency. Finally, we test a number of decision criteria (heuristics) to investigate alternatives to the cumbersome task of determining the true optimum.

### 324. RARE DIATOM SPECIES IN HUNGARY RECORDED DURING SURFACE WATER MONITORING ACCORDING TO THE WATER FRAMEWORK DIRECTIVE

**Strenger-Kovács, Csilla,** University of Veszprém, Department of Limnology, Hungary; **Buczkó, Krisztina**; Hungarian Natural History Museum, Hungary; **Ács, Éva**; Hungarian Danube Research Station, Hungarian Academy of Sciences, Hungary; **Borics, Gábor**, Environmental Protection Inspectorate for Trans-Tiszanian Region, Hungary; **Padisák, Judit**, University of Veszprém, Department of Limnology, Hungary; **Soroczki-Pintér Éva**, University of Veszprém, Department of Limnology, Hungary

In 2005, altogether 52 lakes/reservoirs and 339 running waters were monitored in Hungary according to the Water Framework Directive (WFD) with the aim to assess the ecological status of surface waters. Most of the taxa were very rare and occurred only occasionally in one or in a few samples. The qualification of surface waters was based on the dominant and common species, which does not allow for evaluation of quality status of surface waters habitats from the point of view of conservation biology. Species–based conservation programs should appear as fundamental components of the national and international policies to arrest the loss of biodiversity. In this study our aim was to take the first step in species conservation to gather the lists of endangered species and their distributions. According to red lists of threatened diatom species in Hungary and in the neighbouring countries, we found many species that belong to different categories of endangeredness: presumably threatened (8 species), low risk (8), vulnerable (28), endangered (1) and believed to be extinct (2) e.g. Bacillaria paradoxa Gmelin; Nitzschia vitrea Normana, Achnanthes petersenii Hustedt, Fragilaria capucina Desmazieres var. austriaca (Grunow) Lange-Bertalot, Gomphonema vibrio Ehrenberg, Luticola goeppertiana (Bleisch) H.L. Smith.

### 325. TAWNY OWLS AND THEIR HABITAT: ARE LESSONS FROM HABITAT-POPULATION-RELATIONSHIPS OF A COMMON SPECIES APPLICABLE TO THE DYNAMICS OF THE RARE ONES?

**SUNDE, PETER,** Ntional Environmental Research Institute, Wildlife Ecology and Biodiversity, Denmark

The densities, dynamics and persistence of owl populations depend on the availability and dispersion of habitats of sufficient quality that enable reproductive rates to outweigh mortality rates. Indices of habitat quality can be established on the basis of correlations between certain habitat features and the probability of presence or measures of reproductive success. But how well do we really understand the intricate interactions between resource availability, natural and artificial mortality agents and natural behaviour (reduced population growth rates due to territorial behaviour, unwillingness of juveniles to disperse far away from natal areas or skewed sex ratios)?
Rare or threatened populations are often hard to study. To learn more about the general dynamics of populations in marginal habitats one could instead study the responses of otherwise abundant species across environmental gradients ranging from suitable to unsuitable habitats. The tawny owl is one of the most common and easily studied owl species in Europe. It may therefore serve as subject for investigating how habitat quality, landscape heterogeneity and the presence of mortality agents (natural enemies as well as human caused factors) influence the performance of individuals and populations.
In the talk, I will summarise results of studies on spatial behaviour and population dynamics of tawny owls in relation to environmental variation and habitat heterogeneity in Norway, UK and particularly Denmark. Given the premise that the main difference between threatened and non-threatened populations is that the former have experienced a higher level of habitat degradation than the latter, I argue that widespread and abundant species may serve as good models to help us understand how habitat (*sensu lato*) influence individuals and populations.

### 326. WHY IS THERE A NEED FOR EVIDENCE-BASED CONSERVATION?

**SUTHERLAND**, **WILLIAM**, University of East Anglia, United Kingdom

Much of conservation practice is based upon hearsay rather than information that can be supported. Following the success of evidence-based medicine this has lead to calls for evidence-based conservation. The aim of this presentation is to quantify the magnitude of the problems with current conservation practice and show how evidence-based conservation could help overcome such problems. The major issue with conservation management are that: (1) It is difficult for conservation practioners to obtain information from the range of other

practioners carrying out similar work. (2) Very little practice is based upon traceable sources. (3) Conservation practices vary in success, but some are unsuccessful. A range of approaches can be used to estimate success. From this it is clear that very large sums are spent annually on conservation practices that are not successful. (4) Little of the management is documented in a way that can be used by others. A solution to changing this is to provide the means for the collation and dissemination of the experience of practioners and to collect the evidence of effectiveness through systematic reviews.

### 327. CROSS-BORDER INVENTORY OF BIOLOGICAL DIVERSITY AS TOOL FOR CONSERVATION OF IMPORTANT WETLANDS SHARED BY LITHUANIA, BELARUS AND RUSSIA

**SVAZAS**, **SAULIUS**, Institute of Ecology of Vilnius University, Lithuania; **Bezaras**, **Vidmantas**, State Service for Protected Areas , Ministry of Environment, Lithuania

The changes that have taken place in Europe during recent years have impacted many key wetlands, shared by two or more countries. International borders loose their importance in Central Europe due to European integration processes. Simultaneously new strictly protected international borders are formed along eastern borders of the EU. Many important wetlands are shared by Lithuania-Belarus and Lithuania-Russia. The biodiversity of these particularly valuable nature areas was investigated in 2001-2005. Nine cross-border sites of international importance (their total area – 170,000 ha) were designated during a special program. The results of this study enabled to establish several new protected cross-border areas and to designate the first transboundary Ramsar site in this part of Europe – the "Cepkeliai/Kotra" wetland complex, shared by Lithuania and Belarus. Such results would be not possible without joint efforts of Lithuania, Belarus and Russia. This joint project was implemented by research organizations, local communities, regional and state authorities, NGOs and international environmental organizations. It is expected that the results of this cross-border program will stimulate joint management and conservation efforts in other important transboundary wetlands, located on the new border of the European Union.

### 328. BEARS IN AN INDUSTRIAL FOREST: MANAGING THE EXPANDING BROWN BEAR POPULATION IN SWEDEN

**SWENSON, JON E.,** Department of Ecology and Natural Resources Management Norwegian University of Life Sciences, Norway & Norwegian Institute for Nature Research, Norway

The brown bear (*Ursus arctos*) was almost exterminated in Sweden. Around 1930, there may have been as few as 130 bears in four isolated populations. Effective protective measures allowed numbers to increase, and in 1943 there were about 300 bears, and a controlled hunting season was initiated. Since then the population has increased to about 2200 bears found over almost 75% of Sweden's area. This increase has occurred in spite of the fact that Sweden has one of the most intensively managed boreal forests in the world. The factors allowing the increase have been the generally positive attitude among the public towards bears, relatively low levels of depredation on domestic livestock, low human population densities in bear areas, conservative hunting quotas, and some positive aspects of the intensive industrial forest management. This management has provided excellent habitat for two important bear foods: moose (*Alces alces*) and ants (especially *Componotus* spp.). The bear population is now expanding into areas with higher human densities. This, in addition to the increasing numbers of other predators, notably the wolf (*Canis lupus*), is leading to increased conflicts with people. Bear predation on moose, mostly calves, seems to be offset to a large degree by the bear's value as a game animal itself. However, many people are afraid of bears, especially near houses, and the number of bear injuries seems to be increasing. In addition, the bear may be an important predator on the calves of semi-domestic reindeer (*Rangifer tarandus*) in some areas. Management has changed from conservation of a vulnerable species, to reducing conflicts and managing the number and distribution of bears in relation to human tolerance.

### 329. RESTORATION OF OPEN SANDY GRASSLAND ON OLD-FIELDS: DOES SOIL NITROGEN MATTER?

**SZABÓ**, **REBEKA**, Institute of Ecology and Botany of the Hungarian Academy of Sciences, Hungary; **Halassy**, **Melinda**, Institute of Ecology and Botany of the Hungarian Academy of Sciences, Hungary; **Szitár**, **Katalin**, Institute of Ecology and Botany of the Hungarian Academy of Sciences, Hungary; **Török**, **Katalin**, Institute of Ecology and Botany of the Hungarian Academy of Sciences, Hungary

Degraded old-fields are more and more common in Hungary, especially in the Kiskunság region. The natural process of secondary succession is often too slow and can stall at an intermediate state dominated by weeds for a long time. Restoration methods can shift succession towards a state with higher natural value. Field experiment was carried out from 1998 to 2003 on three sites differing in elevation, moisture and productivity. Carbon treatment was applied in order to lower soil nitrogen availability, thus providing competitive advantage for the species of the target open sandy grassland over fast-growing nitrophilous weeds. The soil nitrogen availability was significantly decreased through the immobilization of nitrate. Despite the results in the soil, the changes of the vegetation were similar in the control and treated plots. However, the trends of the five-year succession were different in the three sites. The abundance of the target species increased only at the driest site, while the others that seemed to be more mesic remained dominated by generalist species of closed sandy grasslands. As the specialist species typical for this community are missing in the surrounding vegetation, the propagule limitation will determinate the succession until new restoration methods could be applied.

### 330. BENEFITS OF AGRICULTURE: MOWING ENHANCES HUNTING YIELD OF THE ENDANGERED MONTAGU'S HARRIER

**SZENTIRMAI**, **ISTVÁN**, Eötvös Loránd University, Hungary; **Dijkstra**, **Cor**, University of Groningen, Netherlands; **Trierweiler**, **Christiane**, University of Groningen, Netherlands; **Koks**, **Ben J.**, Dutch Montagus Harrier Foundation, Netherlands; **Harnos**, **Andrea**, Szent István University, Hungary; **Komdeur**, **Jan**, University of Groningen, Netherlands

Agricultural operations, like mowing, may temporarily increase the accessibility of prey for raptors through reducing vegetation cover. However, to what extent mowing affects hunting yield of farmland predators and whether it eventually enhances their reproductive success or survival is still largely unknown. In this study we investigated the effect of mowing on hunting yield and time budget of an endangered farmland raptor, the Montagu's harrier Circus pygargus. In the short-term, mowing enhanced hunting yield (prey caught per hour hunting) due to a 1.5-2-fold increase in strike frequency and strike success on the day of mowing and one day after mowing. Consequently, harriers preferably hunted on fields shortly after mowing, and the total amount of prey caught was 16-36 times higher shortly after mowing than before mowing. In addition, the more time harriers spent hunting on mown vegetations the less they hunted in total and the more time they spent resting over a day. Our results revealed that both detectability (strike frequency) and catchability (strike success) of prey are enhanced after mowing, leading to a short-term increase in the hunting yield of Montagu's harriers. This increased hunting efficiency in turn positively influences the time available for resting and may eventually increase body condition and survival chances of adults.

### 331. BIODIVERSITY OF NATURAL ENEMIES IN *BT*- VS NON-*BT* MAIZE FIELDS: COMPARATIVE ANALYSIS OF A HUNGARIAN AND OTHER EXPERIMENTS

**SZENTKIRÁLYI, FERENC,** Hungarian Academy of Sciences, Department of Zoology, Plant Protection Institute, Hungary; **Szekeres, Dóra,** Hungary; **Kádár, Ferenc,** Hungary; **Kiss, József,** Hungary

Maize is one of the most important arable crops in Hungary in terms of growing traditions, practices and of acreages (1,2 million ha). Hungarian long-term monitoring programs for arthropod communities associated with maize ecosystems revealed several hundred species with a huge number of trophic relations among them inside the food webs. A significant portion of these arthropod communities are the predatory and parasitoid natural enemies of pests. Therefore it is necessary to know any possible positive/negative impacts to these non-target control agents caused by new insect resistant, transgenic *Bt* crop plants.
A 3-year field experiment was carried between 2000 and 2003 in Hungary using *Bt*-maize expressing Cry1Ab toxin, as a part of the EU 5$^{th}$ framework project Bt-BioNoTa ("Effects and mechanisms of *Bt* transgenes on biodiversity of non-target insects: pollinators, herbivores and their natural enemies"). Our lecture will overview and evaluate the results of biodiversity investigations concerning to predatory insect groups sampled on plots of *Bt*-maize (DK 440 BTY, MON 810) and non-*Bt* isogenic line (DK 440). The lecture also presents a comparative analysis of predatory and parasitoid guilds recorded in maize fields in Hungary and in other countries.

### 332. IS CARBON ADDITON AN EFFECTIVE METHOD FOR CONTROLLING THE INVASION OF ASCLEPIAS SYRIACA L. TO RESTORE SEMI-ARID GRASSLANDS IN HUNGARY?

**SZITÁR**, **KATALIN**, Eötvös Loránd University, Hungary; **Török**, **Katalin**, Institute of Ecology and Botany of the Hungarian Academy of Sciences, Hungary; **Halassy**, **Melinda**, Institute of Ecology and Botany of the Hungarian Academy of Sciences, Hungary; **Szabó**, **Rebeka**, Institute of Ecology and Botany of the Hungarian Academy of Sciences, Hungary

Restoration efforts are often hindered by the spread of non-indigenous plant species. In Hungary, invasion of common milkweed (Asclepias syriaca L.) significantly reduces regeneration potential of degraded sandy grasslands. Degradation processes often result in elevated nitrogen availability, which promotes mostly undesired species requiring high nitrogen level. In a restoration experiment aimed at accelerating the regeneration of semi-arid grasslands on ex-arable fields through the immobilization of available nitrogen, common milkweed invaded 35 plots. We used this opportunity to study its population growth in relation to the carbon treatment. Statistical analysis revealed that carbon addition did not reduce the cover of Asclepias syriaca. However, the growth rate of common milkweed was significantly lower in treated plots compared to controls. Asclepias syriaca is a competitive invasive species probably not limited directly by soil nitrogen as it grows vigorously in only mechanically disturbed sandy grasslands with extremely low nitrogen level. It is more likely that community dynamics altered by available nitrogen level influenced its growth rate in a favourable way.

### 333. THE SOIL ECOSYSTEM IN URBAN AREAS: SOIL BIODIVERSITY

**SZLÁVECZ**, **KATALIN**, The Johns Hopkins University, United States; **Hornung**, **Elisabeth**, Szent Istvan University, Faculty of Veterinary Science, Hungary; **Vilisics**, **Ferenc**, Szent Istvan University, Faculty of Veterinary Science, Hungary; **Csuzdi**, **Csaba**, Hungarian Natural History Museum, Hungary; **Korsós**, **Zoltán**, Hungarian Natural History Museum, Hungary

Urbanization is portrayed as one of the leading causes of biodiversity loss. Soils in cities are transported and heavily managed leading to altered community composition. We have been surveying soil fauna in Baltimore, US and Budapest, Hungary for several years. Using our as well as literature data we evaluated patterns of urban soil biodiversity. Significance of exotic soil fauna is strongly taxon-dependent. The proportion of non-native species varies between 0% and 100%. Contrary to expectations soil invertebrate diversity can be quite high. In Budapest 58 % of the Hungarian Oniscidea fauna is present (30% introduced). Many species were new to the region or to science. Changes in soil community structure often result in altered rates and pathways of decomposition. In Baltimore lower richness Silphidae decreased the probability of vertebrate carrion burial. High earthworm abundance in urban forests affected N cycling, but there was a strong species effect: the Asian Amynthas hilgendorfi facilitated N-mineralization much faster than the European Lumbricus terrestris. Terrestrial isopods behaved more similarly: on the short term they all enhanced N-mobilization. Studies on altered urban soil communities enable us to address more fundamental ecological questions such as the relationship between biodiversity and ecosystem function, and the issue of species redundancy.

### 334. STUDY ON THE FEEDING HABITS OF THE STONE MARTEN (MARTES FOINA ERXLEBEN 1777) ON DIFFERENT URBAN HABITATS

**SZOCS**, **EMESE**, Saint István University, Hungary; **Heltai**, **Miklós**, Saint István University, Hungary; **Budaházi**, **Katalin**, Saint István University, Hungary

In the past decades the stone marten often moves to inhabited areas. Probably some new features evolved, due to the special circumstances. In our study the main aim was to examine if the diet of the stone marten differs on different urban habitats, and to estimate the rate of human related food sources in the diet composition. We made scat analysis on 150 scats from different urban areas (Gödöllo n=77, Budapest n=53, 3 other cities n=20). Our results show that the main food sources were the fruits (relative frequency of occurrence ®=31,06%, biomass rate (B)=46,3%, n=150). The rate of human related sources (like birdseed, salami skin) was R=9,09%. The diet of the stone martens living in the two main examined habitats was significantly different (chi2=706,1167, df=3, p<0,001). The main source in Gödöllo was the group of fruits (R=36,7%, B=54,69%) and small mammals were the second (R=24,47%, B=24,06%). Whilst in Budapest birds took the first place (R=34,64%, B=63,97%) and fruits the second (R=30,71%, B=33,56%). Apart from the digestible and nutritious food components the chewing of some other materials (cable, sealer, rubber etc.) was also proved. With the chewing of these things the stone marten apparently caused property damage. On the whole we can say, that this species has found it's life supports near men too, but the caused conflicts are need to be sold.

### 335. REMOVAL EXPERIMENT OF AILANTHUS ALTISSIMA ON THE 'FÓTI SOMLYÓ' HILL, HUNGARY, AND SUBSEQUENT CHANGES IN THE VEGETATION

**SZÖLLÖSI, TÜNDE IRÉN**, Department. of Plant Taxonomy and Ecology, Loránd Eötvös University, Hungary; **Tóth, Mária**, Department of Systematic Zoology and Ecology, Loránd Eötvös University, Hungary; **Kalapos, Tibor**, Department of Plant Taxonomy and Ecology, Loránd Eötvös University, Hungary

Seminatural grasslands on the Fóti Somlyó hill, Central Hungary, are endangered by the invasive tree-of-heaven (*Ailanthus altissima*). A weed control experiment was set up in 2003 using a herbicide treatment (one time exposure of the freshly cut log surface to Garlon solution) and a mechanical one (biweekly manual removal of sprouts). On disturbed areas the abundance of *A. altissima* was higher, and the undergrowth was species poor and markedly different from the original grassland flora. Manual sprout removal tripled the cumulative number of sprouts in the vegetation period, while chemical treatment decreased this value by 40-50%. Without manual removal, sprout density

stopped increasing by mid-July, while with manual clearing it continued to rise in a steady rate in chemically untreated plots, but with declining intensity in Garlon-treated ones. After a growth-season-long manual sprout removal in 2005, in May 2006 sprout density was 60% and 78% lower than one year before in chemically untreated and Garlon-treated plots, respectively. After clearing the tree-of-heaven the abundance of nitrophilous weeds declined rapidly. These results indicate that persistent sprout removal may gradually deplete root reserves, and herbicides applied to cut log surface might further decrease sprouting capacity without damaging the surrounding vegetation.

### 336. SUSTAINED DEVELOPMENT – A CHANCE FOR NATURE CONSERVATION POLICY

**SZYSZKO**, **JAN**, Laboratory of Evaluation and Assessment of Natural Resources, Poland

The question is set whether sustained development is a useful tool of nature conservation policy. To deal with this topic the terms 'sustained development' and 'nature conservation policy' are defined and indicators for sustained development are introduced. Problems concerning nature conservation with respect to today's land use are addressed. Introducing carabid beetles as indicators for the stage of succession of a habitat the importance to recognize stages of succession is stressed, because species change their strategy of survival in different situation (stage of succession). Moreover, species with the need for different stages of succession are defined as indicators for landscape quality. An analysis of today's land use indicates that man has to maintain different stages of succession. In this situation man – like nature – protects biodiversity by using this nature. Two important conclusions are made: First, man is a part of the natural environment. Thus, he has to use it and introduce changes to it. It is not only his right but also his duty. Secondly, none of the human activity needs to detoriate the condition of the natural environment. Sustained development is an instrument of nature conservation policy, if the indicators of sustained development are realized.

### 337. THE PROFESSIONALS: CHALLENGES FACING ECOLOGISTS IN THE 'REAL' WORLD OF EUROPE

**THOMPSON, JIM**, Institute of Ecology and Environmental Management (IEEM), United Kingdom

If ecology is to engage with society at large it has to ensure that in common with other professionals such as planners and engineers, it has a proper professional basis to do so. There is an increasing raft of European Union legislation including the Environmental Impact Directive, the Habitats Directive, the Water Framework Directive and the Environmental Liabilities Directive. Such directives and others demand as never before, the skills of professional ecologists to deal with the significant practical conservation issues of the day.
The paper will use the example from the UK of the Institute of Ecology and Environmental Management and how it deals with issues such as:

- A Code of Professional Conduct;
- Continuing Professional Development;
- Making ecology heard in the wider society;
- Skills – is there a shortage?;
- Salaries for Ecologists;
- Creating European Norms;
- Being part of organizations such as the Society for the Environment (SocEnv) in the UK and the European Federation of Associations of Environmental Professionals (EFAEP) on a wider European scale.

The paper concludes that there is a need for a pan European Professional Institute or grouping of Institutes for ecological professionals that goes beyond the traditional learned societies.

### 338. A CO-VIABILITY MODEL OF GRAZING AND BIRD COMMUNITY MANAGEMENT IN FARMLANDS

**TICHIT**, **MURIEL**, INRA, France; **Doyen**, **Luc**, CNRS-MNHN, **Lemel**, **Jean-Yves**, INRA, France; **Renault**, **Olivier**, Conseil Général, France

The maintenance of habitat quality is a key issue for the conservation of biodiversity. For wader populations foraging and nesting in wet grasslands, grazing is a major driver of habitat quality. Our objective is to investigate how livestock grazing may be used to sustain wader biodiversity without penalizing farmers. We develop a model that described the temporal dynamics of (1) a grass sward controlled by grazing where the viability of grazing depends on technical and economical constraints linked to feeding costs for farmers and (2) a community of three wader species formalised using an age-structured matrix model that incorporates explicitly the impact of sward structure on the vital rates of each species. The results show that grazing is a key component to prevent extinction of wader community. In absence of grazing the growth of sward during the breeding season does not allow the development of a favourable sward structure. According to habitat quality targeted (optimal or sub optimal) different viable grazing strategies emerge and some are more cost-effective than others. Our results are discussed in the light of agri-environment schemes aimed at bird conservation in Europe and highlight the need to develop integrated modelling approaches linking agricultural and conservation issues.

### 339. EVALUATING THE CONSEQUENCES OF FARMERS' CHOICES: IMPACTS OF GMO CROPS ON A PROTECTED SPECIES ASSESSED USING AN AGENT-BASED MODEL

**TOPPING, CHRIS,** NERI, Dept. Wildlife Ecology & Biodiversity, Denmark

Linking simulations of agricultural landscapes with agent-based models of animals provides a method of integrating a wide variety of interacting components within a system, including effects in space and time, to predict the system consequences of changes in environmental inputs. This approach mimics the way in which the real system is assembled and aims to incorporate the mechanisms necessary to re-create system-level patterns. These tools are now highly advanced and are capable of developing highly realistic simulations of landscapes, agricultural management, and animal populations. Here we use one such tool to investigate the impact of hypothetical future GMO crop scenarios on populations of skylarks in an arable landscape. Scenario results demonstrate that it is possible to eliminate skylarks or to increase their population size dependent upon agricultural management. This emphasises that the future of wildlife in farmed landscapes of Europe is heavily dependent upon the actions taken by farmers, who have the power to exterminate species if the wrong decisions are taken. The use of comprehensive simulation tools for impact assessment of future scenarios for GMO crop usage is recommended.

### 340. HAIR DETERMINATION FROM BIRD NEST AS A NEW NON-INVASIVE METHOD FOR DETECTING MAMMALS

**TÓTH**, **MÁRIA**, Eötvös Loránd University, Hungary; **Szemethy**, **László**, St. Stephen University, Hungary; **Márkus**, **Márta**, St. Stephen University, Hungary; **Udvardy**, **Orsolya**, Eötvös Loránd University, Hungary; **Lukács**, **Gabriella**, Eötvös Loránd University, Hungary

Nests of birds can be regarded as "natural" hair snares. Certain birds use mammal hair as lining or structural strengthening material of the nest. The selected hair can be identified. Based on the preliminary studies the "bird nest analysis" is an appropriate method for detecting mostly hardly detectable mammals live or migrate through the sampling areas. A pilot study was made in large carnivore LIFE project in 2004-2005 autumn and winter period. The method was used for detecting the possible presence of the strictly protected wolf and European

lynx in the Hungarian Middle Mountains. The intense field collecting resulted in some 2.500 nests, one quarter of the nests contained hairs. Only a few nest contained hair samples of the target predator species, otherwise the synchronous field investigations showed the same results. This method do not assist in the assessment of the number and density of individuals; in combination with other mammal research methods (e.g. live trapping, radio telemetry, DNA analysis, etc.) the gained information may result the cross-confirmation of the data of different approaches. It appears as practical, simple, informative, non-invasive method, recommended to apply in various disciplines representing different aspects of the biodiversity studies (faunistics, nature conservation, zoo-ecologicy, etc.).

### 341. AFFINITY INDICES FOR SPECIES-BASED ENVIRONMENTAL ASSESSMENT USING CARABIDS

**TÓTHMÉRÉSZ**, **BÉLA**, Debrecen University, Hungary; **Magura**, **Tibor**, Hortobágy National Park Directorate, Hungary

New kinds of habitat-affinity indices, useful for species-based environmental assessment, were developed. They were based on the concepts of habitat specificity and fidelity. The usefulness of these indices was assessed using data on ground beetles (Carabidae) from the Hungarian GlobeNet site, in the city of Debrecen (Eastern Hungary), studying a rural-urban gradient. Forest affinity values were attributed to the species based on our earlier research, and literature data. We demonstrated that the carabid assemblage of the rural end of the gradient was characterized by a high forest affinity value that decreased across the gradient towards the urban area. The affinity indices based on fidelity or specificity of the species proved to be useful in comparing different habitat patches. The index based on a combination of specificity and fidelity characteristics produced a good alternative to the otherwise hazy ecological character of the studied carabid assemblages. These kinds of affinity indices may be used widely as a species-based environmental qualification system in the case of other taxa.

### 342. HOW APPROPRIATE IS THE METAPOPULATION CONCEPT FOR OUR UNDERSTANDING OF ORCHID POPULATION DYNAMICS AND PERSISTENCE?

**TREMBLAY**, **RAYMOND**, University of Puerto Rico, United States; **KINDLMANN**, **PAVEL**, University of South Bohemia, Czech Rep.; **MELENDEZ-ACKERMAN**, **ELVIA**, Institute of Tropical Ecosystems Studies,, United States

Many species of terrestrial and epiphytic orchid populations are organized as small ephemeral populations, occupying suitable habitat patches, in which colonizations and extinctions are common. The situation can be seen as a dynamic mosaic with habitat patches blinking on and off through time. For the persistence of such a metapopulation, a balance between extinction of populations in occupied patches and colonization of unoccupied patches is necessary. Here we present our recent survey of an epiphytic & lithophytic tropical orchid species, which suggests that extinction and colonization rates are close to being at equilibrium and that population dynamics, recruitment and mortality among even closely located populations are not highly synchronized. We show that the simple Levin's metapopulation model does fit our empirical data. We suggest that the difficulty in application of the metapopulation concept for conservation may be in identifying suitable sites/habitats for colonization. Most epiphytic species of orchids are not restricted to unique or limited types of host trees, while many terrestrial orchids to special types of habitat. The existence and quality of these habitats may also be dynamical in time. Based on these considerations, we suggest a new metapopulation model, more suitable for the orchid situation.

### 343. IMPORTANCE OF SPECIES TRAITS FOR SPECIES DISTRIBUTION IN FRAGMENTED LANDSCAPES

**Tremlová, Kateřina,** Department of Botany, Charles University, Prague, Institute of Botany, Academy of Sciences of the Czech Republic**; MÜNZBERGOVÁ, ZUZANA,** Department of Botany, Charles University, Prague, Institute of Botany, Academy of Sciences of the Czech Republic

Studies exploring the relationship between species traits and landscape structure are important tools to elucidate prospect of species survival at a landscape level. The existing studies on this topic, however, suffer from several drawbacks. First, most studies do not take into account phylogenetical relationships between species. The second issue is related to our perception of the landscape and to ways of calculating isolation of the habitats, since little care is usually given to the large variety of ways how isolation can be calculated. The last problem is related to the species traits considered. It is common to consider traits related to species dispersal, importance of traits related to plant growth is largely unexplored.
We explore pattern of distribution of pairs of congeneric species in dry grasslands. We measured range of traits related to both growth and dispersal in these species and search for relationships between the traits and spatial pattern.
The results show a number of strong relationships between species spatial pattern and species traits. Phylogenetic correction even strengthens the patterns. Most importantly habitat isolation had much stronger effects on plant distribution than habitat size. The species occurring at these habitats are usually fast growing species with light seeds.

### 344. THE EUROPEAN ROLLER AS A FLAGSHIP SPECIES FOR A LOCAL COMMUNITY-BASED APPROACH TO CONSERVATION ON MEDITERRANEAN FARMLAND

**TRON**, **FRANCOIS**, A Rocha France, France

Despite its high conservation status, there have been few attempts to improve biodiversity in the vallée des Baux, a French Mediterranean farmland of 3000 ha and a Natura 2000 site. As conservationists, we investigated direct partnership with landowners and farmers for optimizing biodiversity. We used the "Near-Threatened" European Roller (Coracias garrulus) as a flagship species for an integrated research, education and conservation program. By studying the foraging and breeding behaviour of Rollers, we identified the importance of Populus alba gallery forests as nesting sites and Orthopteran insects (especially the larger Decticus spp. & Platycleis spp.) as sources of food. High Roller densities were associated with marginal riparian and farmland habitats (e.g. wooded streams, hedges, uncultivated strips and areas with low pesticide usage), which in turn are usually of high biodiversity value. The cooperation with landowners and farmers to improve the nesting and foraging conditions for Rollers (e.g. via nest-boxes, artificial perches, uncultivated strips…) led to a significant increase of the breeding population. By identifying natural nesting sites and threats, we were jointly able to protect these habitats. Within this context of community participation and quality human relationships, a broader conservation project is emerging with both private and public support.

### 345. SYSTEMATIC CONSERVATION PLANNING WITH A HUMAN DIMENSION IN THE LESSER CAUCASUS REGION OF TURKEY

**TURAK**, **AYSE**, The Turkish Foundation for Combating Soil Erosion, for Reforestation and the Protection of Natural H, Turkey; **Zeydanli**, **Ugur**, The Turkish Foundation for Combating Soil Erosion, for Reforestation and the Protection of Natural H, Turkey; **Bal**, **Mehmet**, The Turkish Foundation for Combating Soil Erosion, for Reforestation and the Protection of Natural H, Turkey; **Domac**, **Aysegul**, The Turkish Foundation for Combating Soil Erosion, for Reforestation and the Protection of Natural H, Turkey; **Bilgin**, **Cemal Can**, Middle East Technical University, Turkey

A quantitative assessment was carried out in 2004-2005 for determining priority conservation areas in the Turkish Lesser

Caucasus. The assessment was carried out on 351 planning units through complementarity analysis. Vegetation cover was derived from satellite images through supervised classification. Presence of 359 species of birds, butterflies, endangered plants, large mammals and herpetofauna, and the area of 40 plant communities in each planning unit were used as biodiversity surrogates. Distribution maps for large mammals and birds were enhanced through spatial modeling with GIS. Threats to biodiversity, calculated from population density, livestock numbers and proximity to settlement, were incorporated into the analysis. Surrogate conservation priorities based on threat status were also used. The assessment produced 21 planning units in which representation goals can be reached for 86% of the surrogates. Translation of the outcome to conservation action was initiated with post-analysis field surveys to identify threats and conservation opportunities. Management and monitoring guidelines were developed for implementation by government authorities after stakeholder meetings. We argue that without dealing with the human dimension fully through stakeholder involvement and ecologically sustainable economic enterprise projects, the reserve selection process is not complete.

### 346. CONSERVATION OF MOUNTAIN BIODIVERSITY AND CHANGES ON THE AGRICULTURAL SECTOR

**TZANOPOULOS**, **JOSEPH**, Imperial College London, United Kingdom

The long history of farming on the mountains has created anthropogenically-maintained open and diverse landscapes and it has shaped the mountain biodiversity. However, the future of the agricultural sector is uncertain and land abandonment is now widespread in the mountains of Europe. In order to investigate the potential future of mountain biodiversity under the current changes in the agricultural sector, four contrasting policy scenarios of agriculture-biodiversity interaction were developed and their impacts on species and habitats were studied on six mountainous areas across Europe. The scenario analysis was based on interdisciplinary research combining landscape and species modelling with policy analysis and stakeholder participation. Significant differences on the biodiversity consequences have been observed not only between the four scenarios but also between the study areas. Guiding the future direction of agricultural activity towards a model of delivering biodiversity goods could help to achieve the current biodiversity targets. However, before drawing policy recommendations about the implementation of the most beneficial for biodiversity conservation scenario, it is important to assess the public response to future changes and possibly re-thing about the definition of current species and habitat priorities.

### 347. LINKING URBAN ECOSYSTEM AND HUMAN HEALTH THROUGH GREEN INFRASTRUCTURE

**Tzoulas**, **Kosta**, University of Salford, United Kingdom; **JAMES**, **PHILIP**, University of Salford, United Kingdom

Urbanisation affects both ecosystem and human health by altering ecological processes and public health determinants. This paper firstly reviews the concepts of ecosystem and human health in urban areas. Then, existing models that integrate social and ecological systems are reviewed to identify the opportunities they offer for integrating urban public health and ecological research. This review revealed that existing socio-ecological models had the limitation of not addressing the variety of public health determinants holistically. Furthermore, by reviewing the concept of multifunctional Green Infrastructure it was possible to make explicit conceptual links between ecosystem services and public health determinants. Consequently, the findings from these literature reviews were integrated into a conceptual model linking Green Infrastructure, ecosystem services and health, with socio-economic, psycho-social, and physical health and well-being of people in urban areas. By linking the health aspects of urban social and ecological systems the proposed model reveals potential for interdisciplinary work between urban nature conservation and public health, and contributes to other conceptual tools in addressing the long recognised need for integration between ecological and social systems.

### 348. THE IMPORTANCE OF STRICT FOREST RESERVES FOR THE CONSERVATION OF SAPROXYLIC INVERTEBRATES AND FUNGI IN FLANDERS (BELGIUM)

**VANDEKERKHOVE, KRIS,** Research Institute for Nature and Forest, Belgium; **Walleyn, Ruben,** Research Institute for Nature and Forest, Belgium; **De Keersmaeker, Luc,** Research Institute for Nature and Forest, Belgium; **Versteirt, Veerle,** Royal Belgian Institute of Natural Sciences, Belgium; **Crèvecoeur, Luc,** Provinciaal Natuurcentrum, Documentatiecentrum, Het Groene Huis, Belgium; **Branquart**, **Etienne,** Belgian Biodiversity Platform, Belgium

Over the last centuries, forest in densely populated areas like Flanders have been highly fragmented and intensively used by man. These conditions are very unfavourable for the survival of saproxylic organisms. Only since the last decades, the importance of dead wood for conservation of wood inhabiting species has become a topic in conservation and management of woodlands. Furthermore, little was known on the current status of these organisms. Therefore a number of case studies was performed in order to analyse the current status of saproxylic organisms in Flemish forests and the factors determining their diversity. The case studies showed that both quantitative and qualitative diversity of saproxylics appears to be eroded over time, when compared to ancient woodland remnants and strict reserves in North and Central Europe. However, species richness is still important and some European quality indicator species managed to survive under adverse conditions. New policies on dead wood conservation both in reserves and in multifunctional forests provide new perspectives for survival and development of these saproxylic communities. In this framework also distribution data of indicator species are compiled in order to identify hotspots for the conservation of saproxylics, where additional incentives for conservation can be introduced.

### 349. FUNCTIONAL HABITAT DEFINITION AS A CONSERVATION TOOL IN HUMAN-DOMINATED LANDSCAPES: LESSONS FROM HEATHLAND BUTTERFLIES

**VAN DYCK, HANS**, Biodiversity Research Centre, Ecology & Biogeography Unit, University of Louvain (UCL), Belgium; **Vanreusel, Wouter**, Biodiversity Research Centre, Ecology & Biogeography Unit, University of Louvain (UCL), Belgium; **Maes, Dirk**, Institute of Nature and Forest Research, Belgium

Habitat is a key concept in ecology and conservation. General environmental surrogates have typically been used to define and delineate a species' habitat (e.g. general vegetation or land-use classes) as patchwork in a matrix of a different type. However, species may only use very specific parts of general vegetations, or transition zones between such types. In human-dominated landscapes, the process of habitat fragmentation may tear apart the spatial cohesion of different habitat components compared to natural systems. We adopt a novel bottom-up approach in GIS to delineate a species' functional habitat when it does not simply correspond to physical patches of vegetation. Our resource-based habitat approach essentially selects those zones in and across vegetation types that comprise essential resources and conditions (nectar, hostplants, shelter, and microclimate) within an appropriate species-specific spatial frame. We tested the approach with several species of regionally threatened butterflies in the National Park Hoge Kempen (NE-Belgium). It resulted in fine-grained predictive distribution models of high performance. Moreover, models were transferable among independent areas. Resource-distribution maps were highly suitable tools to detect actual, but also potential habitat zones where some resources were lacking. Results are currently

implemented to adapt the conservation and restoration management in the National Park.

### 350. OPTIMAL RESTORATION PLANNING WITH RESERVE SELECTION ALGORITHMS

**VAN TEEFFELEN**, **ASTRID**, University of Helsinki, Finland; **Moilanen**, **Atte**, University of Helsinki, Finland

Habitats in many parts of the world, including Europe, are often in a fragmented and degraded state. Habitat restoration is therefore becoming a very important tool for biodiversity conservation. As funds are limited, careful planning of the location and type of restoration action is required. Concepts and tools from the field of reserve selection can aid in effective restoration planning. However, restoration planning problems can be different from reserve selection problems. Where in reserve selection a site is typically either selected or not, in restoration planning each site can potentially be restored in different ways, with different effects on different species. We address the restoration planning problem as an optimisation problem, and present a novel method that simultaneously considers restoration objectives for many species, and multiple restoration options per site. This algorithm finds (very near) optimal solutions for a wide range of simulated data. Our method can prove useful in planning problems, like those where former agricultural land can be restored in several ways. The effects of each restoration action on multiple species, as well as action cost, are evaluated in order to identify cost-efficient and effective solutions. We also discuss other restoration problem variants and methods to solve them, from the perspective of optimal restoration planning.

### 351. LITTLE OWL CONSERVATION IN A STRONGLY DIMINISHED AND ISOLATED POPULATION

**VAN 'T HOFF, JAN**, Little Owl working group Groningen, The Netherlands

Since the mid 70's the Little Owl population in the northern part of the Netherlands has strongly declined and fragmented.
Monitoring the population in the last decade, the Little Owl working group Groningen did research on the possible causes of its decrease. Changes in habitat and isolation characteristics were measured as well as differences between occupied and abandoned territories. Furthermore, food composition was studied and habitat quality quantified. Thanks to government subsidies, the working group managed to improve the habitat quality in the areas where the last remaining populations live. Landscape restoration was the instrument most used. The protection measurements were very successful, but could not change the negative trend of the Little Owl population on the short term.
Can we prevent the Little Owl from distinguishing in intensively used agricultural landscapes? And what more do we need to do to achieve that goal?

### 352. BIOGEOGRAPHICAL PRIORITIES OF THE NATURE CONSERVATION IN THE PANNONIAN REGION

**VARGA, ZOLTÁN**, Department of Evolutionary Zoology, University of Debrecen – HAS-DE Research Group for Evolutionary Genetics and Conservation Biology, Hungary

The Pannonian region shows high level of biodiversity, despite the lack of alpine and littoral habitats which can be explained by the transitional biogeographical position of the Carpathian basin. Highest level of biodiversity was observed in marginal areas where species of several different faunal types overlap. Accumulation of diverse biogeographical components took place also at the colline altitudes of the Hungarian Middle Range, where the overlapping of Ponto-Pannonian, Mediterranean, Balkanic and Xeromontane elements has succeeded. Survival centres of relict species and subspecies are typical for the edaphically extreme habitats of the colline and lowland areas which have resisted against the postglacial re-forestation. These patterns of species diversity is demonstrated by the manifold composition of insect assemblages of vegetation complexes consisting of mosaic-like patterns of forest, skirt and grassland compartments. Characteristic species of the Pannonian region are often connected to special habitat structures, e.g. traditionally managed ecosystems, structured grasslands or forest-fringe/grassland complexes of the Pannonian forest-steppe. Effective conservation of them is possible only by the connectivity of their populations and metapopulation structures at the landscape level. Nested hierarchy of diversity is present at levels of populations, communities, community-complexes (sigmata) and landscapes.

### 353. IN SITU AND EX SITU APPROACHES TO IBERIAN LYNX RECOVERY

**Vargas, Astrid**, Centro de Cría de Lince Ibérico El Acebuche, Parque Nacional de Doñana, Spain; **Simón, Miguel Angel**, Consejería de Medio Ambiente, Junta de Andalucía Proyecto LIFE, Spain; **Aymerich, Miguel**, Dirección General para la Biodiversidad, Ministerio de Medio Ambiente, Spain; **Cadenas, Rafael**, Consejería de Medio Ambiente, Junta de Andalucía Proyecto LIFE, Spain; **Delibes, Miguel**, Estación Biológica de Doñana, Spain; **Calzada, Javier,** Universidad de Huelva, Dpt. de Biología Ambiental, Grupo Lince SECEM, Spain; **Breitenmoser, Urs**, IUCN Cat Specialist Group, Institute of Veterinary Virology, University of Bern, Switzerland

The Iberian lynx (*Lynx pardinus*) is the only species of wild cat considered to be critically endangered according to IUCN criteria. The wild populations have declined at an alarming rate duringt the past century, mostly due to human encroachment and the introduction of two viral diseases that affect wild rabbits – the lynx´s main prey. By 2002, two remnant populations were known to exist, Doñana and Sierra Morena, both located in the Spanish province of Andalusia, totalling no more than 200 individuals. Presently, a coordinated regional, national, and international crisis-management approach has helped stop the species´ decline in its last two strongholds. Besides ensuring local, national, and international support for the species, these efforts, financially supported by a LIFE-Nature program, have helped stabilize the Doñana population and expand the Sierra Morena nuclei with the establishment of three new breeding territories in 2005. In addition, a formal captive-breeding program was initiated in the winter of 2003, which yielded its first results in the spring of 2005.
Current recovery goals include: (1) Maintaining and expanding the two existing populations; (2) Aiming conservation breeding efforts towards maintaining genetic diversity and providing lynx for future reintroduction programs; (3) Preparing habitat – following IUCN critera— to host future reintroductions from captive-bred stock; (4) Preventing potential inbreeding depression by “genetically connecting” the two existing populations via translocation of selected individuals; (5) Continuing to promote local, national, and international support to ensure the recovery of this highly endangered carnivore.
Besides its value as a conservation flagship for Europe, the Iberian lynx can be considered an umbrella species whose recovery will help preserve vast areas of Mediterranean forests and scrublands. An effective recovery of the Iberian lynx will help protect a wide diversity of species that also depend on this rich and endangered Mediterranean ecosystem for survival.

### 354. MECHANISMS AND CONSEQUENCES OF EUTROPHICATION AND OVERFISHING FROM THE NETWORK PERSPECTIVE

**VASAS**, **VERA**, Universite Libre de Bruxelles, Belgium; **Lancelot**, **Christiane**, Universite Libre de Bruxelles, Belgium; **Rousseau**, **Véronique**, Universite Libre de Bruxelles, Belgium

Conservation of coastal communities faces two major and widespread problems: increased nutrient loading with altered

nutrient ratios and overfishing. Both phenomena were proposed to contribute to eutrophication with apparently a higher frequency of harmful algal blooms, leading to the degradation of these ecosystems. The global nature of these problems calls for holistic approaches. In order to address this problem, we investigated the topology of a generic pelagic food web. Structural network analysis was used to address the following questions: (1) what are the roles of the different harmful species in eutrophicated systems? (2) what changes in human influence, resulting from bottom-up or top-down (overfishing) effects, induce disturbation of the food web? According to our results, blooms of inedible blooming algae are related to the increased organic nutrient loading, while blooms of the red-tide dinoflagellate, Noctiluca are the result of increased inorganic nutrient input. Finally, while the earlier overfishing of piscivorous fish that counteracted eutrophication, the present loss of planktivorous fish has the same effects as increased nutrient loading. These results highlight fundamental constrains that are inherent in the generic structure of pelagic food webs, thus help to understand the general mechanisms of eutrophication and overfishing.

### 355. BLUE FIN TUNA CONSERVATION IN THE MEDITERRANEAN SEA: ECOLOGY AND GENETIC ASSESSMENT IN CENTRAL MEDITERRANEAN REGION

**VELLA**, **ADRIANA**, Conservation Biology Research, Malta

Total blue fin tuna catch in kgs in the Maltese Islands, in the centre of the Mediterranean Sea, have followed an over all decline from its peak of 353,014 in 1995 to 227,774kg in 2004. As the Mediterranean fishermen have been increasing their effort in time and gear this decline may also be considered a serious signal of blue fin tuna stock depletion in this Mediterranean region during its spawning season between April and July.
The ecological considerations of this study, side by side with the population's DNA study provides a more complete picture of the blue fin tuna species spawning in the Mediterranean. Toward better understanding the blue fin tuna stock and its viability and genetic diversity: fisheries landing statistics; blue fin tuna biogeography and; tuna molecular genetics in this fishing area are considered in detail. Over 300 specimens caught offshore were sampled between 1998 and 2004 in order to study variations in sizes, sex ratios, biogeographical setting and molecular genetic identity. With such detail in number sampled and period covered, this study was a necessary first in order to obtain an important indication of the conservation management needs of this highly valued and exploited species, especially with tuna penning and the greater interest in this same species in recent years.

### 356. EFFECTS OF LAWN MANAGEMENT ON CARABID (COLEOPTERA, CARABIDAE) AND VEGETATION DIVERSITY IN URBAN PARKS

**VENN**, **STEPHEN**, University of Helsinki, Finland; **Taipale**, **Tiina**, University of Helsinki, Finland

We test the assumption that "benign neglect," i.e. termination of an intense management regime, will enhance species diversity. Effect of mowing intensity of lawns on the carabid (Coleoptera, Carabidae) and vascular plant assemblages is tested in urban parks in Helsinki, using three management intensities: frequently mown, mown until previous season and unmown for ten years. Our hypotheses are that 1) unmown lawns develope a richer carabid community, and 2) there is a succession as the fauna of an unmown meadow developes. We also test Connells intermediate disturbance hypothesis and Grays hypotheses of decreasing diversity, increasing body size and ratio of flightless to flight-capable species with increasing disturbance. For carabids, we refute the applicability of IDH and supprot all of Grays predictions. The plant assemblage of intensively mown lawns was dominated by synanthropic, disturbance tolerant species. Ruderal plant species became established in the intermediate treatment. These were species rich, though affected by exotic and invasive species. The unmown plots contained more slowly developing species and meadow species, though nutrient rich ones. We confirm that species assemblages of unmown lawns are richer but suggest that introduction of a meadow management strategy, with occasional mowing and removal of cut material, would further improve species diversity.

### 357. STRENGTHENING LANDSCAPE HETEROGENEITY IS THE KEY TO CONSERVE AND RESTORE ANIMAL DIVERSITY IN WETLANDS

**VERBERK**, **WILCO**, Radboud University Nijmegen / Bargerveen foundation, Netherlands; **Van Duinen**, **Gert-Jan**, Radboud University Nijmegen / Bargerveen foundation, Netherlands; **Kuper**, **Jan**, Radboud University Nijmegen / Bargerveen foundation, Netherlands; **Esselink**, **Hans**, Radboud University Nijmegen / Bargerveen foundation, Netherlands

Heterogeneous landscapes are hotspots for biodiversity. Degradation decreases local habitat quality, but on a larger scale also causes a decline of heterogeneity. Although, restoration measures aim at restoring the habitat quality, comparative research in various bog remnants has provided strong indications that rewetting measures entail risks for aquatic macroinvertebrates. Risks include (i) rapid changes causing a disturbance, and (ii) similar changes at a large scale leading to a loss of environmental heterogeneity, and consequently to a loss of species. Here we examine the risks associated with rewetting measures in bog remnants directly by investigating and comparing the macroinvertebrate assemblages in the same area before and after measures took effect. Cumulative number of species declined in the rewetted parts, indicating that in general everywhere the same species benefited from the changes. This response was strongest for water bodies where the groundwater influence had decreased. At the scale of the entire reserve abundant species further increased, while scarce species further decreased. It is concluded that strengthening the landscape heterogeneity by restoring the regional hydrology is of vital importance to the conservation and restoration of aquatic macroinvertebrate diversity in wetlands.

### 358. THE EFFECTS OF LAND USE ON WILDLIFE DISTRIBUTION AND ABUNDANCE IN AGROECOSYSTEMS OF THE STATE OF SÃO PAULO, BRAZIL: THE PASSA-CINCO RIVER BASIN

**VERDADE**, **LUCIANO**, University of Sao Paulo, Brazil; **Penteado**, **Marli**, University of Sao Paulo, Brazil; **Gheler-Costa**, **Carla**, University of Sao Paulo, Brazil; **Dotta**, **Graziela**, University of Sao Paulo, Brazil; **Vettorazzi**, **Carlos Alberto**, University of Sao Paulo, Brazil

We investigated the effects of landscape attributes on the wildlife distribution and abundance in the Passa-Cinco river basin, in São Paulo, Brazil. This basin presents many anthropogenic processes at different scales. We surveyed mammals and birds from August 2002 to January 2005 in 16 sites of native forest, Eucalyptus plantations, sugar cane plantation and exotic pastures (4 sites each). We detected 27 species of large mammals, 8 of small mammals and 202 of birds. Both large and small mammals were significantly less diverse in the exotic pastures and more abundant in the sugar cane plantations, whereas birds were significantly more diverse in the native forest and more abundant in the exotic pastures. The species incidence curves reached the asymptote only for the total area for both mammals and birds, keeping an open shape for the individual environments. This pattern suggests that both communities are formed by generalist species using the landscapes as a whole not only the remaining native forest fragments, what is corroborated by the species composition found. This can be considered as an evidence of behavioural-ecological and evolutionary adaptation processes. This pattern suggests that agroecosystems merit conservation efforts. This

should be considered respectively by researchers and wildlife biologists.

### 359. AGRI-ENVIRONMENT SCHEMES IN THE NETHERLANDS, EFFECTIVENESS AND SPATIAL ARRANGEMENT

**VERHULST**, **JORT**, Wageningen University, Netherlands; **Kleijn**, **David**, Wageningen University, Netherlands

In Dutch wet meadows, wading birds used to nest in high densities but are declining rapidly. Agri-environment schemes (AES) are supposed to halt declines but do not seem effective. The reasons for the lack of effectiveness are poorly understood. AES might affect environmental conditions resulting in unfavorable conditions for waders. Also, spatial arrangement of AES might not be optimal. In 2003, we have carried out a pair wise evaluation of a combination of two widely applied meadow bird schemes. Additionally, a number of environmental factors have been surveyed. The combination of postponed mowing and per-clutch payment proved insufficient to raise wader abundance. However, the number of territories appeared to be higher on scheme farms but differences might be attributed to differences in groundwater level. To evaluate the arrangement of schemes on a landscape scale, we have extensively studied habitat use of waders in relation to sward height and heterogeneity. From March until June 2005, waders have been mapped during 60 surveys on four 100 ha areas. Until the first mowing period, sward height was uniform throughout the areas. Analyses will determine how the distribution changed after massive mowing and whether waders concentrate around fields with tall swards.

### 360. ENSCONET- THE EUROPEAN NATIVE SEED COLLECTION NETWORK

**WALDREN, STEPHEN**, Trinity College Botanic Garden, Ireland

ENSCONET is a Research Infrastructure Network of the EU framework programme 6, involving 19 European genebanks as partner institutions. The network, co-ordinated from the Millenium Seedbank of the Royal Botanic Gardens, Kew, has four main activities centred around collection of seed from wild European native seed plants, curation of collections, management of associated data and dissemination information about ENSCONET's activties. Through the integration of these activities across partners, ENSCONET aims to improve standards of operation of European seed genebanks dealing with wild, native plants, and thereby make significant contributions to the conservation of the flora of Europe. Some of the developments and activities of the network, now in its second year, will be described.

### 361. SPATIAL ANALYSES OF THE EMERGENCE OF AMPHIBIAN CHYTRIDIOMYCOSIS IN SPAIN

**WALKER**, **SUSAN**, Imperial College, United Kingdom; **Garner**, **Trenton**, Institute of Zoology, United Kingdom; **Bosch**, **Jaime**, Museo Nacional de Ciencias Naturales, Spain; **Cunningham**, **Andrew**, Institute of Zoology, United Kingdom; **Fisher**, **Matthew**, Imperial College, United Kingdom

Batrachochytrium dendrobatidis, the aetiological agent of amphibian chytridiomycosis, is highly pathogenic to certain species of amphibians and is postulated to be one of the main factors behind global amphibian declines. This pathogen was first described in 1998 and there remain many ambiguities concerning its epidemiological profile. The first known outbreak of chytridiomycosis in a wild European amphibian assemblage was reported from the Sierra de Guadarrama mountain range, in central Spain, in 1997. Taking this as the index site, we report here on the actual distribution of Batrachochytrium dendrobatidis across Spain, reporting on evidence for spatial heterogeneity in the prevalence of infection and localities of disease outbreaks. Subsequently, we consider what ecological factors may be driving these spatial patterns and discuss the implications of recent abiotic surveillance. One of the key outputs of this research will be the production of predictive spatial models, addressing the epidemic potential of Batrachochytrium dendrobatidis in both areas in which it is considered to be endemic and for which no cases have been reported.

### 362. COLONIZATION OF FORMER ARABLE LAND BY BUTTERFLIES AFTER REMOVAL OF TOPSOIL

**WALLISDEVRIES**, **MICHIEL**, De Vlinderstichting / Dutch Butterfly Conservation, Netherlands; **Ens**, **Sicco**, De Vlinderstichting / Dutch Butterfly Conservation, Netherlands

In areas with intensive land use, such as The Netherlands, habitat fragmentation and loss of habitat quality due to eutrophication, are major threats to the preservation of species-rich communities of heathland and acid grassland. Restoration of such habitats may be carried out by removing the topsoil from ex-arable land, in order to lower the nutrient levels. However, the establishment of target plant communities is fragmentary. The present study shows that this also applies to butterflies. Ten years after topsoil removal in eight study areas, on average only two out of ten characteristic heathland species had recolonized the sites, and then mostly at a lower density than in the source populations. Although isolation from source populations limited colonization, poor habitat quality was the most important limiting factor, mainly due to lack of host plants, wet conditions and excessive residual nutrient levels. It can be concluded that habitat restoration by topsoil removal can be successful for butterflies of wetter heathland habitats, provided that source populations are at close range and care is taken to restore the habitat by, for example, introducing seeds of the original plant community.

### 363. THE EFFECT OF GRAZING AND MANAGEMENT MEASURES ON MEDITERRANEAN DEHESA VEGETATION

**WALTHER**, **DOROTHEE**, Germany; **Poschlod**, **Peter**, Germany

The decline of open semi-natural grasslands as well as their typical and species-rich flora and fauna caused by abandonment or agricultural intensification represents a global problem. The maintenances of these habitats in order to keep them open are mostly chosen based on costs and amount of work. To investigate the effect of these often simplified management treatments, the Dehesa in Spain was chosen as the study area. The Dehesa is the result of multi-factorial use over several centuries and an example for an agro-ecosystem with very high biodiversity. In 2003, the exploitation of selected areas were rearranged from the traditional mixed pasture of cattle and pig to exclusive cattle and pig pasture and fallow. Furthermore, different unique management treatments as ploughing, mulching and burning were implemented. Investigations based on vegetation samples of permanent plots over 3 years showed a change in species composition and an increase in species richness on the pig pasture and the ploughed area. To understand the mechanisms behind the changes vegetation data were correlated to management specific plant functional traits related to persistence and establishment.

### 364. BIODIVERSITY AND ECONOMY OF FOREST SET-ASIDES

**WIKBERG**, **SOFIE**, Swedish University of Agricultural Sciences, Sweden; **Boberg**, **Line**, Swedish University of Agricultural Sciences, Sweden; **Kindstrand**, **Claes**, Swedish University of Agricultural Sciences, Sweden; **Perhans**, **Karin**, Swedish University of Agricultural Sciences, Sweden

Setting aside forestland requires large economical resources and it is therefore important to know what we get for the money. In this study we have compared biodiversity and economical

value per unit area of three different types of forest set-asides: nature reserves, key habitats and retention groups on clear-cuts. We surveyed bryophytes and lichens in boreal Sweden and found that key habitats always had the highest number of species. On the other hand, the economic value of retention groups was only 1/5 of key habitats and reserves, mainly due to smaller timber dimensions.
By relating species-accumulation curves to economic value we found that retention groups were the most cost-efficient type of set-aside when the total budget for setting aside forests was low, whereas key habitats were the most cost-efficient type when the budget was high. However, the break point differed depending on which species group was the target. When only red-listed species were considered key habitats were the most cost-efficient type at almost all budget levels, both for lichens and bryophytes. Nature reserves were never the most cost-efficient type of set-aside in this study, because they cover larger areas and therefore contain not only the absolute hot spots.

### 365. PRIORITISING CONSERVATION ACTIONS BETWEEN THE WORLD'S MEDITERRANEAN ECOREGIONS

**WILSON**, **KERRIE A.**, The University of Queensland, Australia; **Underwood**, **Emma**, The Nature Conservancy, USA; **McBride**, **Marissa**, The University of Queensland, Australia; **Bode**, **Michael**, The University of Queensland,Australis; **Klausmeyer**, **Kirk**, The Nature Conservancy, USA; **Murdoch**, **Bill**, University of California, USA; **Shaw**, **Rebecca**, The Nature Conservancy,USA; **Possingham**, **Hugh**, The University of Queensland, Australia

Multiple global assessments have identified mediterranean regions as priorities for conservation. How should limited conservation resources be allocated to these regions to achieve the biggest 'bang for our conservation buck'? To solve this question we developed a conservation resource allocation approach that accounts for how returns from investment change through time and the dynamic nature of landscapes. To prioritize amongst different actions in different places we consider a range of conservation actions to abate specific threats. We apply this approach to 17 mediterranean ecoregions, occurring in Australia, South Africa, Chile, and California and Baja. We find that the priority actions for investment are not only determined by the biodiversity benefit from the action, but also by the area requiring investment, the marginal returns from investment (potential benefit:cost ratio), and the urgency for action (using rate of habitat loss as a proxy). Our findings indicate that focussing investment in species-rich and/or highly threatened ecoregions does not necessarily yield the best return on investment. Our resource allocation approach provides a valuable tool for decision makers to both identify the most cost-effective resource allocation schedule over time and evaluate the impact of alternative investments.

### 366. DNA STUDIES OF OWLS: PHYLOGENY, PHYLOGEOGRAPHY AND POPULATIONS

**WINK, MICHAEL**, University of Heidelberg, Germany

The application of DNA markers has widely helped to study owl genetics. We have started to reconstruct a complete phylogeny of owls by sequencing mitochondrial and nuclear marker genes, such as cytochrome b and RAG1. Furthermore we use genomic fingerprinting by ISSR analysis to discover variation at the nuclear DNA level. Using these markers we can already now design a new systematics of owls that will explain the genetic relationships between owl genera and will change the names of a few taxa. For example, the former genera *Nyctea, Ketupa* and *Scotopelia* are imbedded with the *Bubo* complex thus making Bubo a paraphyletic taxon. As a consequence we suggest to merge these genera with *Bubo*. Since owls are rather resident species, we can discover a pronounced phylogeographic pattern in most widely distributed species. That means that we have specific genetic lineages in many parts of the distribution area; an important fact when birds are acquired from the wild for breeding programs. This topic will be illustrated using example from *Bubo bubo, Athene noctua* and *Tyto alba*.

### 367. TRANSLOCATION OF AN ENDANGERED INSECT SPECIES, THE FIELD CRICKET, GRYLLUS CAMPESTRIS LINNAEUS, 1758, IN NORTHERN GERMANY

**WITZENBERGER**, **KATHRIN**, University of Osnabrück, Department of Biology/Chemistry, Division of Ecology, Germany; **Hochkirch**, **Axel**, University of Osnabrück, Department of Biology/Chemistry, Division of Ecology, Germany

Relocations of species have become a tool widely used in nature conservation, but insects have rarely been considered as targets. Here, we present a translocation project of the field cricket (Gryllus campestris L. 1758), which is an endangered species at the northern edge of its range. Only ten populations were left in Lower Saxony (Germany), illustrating the need for urgent conservation measures. After 10 years of monitoring and management of an isolated population, 213 nymphs were captured and released at another nature reserve in summer 2001. The size of the new population increased significantly from 27 singing males in spring 2002 to 335 singing males in spring 2005. Our results indicate that translocations of highly reproductive insect species are promising, as long as the release locality contains sufficiently large areas of suitable habitat and a high number of wild juveniles from a closely located and large source population are released in a climatically favorable period. Management and restoration of habitats, as well as continuous monitoring are of crucial importance for the success of the translocation project. Moreover, the importance of a high quality of cooperation between conservationists, authorities, foresters, farmers, financiers and scientists cannot be overstated.

### 368. THE BIODIVERSITY POTENTIAL OF SWISS MOUNTAIN FORESTS IN LIGHT OF DOMINANCE REDUCTION

**WOHLGEMUTH**, **THOMAS**, Swiss Federal Research Institute WSL, Switzerland; **Moser**, **Barbara**, Swiss Federal Research Institute WSL, Switzerland

Mountain forests in the Alps correspond to boreal forests with respect to both growth conditions and physiognomy. They greatly differ, however, with respect to their biodiversity. Swiss mountain forests are century old and increasingly prone to disturbance. Recently, winter storms and fires during drought periods have dramatically reduced the dominance of these mountain forests. An impressive vegetation change followed and resulted in a continuing increase of biodiversity. Two examples of primary/secondary succession in coniferous forests demonstrate the importance of disturbance for the ecological continuity. A long-lasting increase of species richness was observed in windthrown forests. After fire, plant species richness rapidly exceeded the one of the pre-fire forests. The biodiversity potential of boreal-like ecosystems emerged by considering co-occurrence of species assemblies at different successional stages. Given the great variety of early colonizers after wind and fire disturbance, effects of disturbance events must be regarded as natural as the long-term dominance of only few tree species. Severe storms or fires are often catastrophic for the people. Nevertheless, such catastrophes are part of boreal-like forest ecosystems in the Alps and hence part of their diversity. Controlled mimicking of extensive disturbances by logging may be a benefit for biodiversity.

### 369. CAN AGRI-ENVIRONMENTAL PROGRAMMES HALT THE LOSSES OF BIODIVERSITY? LESSONS LEARNED FROM A FIRST ROUND OF MONITORING IN AUSTRIAN AGRICULTURAL LANDSCAPES

**WRBKA**, **THOMAS**, University of Vienna, Department for Conservation Biology, Vegetation and Landscape Ecology, Austria; **Prinz, Martin**, University of Vienna, Department for Conservation Biology, Vegetation and Landscape Ecology, Austria; **Schmitzberger, Ingrid**, University of Vienna, Department for Conservation Biology, Vegetation and Landscape Ecology, Austria; **Peterseil, Johannes**, University of Vienna, Department for Conservation Biology, Vegetation and Landscape Ecology, Austria; **Bartel, Andreas**, University of Vienna, Department for Conservation Biology, Vegetation and Landscape Ecology, Austria;

Assessing the performance of the Austrian agro-environmental program (ÖPUL) with respect to biodiversity and landscapes was the aim of a nationwide interdisciplinary research project carried out in 2003. In particular the effects of a variety of subsidized land management practises and measures, commonly regarded as “environmentally friendly” like reduction of fertilizers, crop-rotation, adaptive hay-cutting and the like, were studied on parcel-, habitat and landscape level. The study was laid out as a two-module approach, one part focussing on temporal changes from 1998 to 2003, the second part addressing the actual impact of agro-environment measures on paired sites with differing land management regimes. Biodiversity data were collected in 2003 in 10 sites of 1km², respective information from 1998 could be retrieved from a geo-database that was the result of previous investigations by the authors. Vascular plants, birds and bryophytes were used as biodiversity indicators, parameters for landscape richness as indicators for the landscape and habitat level. Socio-economic data could be retrieved from the official farm survey (INVEKOS-database) to identify the agreements and management practises of the parcels in question. This allowed to detect landscape and species changes and to correlate these changes with the presence of certain agro-environmental measures. Reduction of agricultural inputs showed positive effects on species biodiversity of both vascular plants and birds. Especially abdication measures proved successful, whereas reduction measures did not appear to positively influence species. This differentiation was more pronounced in arable landscapes than on grassland. Measures that directly address the support of species in need of protection only occurred on very small area proportions. They consistently showed positive effects on threatened birds, whereas the influence on threatened plants is more obscure. Contradicting developments became apparent for ecological infrastructure. Whereas the trend of linear features (hedgerows, rows of trees, grassy field boundaries), woodlots and single trees was predominantly negative, infrastructures with wider area extension, especially set aside areas, increased in several test areas. In respect to the acceptance of measures a general trend became obvious: Measures with high potential of biodiversity enhancement are accepted and extended much less than measures oriented towards more general environmentally friendly production practices that showed less effect on biodiversity.

### 370. SMALL-SCALE DIFFERENCES IN LOGGERHEAD SEA TURTLE HATCHLING SEX RATIOS – CONSEQUENCES FOR THE CONSERVATION OF THE MEDITERRANEAN METAPOPULATION

**ZBINDEN**, **JUDITH**, Zoological Institute, Universtity of Bern, Switzerland; **Margaritoulis**, **Dimitris**, ARCHELON, The Sea Turtle Protection Society of Greece, Greece; **Arlettaz**, **Raphael**, Zoological Institute, Universtity of Bern, Switzerland

Sex determination in sea turtles is temperature-dependent with cold temperatures producing males and warm temperatures females. This mechanism raises concerns in view of global warming. We estimated hatchling sex ratios of the loggerhead (Caretta caretta) population nesting on the Greek island of Zakynthos. The nesting habitat of this largest known loggerhead population in the Mediterranean is composed of six adjacent, but distinct nesting beaches. Our main goal was to investigate whether individual beaches produce different hatchling sex ratios. Estimates of hatchling sex ratio were calculated from clutch incubation duration and sand temperature profiles. We found clear-cut differences between two groups of beaches. We conclude that high conservation priority should be given to the beaches producing a male-biased sex ratio. These beaches with relatively cold sand may buffer the overall hatchling sex ratio of Zakynthos from the effect of climate warming. Since it is unlikely that any other major Mediterranean population produces a high number of male hatchlings and at least some male-mediated gene flow exists between populations, we hypothesize that the male loggerheads produced on Zakynthos will be of great importance to the entire metapopulation.

### 371. RECONCILING DIFFERENT APPROACHES TO SYSTEMATIC CONSERVATION PLANNING IN TURKEY

**ZEYDANLI**, **UGUR**, Nature Conservation Centre, Turkey

Biodiversity conservation in Turkey through protected areas began in 1959. For a very long time, conservation efforts were biased towards exceptional scenery, unique forest types, ancient trees and some game animals in an ad hoc manner. In the late 70s, an NGO designated Important Bird Areas and Important Plant Areas, and introduced a more objective approach in selecting sites for conservation. In late 90s, the main improvement in conservation planning was achieved with the implementation of gap analysis for several regions of Turkey, by NGOs and universities. These used the ecoregion approach and coarse-fine filter concepts of the TNC and WWF US, with some minor adaptations. A response to SCP came from the government, which established a Biodiversity Monitoring Unit under the Ministry of Environment and Forestry, to provide a scientific basis for conservation in the country. However, there are some other approaches which must be considered in order to establish a commonly accepted and implemented SCP process in Turkey, such as biodiversity hotspots, Key Biodiversity Areas which seems to be an extended version of the IBA/IPA approach, or Natura 2000 network as foreseen by the EU integration process. The utility of different approaches should be considered in terms appropriate spatial scale, political acceptance and ease of communication.

### 372. PREDICTIVE HABITAT MODELLING OF RARE GRASSLAND SPECIES AND ASSESSMENT OF A NATIONAL DRY MEADOW MAPPING PROJECT FOR NATURE CONSERVATION IN SWITZRELAND

**ZIMMERMANN, NIKLAUS E**., Swiss Federal Research Institute WSL, Switzerland; **Eggenberg, Stefan**, UNA Consultancy for Nature Conservation, Switzerland; **Guisan, Antoine**, University of Lausanne, Department of Ecology and Evolution, Switzerland

In Switzerland the mapping of habitats of rare and endangered species and the subsequent negotiations for low-intensity, traditional landuse with farmers and owners of such habitats is a major strategy for maintaining biodiversity and sustainable nature conservation. Such a mapping project for dry meadows and pastures is ongoing since 19… nearing its completion. When evaluating such a mapping effort, one key problems is the spatial accuracy of data involved (distribution of species and GIS-based predictors). We therefore applied our analyses at multiple spatial scales in order to answer the following questions: (1) to what degree are known existing observations of rare and endangered plant and animal species actually found within mapped polygons intended to cover there habitats, and (2) how well do mapped habitats represent the potential distribution of rare and endangered species? Depending on the species groups and the region analysed, 3 to 42% of the observations fell within mapped objects. If buffered for spatial uncertainty, up to 72% of the observations were covered. The predictive modeling showed that the mapped polygons covered the general

distribution of potential habitats well, but due to mapping restrictions smaller and potentially well suited habitats are not covered.

### 373. BIODIVERSITY OF ARBORESCENT SPECIES ALONG URBAN-RURAL GRADIENTS: IMPLICATIONS FOR CONSERVATION

**ZIPPERER, WAYNE C.,** USDA Forest Service, USA

Composition, structure, and function in forest patches along urban-rural gradients were influenced by patch size, landscape context, and disturbance regime. Compositionally, native species richness remained relatively constant but species importance diminished for large-urban forest patches (>5 ha). For small-urban forest patches (<1 ha), non-native species dominated and native species richness declined. Structurally, urban-forest patches had a higher density of smaller (<10 cm dbh) and larger diameter (>40 cm dbh) stems. Large and small patches had similar diameter distributions. Functionally, urban forest patches (>5 ha) had altered decomposition and nitrogen cycles, which may affect forest regeneration. Composition shifted towards species with wind-blown seeds. Analysis of disturbance regimes identified novel disturbances (e.g., trampling, vandalism, dumping), which occurred at greater frequency in residential areas of urban landscapes and had a greater effect on smaller forest patches. Spatio-temporal analysis showed conversion of forest patches (>1 ha) into residential and commercial land uses. Conservation efforts should focus on both large and small forest patches. Conservation on large patches should focus on maintaining species composition and structure. On smaller patches, the focus should be on retention specifically for the dispersal of fauna species. Smaller patches may serve as stepping-stones across a hostile environment.

### 374. THE AUSTRIAN RED LISTS OF THREATENED ANIMALS – CATEGORISATION SYSTEM AND RESULTS

**ZULKA**, **KLAUS PETER**, Umweltbundesamt, Austria

The first volume of the updated Austrian Red Lists comprises seven organism groups: mammals, birds, grasshoppers, water beetles, neuropterans, scorpion flies and butterflies; further volumes are in preparation. The categorisation system aimed at compatibility with current IUCN approaches. However, adoption of the IUCN regionalisation guidelines would have been difficult for various reasons. An alternative categorisation method, inferring the extinction risk from threat indicators like abundance, abundance trends and habitat availability was developed, allowing for the group-specific fine-tuning of threat indicator scales. Application of the method was generally straightforward even for less-known invertebrate groups. For example, the collection of the Natural History Museum Vienna provided an excellent reference data set to assess the abundance trends of water beetles. A careful comparison of old and new threat categories in the bird list showed that 13 species were listed in a lower threat category because of a positive abundance trend, but 22 species were upgraded to a higher threat category owing to population declines. In summary, the new Red List of threatened Austrian animals aims at describing and disentangling the various components of endangerment and thus to deduce effective countermeasures for each threatened species.

# ABSTRACTS OF POSTER PRESENTATIONS

### 375. WHAT IS THE FUTURE OF WILD FLORA IN AGRICULTURAL LANDSCAPES? A MONITORING PROGRAM OF FIELD MARGINS IN FRANCE

**ABADIE**, **JEAN-CLAUDE**, Muséum National dHistoire Naturelle, France; **Baudoin**, **Raymond**, Muséum National dHistoire Naturelle, France; **Moret**, **Jacques**, Muséum National dHistoire Naturelle, France; **Nathalie**, **Machon**, Muséum National dHistoire Naturelle, France

Arable field margins are generally the only available refuge for wild flora in agricultural landscapes, so that management of both fields and their margins has a potentially major impact on plant biodiversity of agroecosystems. To study the factors influencing plant biodiversity in such landscapes, we implemented a monitoring program for plant species in field margins. A pilot study was performed in 2005 in the margins of 30 fields around Paris, an area representative of highly anthropized landscapes. The first results demonstrate a strong effect of (1) structure of the margins (e.g. road, hedge) and (2) landscape structure on the floristic diversity. In particular, we show that the presence of a wood in the neighbourhoods of the field significantly enhances the floristic diversity of its edges. This monitoring program, which will be extended countrywide in the near future, will provide key information to identify agricultural policies that preserve Biodiversity. In addition, it can be used as a tool to survey biodiversity and its erosion in agricultural landscapes.

### 376. DETECTION OF DNA DAMAGE OF *CLARIAS GARIEPINUS* EXPOSED TO 2,4-D USING CHROMOSOMAL ABERRATION AND RAPD-ASSAYS

**ABU MOURAD, I.M.K**.; Department of hydrobiology, National Research Center,Egypt; **KAWSAR, M. E**., Department of Genetics and Cytology, National Research Center, Egypt, **AYMAN, A.F**, Department of Genetics and Cytology, National Research Center, Egypt

There is a great concern that the extensive usage of pesticides is a chemical pollution, which can affect the fresh water Fauna particularly fish. Inducing genotoxic effects giving rise to gene mutations (that are manifest as a disease), genetic damage, even it may not manifest for several generations. The widely used 2,4- dichorophenoxy acetic acid (2,4-D) is evaluated for acute toxicity and stress behavior on fresh water fish. In this study Chromosomal aberrations *in vivo* also were studied using three concentrations (10 ,20 and 30 mg/ml) for 7 days, the percentage of chromosomal aberrations was found to be statistically highly significant with the different doses. RAPD (PCR- based diagnostic assay) was applied on liver and spleen cells of *Clarias gariepinus* using six primers with different concentrations (0.05, 0.1 and 0.5µg/ml) .RAPD-PCR results indicated genetic damage and difference in the RAPD fingerprinting as a result of toxicity. We could say that, chromosomal aberrations and RAPD- PCR are a useful tools for estimating genotoxicity of chemical pollutants and a bio indicator for genetic damage and diseases.

### 377. DIATOMS OF STROMATOLITES FROM PROTECTED AREA OF AUSTRALIA AND BOLIVIA

**ÁCS, ÉVA**, Hungarian Danube Research Station of the Inst.Ecol.Bot. of Hung.Acad.Sci., Hungary; **Borics, G**., Trans-Tisza Region Environmental, Nature Protection and Water Inspectorate. Hungary; **Grigorszky, I**., Debrecen University, Hydrobilogical Department. Hungary**; Kiss, Á. K**., Hungarian Danube Research Station of the Inst.Ecol.Bot. of Hung.Acad.Sci., Hungary**; Pócs, T**., Eszterházy Károly College, Botanical Department, Hungary; **Szabó, K, É**., Hungarian Danube Research Station of the Inst.Ecol.Bot. of Hung.Acad.Sci., Hungary; **Kiss, K.T**., Hungarian Danube Research Station of the Inst.Ecol.Bot. of Hung.Acad.Sci., Hungary

The Australian stromatolites originate from the Thetis Lake, a few hundred meters wide saline water body less than 1 km from the western coast, among coastal dunes. This lake is one of the only six known locations of stromatolites in Western Australia. The living stromatolites are of 30-100 cm diameter and 20-50 cm high, blackish in color. The investigated sample is a dead piece, it contains a lot of diatoms but no cyanobacteria. Laguna Blaca is a shallow lake (average depth 60 cm) in the bolivian altiplano at high altitude (4350 m), at the Licancabur volcano. The whole lake bottom is covered by a 3-5 cm thick layer of stromatolite formed by a cyanobacteria: *Calothrix parietina* Thuret (Rivulariaceae) a cosmopolitan species occurring generally on stones and dead wood in lakes. The filaments are densely pressed to each other, with a few calcite crystals among them, forming a compact surface on the stromatolite. About one third of the Lake bottom is covered by grass-like macrophyte. *Calothrix* lives in the rhizospheres of this macrophyte. A few dozen diatom species of *Achnantes, Amphora, Brachysira, Cocconeis, Mastogloea, Nitzschia, Staurosira, Surirella* genera were found in both stromatolites.

### 378. IS THE CONSERVATION MANAGEMENT OF THE BROWN BEAR (*URSUS ARCTOS*) IN SLOVENIA BASED ON FALSE ASSUMPTIONS?

**ADAMIC, MIHA**, University of Ljubljana, Biotechnical Faculty, Slovenia; **Jerina, Klemen**, University of Ljubljana, Biotechnical Faculty, Slovenia

In post-WW II, supplemental feeding of brown bears became a crucial management tool on the territories of the Wildlife Reserves inside the core bear range in Slovenia. The shooting of bears on feeding sites was the only legal kind of bear hunting. Supplemental foods, mostly the maize and the corpses of domestic animals have been exposed on numerous feeding sites. It was believed that baiting would keep the bears in the forests and thus away from the settlements and human properties. The extent of predation upon livestock would be thus reduced. But in the period 1995-2004 the predation upon livestock was increasing (Kendall Tau: r = 0,818; p =0,00046; n = 11), with 57 cases reported in 1995 and 814 cases in 2005. The size of feeding places visited by brown bears is unknown, but in 2002 and 2003 the bears have been monitored on 393 feeding places.
The use of GPS-GSM radio-collars, mounted on five bears in core bear range in southern Slovenia in 2005 proved that the bears, visiting the feeding places also visited garbage dumps and other human-generated food sources around remote settlements. We therefore conclude that the positive impacts of supplemental feeding have been overestimated.

### 379. MONITORING AND ASSESSMENT OF THE RESTORATION OF OPEN QUARRIES IN AN INSULAR ENVIRONMENT USING INDICATORS FROM THE LOCAL TERRESTRIAL FAUNA

**Adamopoulou**, **Chloe**, University of Athens, Depertament of Biology, Zoological Museum, Greece; **LEGAKIS**, **ANASTASIOS,** University of Athens, Depertament of Biology, Zoological Museum, Greece

The aim of the project was to monitor the restoration process of open quarries in a Greek island. For this purpose, reptiles and ground arthropods were used as indicators of the extent to which the restoration process conserved the ecological elements that were present before mining. The diversity and the populations of selected species belonging to these groups were assessed in three sites, two open quarries, one 3-year old and one 9-year old, and one natural control area. The results show that 3 years are sufficient to acquire the original number of the most abundant species. The lizard population density of the oldest quarry was very near the density of the natural site. Ground arthropod diversity of both quarries was also near the diversity of the control. The community structure depended on the plants that were used for restoration. Ants, Coleoptera Tenebrionidae and spiders were best suited as indicators of change.

**380. EAGLE OWL (*BUBO BUBO*) MORTALITY ASSESSED BY RADIO TRACKING AND BY SATELLITE TELEMETRY - TOWARDS TARGETED CONSERVATION MEASURES**

**AEBISCHER**, **ADRIAN,** University of Bern, Zoological Institute - Conservation Biology, Switzerland; **Koch**, **Silvia,** University of Bern, Zoological Institute - Conservation Biology, Switzerland; **Nyffeler**, **Peter,** University of Bern, Zoological Institute - Conservation Biology, Switzerland; **Arlettaz, Raphael,** University of Bern, Zoological Institute - Conservation Biology, Switzerland

The Eagle owl is an endangered species in Switzerland. Many breeding sites have been abandoned in recent years despite a high breeding success. This suggests that Eagle owls have a low survival in the modern Swiss landscape. The analysis of 116 dead individuals that were found incidentally and that could be aged showed a surprisingly high mortality after fledging (86% in the first 3 years of life) for this long-living species. In order to propose targeted conservation measures, the main factors threatening the population have to be identified. In a sample of 228 dead birds, electrocution, car traffic and collisions with cables were the most important mortality factors. Altogether 82% of all individuals died due to direct anthropogenic factors. However, birds that die far away from human habitations are less likely to be found. To get results from an unbiased sample, 34 young have so far been followed by means of radio-tracking and satellite telemetry. While the high mortality rate has been confirmed by this method, the respective importance of the various mortality factors in tagged individuals were different compared to individuals found incidentally. Still, among the anthropogenic mortality factors, electrocution was the most important factor in both samples. In collaboration with energy power companies, a catalogue of dangerous electric pylons has been elaborated and many of the pylons already mitigated.

**381. INVENTORY AND MONITORING OF BROWN BEAR IN KACKAR MOUNTAIN RANGE (ARTVIN) TURKEY**

**AMBARLI**, **HUSEYIN**, Middle East Technical University, Turkey; **Bilgin**, **Can**, Middle East Technical University, Turkey

Brown bear (Ursus arctos) was a little investigated species in Turkey, except for local efforts. In this study local habitat use and daily activity patterns of bears was researhed in 400 km2 within Yusufeli. It is defined by large valley systems between steep mountains with slopes covered with a vegetation gradient from oak woodland to alpine meadows. Bear presence and activity were monitored through visual observations; sign, camera trap surveys and radio telemetry. Observations were usually 4 hours before sunset and continued for 1 to 4 hours. Occasionally, night surveys were conducted. One bear was radio collared and monitored for a while. 4 males, 6 females with cubs (n9), 5 subadults, and 9 adults of unknown sex were observed. Population density was found to range between 20 to 25 adult bears km2. Bear activity increased during hyperphagia, with many day time observations. The most appropriate time periods to observe bears were before and during hyperphagia phases between 22:00 to 03:59 and 10:00 to 15:59, respectively. In camera trap surveys, the ratio for total hours spent per bear photographed is 114 hours. 53 either bear sign or conflict point was recorded in 43 days. Several bears were found to be killed within the study area in 2002 to 2005. The use of a combination of field methods was found to be most efficient.

**382. ASSEMBLAGE CHARACTERISTICS OF GROUND BEETLES (COLEOPTERA:CARABIDAE) IN THE PILIS BIOSPHERE RESERVE**

**ANDORKÓ, RITA**, Department of Systematic Zoology and Ecology, Eötvös Loránd University, Faculty of Sciences,Hungary; **Kádár, Ferenc**, Plant Protection Institute, Hungarian Academy of Sciences, Hungary

Carabid communities were investigated in a woodland area within the framework of the Man and the Biosphere project, in Hungary, in 1985-86 and in 1993-94, by pitfall trapping. The structural characteristics of the carabid communitites and the habitat preferences of the most abundant species were studied at different sites. Altogether 7636 carabid individuals were collected, representing 39 species. The value of diversity and the equitability indices were always higher in the transition zone between the oak and beech forests than those of the forest sites. The carabid fauna were clearly separated in the different habitats based on the results of the cluster analysis (Manhattan distance). The dominant species showed habitat preferences. Our result suppose the forest management which was terminated one year before our traps were established, was likely to highly influence on composition of the carabid assemblages living in this area.

**383. GENETIC STRUCTURE AND DISTINCTNESS OF BROWN TROUT (SALMO TRUTTA L) POPULATIONS FROM SOUTH BALKANS AS OBSERVED THROUGH MICROSATELLITE DNA ANALYSIS**

**APOSTOLIDIS**, **APOSTOLOS**, Aristotle University of Thessaloniki, Greece

In order to clarify the genetic structure and the biogeographic relationships of brown trout (Salmo trutta L) populations from south Balkans, a study based on nine microsatellite loci was applied in 172 individuals coming from 7 supposed pure brown trout populations from the above area. Overall, 76 alleles were found across the nine loci tested. Genetic variation was in general low, with the mean number of alleles per locus ranged from 1.22 to 4.33 and the degree of expected heterozygosity from 0.058 to 0.36. Based on correspondence analysis four populations could be clearly discriminated and the alleles characteristic of each population were identified. As revealed by non-significant FIS values, all loci in the populations examined were in good agreement with Hardy-Weinberg expectations suggesting the absence of a within sample substructure. However, genetic differentiation among populations was very high (overall FST = 0.62) indicating significant substructure at this level. Therefore, it is particularly important that conservation measures and strategies should focus on the population level.

**384. PATTERN AND BACKGROUND-FACTORS OF VEGETATION BORDERS**

**ARADI**, **ESZTER**, University of Szeged, Hungary; **Margóczi**, **Katalin**, University of Szeged, Hungary; **Szanyi**, **János**, Hungarian Geological Service, Hungary

In the southern Kiskunság most of the huge grasslands were converted into arable land in the 19th century, but the wet meadows in the large dune-slacks could preserve their natural, rich vegetation. The main background factor determining the pattern and persistence of these diverse vegetation is the dinamyc of water table level and chemical composition of the groundwater. Considering hydrogeological and conservation biological aspects two representatives of dune slack meadows were chosen, and 2-2 automatic piezometers were planted in both of them. Along the line, determined by the piezometers 450 m long transects were established in both meadows, crossing the representative patches of the main vegetation types. The percent cover of plant species were recorded in 5x5 m quadrates along each transect. The combined analysis of vegetation and piezometric data, revealed, that the fine differences in average water table level were followed by the changes of vegetation. The characteristic water table level (month averages) of different vegetation types were determined. These data are necessary to prepare a suitable conservation management plan of these important natural values. We presume, that the transition zones provides the resilience of the main vegetation-types, that is, to follow the long-term changes of the water table level without degradation. Sponsored by OTKA T/042877.

### 385. SPECIES RICHNESS AND REPRODUCTIVE SUCCESS AFTER GAME EXCLOSURE IN AN ENDANGERED ENDEMIC PANNONIAN OAK WOOD COMMUNITY

**ARANY, ILDIKÓ,** CEEWEB Hungarian Office, Hungary; **Török, Péter,** University of Debrecen, Department of Ecology, Hungary; **Matus, Gábor,** University of Debrecen, Department of Botany, Hungary

Most studies of species-rich oakwood (*Cirsio-Quercetum*), endemic to dolomite rocks in Bükk Mts. (NE Hungary), is recently disturbed from overpopulated big game. In a field experiment, initiated in 1992, the response to long-term protection from grazing was studied. Vegetation of 400 $m^2$ plots (fenced, unfenced) was compared. Composition, phytomass and flowering success were sampled in 2004.
Number of flowering shoots was counted, whereas in three abundant herbaceous species (*Symphytum tuberosum, Anthericum ramosum Vincetoxicum hirundinaria*) the height of flowering shoots was also measured. Species composition was recorded in 1$m^2$ subplots (n=12/plot) within and out of the exclosure. Aboveground phytomass was sampled in 25×25 cm sized microplots (n=12/plot), than sorted as i) dead, ii) herbaceous and iii) graminoid.
The amount of living ($p$<0.01) and dead ($p$<0.05) phytomass was higher in exclosure. Species indicating undisturbed site conditions showed a higher reproductive performance in exclosure ($p$<0.05). The number (p<0.001) and height (p<0.05, p<0.001) of flowering shoots of *Symphytum* and *Anthericum* was higher here. Graminoids and *Vincetoxicum* had greater reproductive performance in the grazed plot ($p$<0.01).
The level of disturbance exerted on the community by game favours ruderal species and graminoids, while the reproductive success and phytomass production of a number of species is suppressed.

### 386. EGG-LAYING PREFERENCES OF THE XEROPHILOUS ECOTYPE OF MACULINEA ALCON (LEPIDOPTERA: LYCAENIDAE) IN THE AGGTELEK NATIONAL PARK

**ÁRNYAS**, **ERVIN**, University of Debrecen, Hungary; **Bereczki**, **Judit**, University of Debrecen, Hungary; **Tóth**, **Andrea**, University of Debrecen; **Pecsenye**, **Katalin**, University of Debrecen, Hungary; **Varga**, **Zoltán**, University of Debrecen, Hungary

The oviposition sites of the xerophilous ecotype of M. alcon (= “Maculinea rebeli”) were surveyed in the Aggtelek karst region. The conservation management of the area started in 2001. It had a favourable effect on the habitat as the number of flowering stems of Gentiana cruciata (initial food plant of the butterfly) and the rate of eggs per stem largely increased compared to the values detected in the ’90s. The number of stems per Gentiana clump, the height of the stems, the number of whorls with flowers/flower buds, and the difference between the height of the stems of the host plant and the surrounding vegetation significantly influenced the egg laying preferences of the females. Furthermore, significantly more eggs were found on the adaxial surface of the leaves and flowers/flower buds than on other parts of the plant. We could hardly find any eggs on sterile, grazed and infected stems. The population of M. alcon has become stabilised as a consequence of management. The short grass structure of the sward maintained by grazing and mowing at the end of the vegetation period proved to be beneficial for the growth of the sprout colonies and for the Maculinea population, as well.

### 387. GERMINATION ECOLOGY OF RHAZYA STRICTA

**ASSAEED**, **ABDULAZIZ**, King Saud University, Coolege of Food & Agric. Sciences, Saudi Arabia

Rhazya strictais a noxious weed in desert rangelands of Saudi Arabia. Due to heavy grazing, the plant is out-competing valuable grazing species and decreasing plant diversity. It is potentially poisonous but no serious livestock loss has been reported. Despite the enormous information found on pharmacological characters of R. stricta, little is known about its ecology. The objective of this work was to study the germination ecology of R. stricta seeds in response to alternating temperature, water stress and release from chemical inhibitors by seed soaking in water. Results indicated that seed germination was favored by warm temperature. Germination percentage and coefficient of velocity increased from 38% and 10 to 56% and 26 when temperature was increased from 20/5 C to 30/15 C respectively. Germination decreased from 60% to 14% when water stress increased from 0 to -03 MPa. No germination occurred when water potential fell below 0.3 MPa. Germination improved as the amount of leaching water increased. However, germination did not respond to increase in soaking time at a constant amount of water. These results indicate that this species has specific germination requirements that may not always synchronize in desert environments. Consequently, careful management may reduce its invasion.

### 388. THE EFFECT OF TILLAGE ON BIRD AND EARTHWORM POPULATIONS ON A HUNGARIAN STUDY SITE

**BÁDONYI**, **KRISZTINA**, Geographical Research Institute, Hungarian Academy of Sciences, Hungary; **Hegyi**, **Gergely**, Eötvös Loránd University, Hungary; **Benke**, **Szabolcs**, Geographical Research Institute, Hungarian Academy of Sciences, Hungary; **Kertész**, **Ádám**, Geographical Research Institute, Hungarian Academy of Sciences, Hungary; **Field**, **Rob**, Royal Society for the Protection of Birds, United Kingdom; **Bradbury**, **Richard**, Royal Society for the Protection of Birds, United Kingdom; **Rothwell**, **Avril**, Crop and Environment Research Centre, Harper Adams University College, United Kingdom; **Chaney**, **Keith**, Crop and Environment Research Centre, Harper Adams University College, United Kingdom

In Hungary, 48,5 % of the land is under agricultural crop production and it is important to consider these areas also as habitats. This research is part of the Soil and Water Protection (SOWAP) project, a 3 year EU-Life demonstration project looking at whether conservation tillage (discing with crop residues left on soil surface) is more beneficial for farmland birds and earthworms than conventional tillage using a mouldboard plough. Both groups are important bioindicators of sustainable farming practices and good soil health, respectively. The study site is located at Dióskál, a hilly agricultural region in Zala County, southwest of Lake Balaton. The experiment was carried out on 12 plot pairs (12 conventional, 12 conservation, each approximately 3 to 5 ha in size, total area of 107 ha), in a maize-wheat crop rotation from 2003 to 2005. Feeding birds were recorded along transects weekly for two winter periods, earthworms were sampled in the autumn and spring of each year. The results show that there was a significant difference in seed eating songbird and earthworm numbers between the two plot types. Conservation tillage was more beneficial for both groups. Consequently, besides protecting soil resources, there is the possibility of promoting biodiversity within an intensive agricultural system by using conservation tillage instead of conventional tillage.

### 389. FACTORS INFLUENCING THE SUCCESS RATE OF REINTRODUCTION OF ENDANGERED ANIMAL SPECIES

**BAJOMI**, **BALINT**, ELTE University, Budapest, Hungary

Less than half of the reintroduction programmes are successful. A knowledge of factors influencing the success rate can be useful when planning or carrying out further programmes. To investigate these factors, I reviewed international surveys, case studies and theoretical studies. I found that the factors can be grouped in six categories. The first and most crucial one is related to the quality of the habitat. The second set of problems has in its core the bottleneck effect produced by every reintroduction. There are also several factors related to the methods used. Programmes dealing with common game species

are more successful than those with endangered ones. The reintroduction of translocated wild individuals is usually more successful than that of captive animals. Finally the support of the public and a suitable professional background are also components of the success. Consequently the planning and implementation of reintroduction programmes need a complex approach.

### 390. THE MEASUREMENT OF MATERIAL FLOWING ON THE LONYAY-MAIN-CHANNEL WATERSYSTEM

**BALOGH, EDINA**, University Debrecen, Hungary, **Takács, Péter**, Hungarian Academy of Sciences Balaton Limnological Research Institute, Hungary

Measuring of water pollution of the flowing water of Lonyay-main-channel is outlined in the project of „Tisza and Upper-Tisza county hydrooecological investigation". This work is coordinated by the Hydrobiological Department (The University of Debrecen). 17 sampling places were designated on the catchment of Lonyay-Main-Channel. Samples were collected along the channel and the mouth of its branches in order to determine the concentration of pollutants, mainly concentrating on inorganic coumponds (phosphate, carbonate forms, toxic metals etc.). As a result of these parameters, we were able to estimate the material mass flow into the River Tisza by the channel. It also gave an opportunity to receive more information about the role of its branches in this process.
The results indicate that the Lonyay-Main-Channel has not got a significant effect for the water quality of the River Tisza, because of its relatively small amount.

### 391. ASSESSING THE BREEDING DUCK POPULATION IN HUNGARY: A PROPOSAL

**BARABÁS**, **LILLA**, University of West Hungary, Institute of Wildlife Management, Hungary; **Faragó, Sándor**, University of West Hungary, Hungary

Studying the changes in the population dynamics of wild duck species gives essential information for both conservational and wildlife management planning. The significant breeding sites of these species are often difficult to assign, due to their secretive behaviour during reproduction period. In many cases, the actual nesting is only suspected and the quantitative assessment of nesting pairs is mostly uncertain, even at those few places where any attempt for such assessment exists. The authors have collected previous data about duck nesting from egg collections and by processing local ornithological publications. Although the data are incomplete and irregular, yet they outline the key breeding sites and also sketch regional preferences for some species. The quantity and quality of the found data draw attention to the blank areas and call out for a comprehensive and consistent survey. The authors make a proposal of methodology for the above mentioned survey.

### 392. RED LISTS AND RED BOOK IN ROMANIA (2004-2005)

**BARTÓK, KATALIN,** Babes-Bolyai University, Department of Taxonomy and Ecology, Romania

International context for aims of relevant nature conservation obliges Romania to elaborate red lists and books of its flora and fauna, taking into account the principles and categories promoted by IUCN. This objectiv was assumed by the Romanian Academy, Commission for Nature Monuments, and is in course to be implemented by the scientists working in this field.
Just in 1994 three red list of plant species (Tracheoflora) were issued by three teams of botanists, but a final form (red book, 545 taxa) has been only recently finalized and will be published in 2006. There also have been prepared red lists of Fungi (179 apecies), of Bryophita (160 apecies), of Lichens (87 species). A black list of alien and invasive plant specie was also proposed (397/36 taxa).
Proposals of animal red lists were published since 1984 (birds, fishes and butterfly) and finally the red book of the vertebrate animals was published in 2005 (231 species/subspecies). A complete red list will be finalized and officially adopted through a legislative act during this year.
Some counties have published their regional red lists. A separate red list was issued by the Danube Delta Biosphere Reserve Authority in 2000 (382 plant species, 454 animal species).

### 393. TWO FLAGSHIP TAXA – BIRDS AND BUTTERFLIES IN COMPARISON FOR CONSERVATION

**BATÁRY**, **PÉTER**, Hungarian Natural History Museum, Hungary; **Bálint**, **Zsolt**, Hungarian Natural History Museum, Hungary; **Bankovics**, **Attila**, Hungarian Natural History Museum, Hungary.

Red lists are not equivalent for setting conservation priorities and generally aim to protect rare and/or threatened species but do not consider historical rarity. Further, national red lists usually are not composed in larger (biogeographical or continent-wide) scale. We included Hungarian breeding bird species (N=208) and butterfly species (N=160) in responsibility classes based on their I. historical rarity status (formerly common vs. rare), II. international importance of national populations (high vs. low) and III. European conservation status (unfavourable vs. favourable) for setting conservation priorities. We have taken the data of „Birds in Europe 2." and „Red data book of European butterflies" for characterising international importance and European conservation status. Regarding historically abundant species we found that there are more threatened bird species than butterflies regardless of their percentage of European populations. Whereas the percent of all butterfly species in the responsibility class historically not rare, with high international importance and favourable conservation status was twice as high as the percent of bird species in the same class. This kind of classification could provide a more stressed basis for identifying those species, which need conservation action plan and help in decision where the limited resources should spend.

### 394. HABITAT PREFERENCE EXAMINATIONS ON THE HUNGARIAN HIEROPHIS /COLUBER/ CASPIUS, GMELIN 1789 POPULATIONS

**BELLAAGH**, **MATYAS**, Szent Istvan University, Hungary; **Báldi**, **András**, Hungarian Museum of Natural Science, MTA-MTM Zooecology Research Group, Hungary; **Korsós**, **Zoltán**, Hungarian Museum of Natural Science, Dept. of Zoology, Hungary

During the past seven years authors succeeded to show the presence of Coluber caspius on several habitats where it previously had not been published. Mapping of habitats and preparation of management plans has become an urgent task as part of the protection plan in order to preserve this highly protected species. In the present work we collect those landscape ecological parameters, which could forecast the presence of Coluber caspius in a certain area. Significant differences were found in the case of two landscape ecological parameters between the avoided and preferred habitats of the examined species. Presence of the species is highly influenced by the vegetation border and the heterogeneity of the sample sites within the habitat of the population.

### 395. THE NETWORK ARCHITECTURE AND NESTEDNESS OF TOPOLOGICAL KEYSTONE SPECIES COMPLEXES IN PLANT-POLLINATOR COMMUNITIES

**BENEDEK**, **ZSÓFIA**, Eötvös University, Hungary; **Jordán**, **Ferenc**, Collegium Budapest, Hungary; **Báldi**, **András**, Animal Ecology Research Group, Hungarian Academy of Sciences and Hungarian Natural History Museum, Hungary

The recent pollination crisis and the increasing recognition of the diffuse nature of plant-pollinator interactions call for a

multispecies, community-level approach to understand the organisation of plant-pollinator systems. We present such a study, based on a topological view on this kind of interaction networks. We define topological keystone species complexes and present a network analytical technique for their quantification. Also, we investigate the nestedness of keystone complexes of different size and search for correlations between nestedness and other network properties. We propose that conservation efforts can be more efficient if keystone complexes are more nested. Finally, we illustrate our analysis by a case study and present a metaanalysis of a large plant-pollinator database. Our main conclusion is that it is not the complexity (species richness, connectance) but the actual topology (asymmetry of plants and pollinators) of these systems what determines patterns of topological keystones and the success of conservation practice.

**396. THE FUTURE OF BROWN BEAR (URSUS ARCTOS) RESTORATION IN FRANCE : FROM GREEN BACKLASH TO ECOLOGICAL DEMOCRACY?**

**BENHAMMOU**, **FARID**, ENGREF, France; **Degeorges**, **Patrick**, Ministry of Ecology, France

The story of the Brown Bear is a classical case of extinction of a large carnivore species. There was a hundred Bears at the beginning of the 20th century and only two males would be left if a reintroduction hadn't taken place during the 90's in the Central Pyrenees. A new restoration plan to reintroduce Bears from Sloveny should take place after the accidental death of Canelle (dernière ours de souche pyrénéenne) in a hunting accident in November 2004 (?). So the main question today is to understand why didn't the French authorities manage to save this emblematic species, in spite of the many measures of conservation implemented and of the huge financial means engaged to restore the population in its natural habitat? It appears that part of the French agricultural administration helped local leaders, opposed to Bear conservation in the Western Pyrenees, to become the official manager responsible for the future of the species. More over, now the Bear population is definitely condemned to disappear, if nothing is done to reinforce it, those local leaders continue to block the resolution to reintroduce bears in their valleys, and try to hide the fact that the local population in the Pyrenees is, in its large majority, in favour of saving Bears. Indeed, even if, as we will explain, Bear conservation does impose some constraints to human activities, many elements remain to show that many local political, social and economic actors want to save the species. Therefore, it appears that the future of Bear conservation in France is a case of building locally the conditions of ecological democracy.

**397. PREDICTIVE DISTRIBUTION MODELS AS A TOOL FOR CONSERVATION: ENDANGERED PLANTS IN THE IBERIAN PENINSULA (ARID SE SPAIN)**

**BENITO**, **BLAS**, Granada University, Spain

The arid habitats in the SE Iberian Peninsula are rich in endemic and rare plants, but those habitats are seriously threatened by expansion of greenhouses and urbanization.
Our work is focused in evaluating the situation and propose strategies mainly aimed to conserve three endangered plant species characteristic of such habitats (Linaria nigricans, Linaria benitoi and Astragalus edulis). The first step is to generate and validate distribution predictive models of the previously mentioned species. Starting from GPS points and a high-resolution environmental database, models are generated using different algorithms. Resulting models are filtered to eliminate incompatible land uses. Finally, best models are selected by a combination of two validation methods. As a result, we have obtained a precise distribution surface for each species that is used to: - Evaluate the biogeographical range and estimate population sizes. - Propose potential distribution areas (additional localities worth to prospect) - Contrasts the resulting surface with a map of threats in order to locate areas subject to different threat degrees. - Propose areas to be treated as "conservation reserves". We conclude that high-resolution distribution models combined with field works provide a reliable tool to evaluate the occupation surface of endangered plants in arid lands.

**398. SPATIAL AND TEMPORAL DYNAMICS OF GENETIC VARIATION IN THE ALCON BLUE POPULATIONS IN NORTHERN HUNGARY**

**BERECZKI**, **JUDIT**, University of Debrecen, Hungary; **Pecsenye**, **Katalin**, University of Debrecen, Hungary; **Varga**, **Zoltán**, University of Debrecen, Hungary

Imagos of Alcon Blue were collected from 4 localities in two subregions (Zemplén Mts. and Bükk Mts.) of Northern Hungary between 1999 and 2003. We had 7 samples from two pneumonanthe type populations in the Zemplén Mts. and 5 samples from two cruciata type populations in the Bükk Mts. Enzyme polymorphism was analysed at 16 enzyme loci using polyacrylamide gel electrophoresis. In the analysis of the data, F-statistics was computed and the total genetic variation was partitioned into within and between population components. Nei's genetic distances were calculated and UPGMA dendrogram was constructed on the basis of the distance matrix. Hierarchical F-statistics and AMOVA was computed to study the pattern of genetic differentiation among the samples. PCA analysis was also carried out using the allele frequencies of the samples. The samples exhibited a relatively low level of polymorphism. The average frequency of heterozygotes and especially the mean number of alleles were low. At the same time, the level of differentiation among the samples was considerable in both regions though it was slightly higher among the samples of the pneumonanthe type populations than among the cruciata type ones. The results of AMOVA indicated that the populations were not differentiated within any subregion and practically all variation was observed among the years/generations within the populations.

**399. LONG-TERM POST-FIRE SUCCESSION OF THE SOIL ARTHROPOD COMMUNITIES IN WEST SIBERIAN NORTHERN TAIGA PINE FORESTS**

**Berezina**, **Olga**, Institute of Systematics and Ecology of Animals SB RAS, Russian Federation; **LYUBECHANSKII**, **ILYA**, Institute of Systematics and Ecology of Animals SB RAS, Russian Federation

The soil arthropod assemblages and their post-fire succession were investigated in the West Siberian northern taiga at the surroundings of Noyabrsk city (63° 15' N, 74° 30' E) from 1999 to 2002. The community of soil arthropods in native forest consists of 54 mesofauna species (28 species of oribatid mites, 11 sp. Gamasina mites, 15 sp. of Collembola, 48520 specimens per square meter) and 10 spider species. Young birch trees on the thick moss cower predominate on burnt places with age less then 10 yr. The density of soil mesofauna is three times lower then in native forest (11 sp. of Oribatei, 2 sp. of Gamasina, 9 sp. of Collembola, 14560 specimens per square meter). Mesofauna assemblages involve species, which are common in surrounding ecosystems, and not specific for fire places. Macrofauna mainly consists of myxophytophagous carabid beetles and some widely distributed spider species. The mixed forest with moss-lichen ground cower grows on the old burnt places with age more then 50 yr. The density and diversity of mesofauna are larger then in the young burnt places, but still differ from those in native forest (28 sp. of Oribatei, 11 of Gamasina, 11 sp. of Collembola, 36960 specimens per square meter). In this assemblage the part of spiders increases, the carabid population is most diverse and abundant among the three ecosystems studied.

**400. ALLOZYME VARIATIONS IN SIX NATURAL POPULATIONS OF SCOTS PINE [*PINUS SYLVESTRIS* L. (PINACEAE)] IN TURKEY AND AND ITS IMPLICATION IN GENETIC CONSERVATION**

**Bilgen, B. Banu**; Turkey; **KAYA, NURAY**, Akdeniz University, Faculty of Arts and Sciences, Department of Biology, Turkey

Genetic variation in six natural populations of Scots pine (*Pinus sylvestris* L.) was determined with isozyme analyses in the study. For this purpose, haploid female gametophytes of seeds and horizontal starch gel electrophoresis technique were used. Total of 17 loci and 58 alleles were observed in studying 10 enzyme systems. Average proportion of polymorphic loci for populations ranged from 58.8% to 70.6%. The average number of alleles per locus per population was 2.65. Mean estimated expected-heterozygosity (He) of populations were 0.294. Rather high proportion of genetic diversity (96.4%) was due to within population variation and the remaining (3.6%) was due to variation between populations. The level of gene flow ($N_{em}$) was found to be 6.69 per generation. Nei's genetic distance coefficient ranged from 0.006 to 0.027 among the all possible population pairs. Both high level of gene flow and low mean value of Nei's genetic distance (0.017) among populations explained the low among population variation. According to genetic variation parameters, three out of the six populations (Akdagmadeni, Refahiye ve Vezirkopru) appear to be preferable populations for genetic conservation and forest tree breeding programs.

**401. ENDEMIC PLANT SPECIES FROM THE SOUTHERNER CARPATHIANS**

**BIȚĂ-NICOLAE, CLAUDIA D**., Institute of Biology, Romanian Academy, Ecology & Nature Conservation, Romania; **Sanda, Vasile.** Romania

In the Carpathians chain, the Southerner Carpathians relieve through the highest altitudes. In this area we emphases the local and regional endemic cormophytes species and their specific phytocoenoses. There are 32 vascular endemic species or subspecies and the most of these species belong to *Seslerietea albicantis* (46%) class or *Symphyto-Fagion* alliance- an endemic Carpathians alliance (16%). There is a correlation between the taxon whose each species belonging to, the life form and altitudinal gradients. Moreover, there is a percent of 66 % of hemicryptophytes and 31% chamaephytes in *Seslerietea albicantis* class and 76% of hemicryptophytes and 18% geophytes in *Symphyto-Fagion* alliance.
This high percent of hemicryptophytes is dependent on temperature, and it increases when the temperature decreases but chamaephytes are found at the highest altitudes (1300–2000 m) where the temperature is the lowest. On the other hand, geophytes are found at the lower altitudes where the temperature is higher. However, at the high altitudes the studied species (hemicryptophytes and chamaephytes especially) are framed in *Seslerietea albicantis* class but lower the main alliance is *Symphyto-Fagion* (with hemicryptophytes and geophytes).

**402. INTERACTIONS BETWEEN BOTTLENOSE DOLPHIN (TURSIOPS TRUNCATUS) AND FISHERY IN FILICUDI ISLAND (ITALY)**

**BLASI**, **MONICA FRANCESCA**, Cooperativa Monitoraggio Risorse Naturali, Italy; **Pace**, **Daniela Silvia**, Associazione Oceanomare, Italy

Competitive interactions with artisanal fishery and bycatch in illegal driftnets are the main reasons of bottlenose dolphins (Tursiops truncatus) persecution in Filicudi Island (Eolie Archipelago, Italy). Injuries or mortality from retaliatory measures taken by fishermen for gear damage or catch reduction are frequently reported in the area. A study was performed from June to September 2005. Boat and land-based surveys and photo-identification techniques were used to derive a population estimate, distribution and movements of individuals. Instantaneous, focal group and ad libitum sampling methods were used to assess dolphins behavioural activity. Results indicated a regular distribution in coastal waters, in particular around the rock cliffs and the Banco area. Proximity with fishing gears was recorded on 30/40 occasions. Seven photo-identified resident individuals (mean group size 6.8, SD=3.04, range 1-12) were involved in competitive interactions, spending long time associated with trammel nets, and decreasing natural feeding activities. Damage of various kind was detected on commercially relevant species such as Maena chryselis, Oblada melanura, and Loligo vulgaris. However, 10 boats carrying illegal driftnets were recorded (mean length=15 m, range=12-18 m) in the area. These results besides the findings of three dead animals due to fishing gears, underline the need of management strategies.

**403. NATURA 2000 IN IRELAND**

**BLEASDALE, ANDREW**, National Parks & Wildlife Service, Department of the Environment, Heritage and Local Government, Ireland

The National Parks & Wildlife Service (NPWS), part of the Department of the Environment, Heritage & Local Government (DEHLG), manages the Irish State's nature conservation responsibilities under National and European law. NPWS is charged with the conservation wildlife habitats and species in Ireland. A particular responsibility of NPWS is the designation and protection of Special Areas of Conservation (SACs), Special Protection Areas (SPAs) and Natural Heritage Areas (NHAs). NPWS is also responsible for:

- the implementation of both domestic (e.g. Wildlife Acts 1976-2000) & international (e.g. EU Habitats & Birds Directives) legislation.
- the management & development of National Parks & Nature Reserves.
- overseeing licensing under the Convention on International Trade in Endangered Species (CITES) & the Wildlife Acts 1976-2000.

The overall objective of the Habitats Directive is to achieve and maintain favourable conservation status (FCS) for all habitats (listed in Annex I) and species (listed in Annex II, IV and V) of Community interest. We are obliged under Article 11 of the Habitats Directive to monitor the trends in conservation status for all habitats and species of community interest. There are 59 Annex I habitats, 26 Annex II, 41 Annex IV and 49 Annex V species (101 species in total) in Ireland. The most significant habitats include raised bog, blanket bog, limestone pavement, sand dune systems, sea cliffs and freshwater lakes. The Irish SACs now cover c. 1,100,000 ha, of which some 66% is terrestrial and the remainder either marine or freshwater.
The Birds Directive, identifies 175 species within Annex I which are rare, in danger of extinction or vulnerable to habitat changes within the EU. Ireland supports populations of 28 regularly occurring Annex I species. Under Article 4 of the directive, Ireland is obliged to establish SPAs for these species. In addition, wetlands that regularly support 20,000 or more waterfowl, or more than 1% of a migratory population of any one species, are internationally important and qualify for SPA designation. SPAs currently cover c. 280,000 ha but designations are required for dispersed species and this will add significantly to the total area.
There is relatively good data on bird populations in Ireland over the past 30 years. In contrast, information on habitats is relatively scarce. Within the NPWS Research Branch, the Monitoring Section, in conjunction with the relevant species and habitat experts, has embarked on a programme of monitoring Irish habitats and species in response to EU obligations. Elements of this programme are described in more detail on this poster. In addition, the Research Branch manages a number of research projects that provide scientific data to inform the legislative and policy framework for the conservation of nature and biodiversity in the Republic of Ireland. This poster describes some of the current projects.

### 404. THE ROLE OF FOREST-AGRICULTURE AREAS IN THE EXPANSION OF RED DEER

**BLEIER**, **NORBERT**, St. István University, Hungary; **Szemethy**, **László**, St István University, Hungary; **Márkus**, **Márta**, St István University, Hungary; **Székely**, **János**, St. István University, Hungary; **Katona**, **Krisztián**, St. István University, Hungary; **Hámori**, **Krisztina**, St. István University, Hungary; **Kotán**, **Attila**, St. István University, Hungary

The Hungarian landscapes have been significantly altered by afforestations and structural changes of arable lands. As a consequence, distribution area of red deer has increased. This species can have heavy impact on its environment and is included to the IUCN list of the 100 most invasive species. Causes of this population expansion are not well-understood; it can be explained by the increase of forest areas or the structural changes of agricultural fields. Our purpose was to describe the relationship between the landscape scale changes and red deer expansion. We used radio telemetry to study the ranging behaviour of red deer. Moreover we measured the extent of game damages throughout a whole growing cycle of different agricultural crops. Our results show that red deer mainly used forested habitats, but during the vegetation period they shifted their home ranges toward (or to) the agricultural areas. Game damages in crops were much higher near to the forest edge and decreased by the distance from that. Our studies demonstrated that arable lands provide potential habitat for red deer, but with severe limits in time and space. Agricultural fields, therefore, are not the main determinants, but can be an important factor of deer population expansion. We suggest solving deriving conservation problems by handling forest and agriculture areas together in landscape planning.

### 405. GROWTH AND REPRODUCTIVE SUCCESS OF AN ADRIATIC LIZARD ORCHID (HIMANTOGLOSSUM ADRIATICUM) POPULATION IN HUNGARY

**BÓDIS**, **JUDIT**, University of Veszprém, Georgikon Faculty, Hungary

Adriatic lizard orchid is one of the strictly protected species of Hungary. 162 individuals were marked in a Keszthely-hill (Hungary) population of this species in 1993 and a record of their status (vegetative, reroductive, 'missing') was kept annually. The number of flowers and fruits and the height of inflorescence was measured for each flowering plant. Regarding the whole period: only 6% of individuals reappeared above ground after a so called 'missing' year; following a year of vegetative status in 65% of the cases vegetative status was detected again, and in 23% of the cases plants were in reproductive status. After a year of flowering status 25% of plants bloomed again in the following year and 50% of them were in vegetative status. Reappearance of 'missing' status is rare (6%), this status rather meant mortality. The number of flowering individuals was largest in 1995 (n=73) and in 1996 (n=67) in the whole population.The average fertility was only 16%. There is significant correlation between the height of inflorescence and the number of flowers but there is no correlation between the number of flowers and the number of fruits. There is no reason to conclude reproductive success from the number of flowering plants.

### 406. THE FOOD SUPPLY FOR THE EUROPEAN ROLLER (*CORACIAS GARRULUS* L. 1758) IN THE LAST KNOWN BREEDING SITE IN SLOVAKIA (MYTHS AND REALITY OF ONE CAUSE OF DECLINE)

**BOHUŠ, MIRKO**, Comenius University, Faculty of Natural Sciences, Department of Ecosozology and Physiotactics, Slovakia, **Žáková, Jana,** Comenius University, Faculty of Natural Sciences, Department of Ecosozology and Physiotactics, Slovakia

The European Roller was a common breeder in Slovakia up to the 1960s. One of the causes of the species's catastrophical decline in Europe is thought to have been an insufficient food supply.
The presentation defined the food supply of epigeic invertebrates for the European Roller.
In 2005, 3 pairs began to breed and 2 solitairs occured on the site. Within 3 known foraging ranges, tetrads of pitfall traps (Ø 9cm) were established in 3 habitats (cereal field, maize field and grassland) from April 23 to August 28.
In the total sample of invertebrates greater than 5 mm in size (n=16464), the most dominant were Coleoptera (64.2%), followed by Arachnida (14.4%), Orthoptera (8.3%), Isopoda (4.7%), larvae (3.0%). The most abundant size classes were 10-20mm (54.5%) and 5-10mm (43.6%). The average prey size of the Roller based on pellet analysis fell within 10-20mm. The highest total food supply was found in cereals, the least in mown grasslands, and similarly at the beginning of the breeding season. In spite of the small sample size of analyzed ranges, it seems that cereal fields provide the best food supply. Parallel habitat use research has given similar results.

### 407. SUBSPECIES DIFFERENTIATION IN OSTEOLAEMUS TETRASPIS (AFRICAN DWARF CROCODILE) FOR CONSERVATION BASED ON MOLECULAR ANALYSES

**BORGWARDT**, **CHRISTIN**, University of Leipzig, Germany; **Berendonk**, **Thomas U.**, University of Leipzig, Germany; **Bernhard**, **Detlef**, University of Leipzig, Germany; **Engelmann**, **Wolf**, Zoological Garden Leipzig, Germany; **Schlegel**, **Martin**, University of Leipzig, Germany

The African Dwarf Crocodile (Osteoalemus tetraspis, COPE 1861) is an endangered species, which ranges from western to central Africa. The species is splittet into two different subspecies: the western subspecies Osteolaemus tetraspis tetraspis (COPE 1861) and the central african subspecies Osteolaemus tetraspis osborni (SCHMIDT 1919). During the last decades the habitats have been destroyed by farming and deforestation and wild populations become more vulnerable for extinction. Today most Osteolaemus tetraspis individuals live in Zoological Gardens all around the world. A longtime aim is to use these individuals within an European Breeding Program (EEP) and reintroduce these into the wild. For adequate breeding the identification of subspecies level of the captive individuals is vital. To reach this goal we analysed the mitochondrial DNA features (COI and control region) of individuals with undetermined subspecies level from several zoos, which are involved in this conservation project. The subspecies level was investigated by the comparison of these molecular data with data of voucher material from museums. Our results will support future management decisions for the conservation of this threatened species.

### 408. PLANT INVASION AS THREAT OF HUNGARIAN HABITATS: DATA FROM SURVEY OF WHOLE COUNTRY

**BOTTA-DUKÁT**, **ZOLTÁN**, Institute of Ecology and Botany, HAS, Hungary

MÉTA project compiled a comprehensive, multi-layered, multi-scale database on the actual state of natural habitats in Hungary. Proportion of areas endangered by invasion were calculated for the main seminatural habitat types (wetlands, wet meadows, dry grasslands, alkaline vegetation, alluvial forests, mesic forests and dry forests). First all alien species were considered, then separate analyses were done for the most important species (Acer negundo, Ailanthus altissima, Amorpha fruticosa, Asclepias syriaca, Cetis occidentalis, Echinocystis lobata, Eleagnus angustifolia, Fraxinus pennsylvanica, Phytolacca americana, Prunus serotina, Fallopia spp., Solidago spp., Robinia pseudoacacia, Vitis spp.). All analyses were performed at country level, and at the level of biogeographycal regions. There were significant differences between habitats in the intensity of invasion and most dangerous alien species. The probability of occurrence of invasive species differ between biogeographical regions within the same habitat.

### 409. DEVELOPING PREVENTIVE MEASURES FOR LARGE CARNIVORE – HUMAN CONFLICT BY A NON-GOVERNMENTAL ORGANIZATION AND STATE AGENCIES FOCUSED ON BROWN BEAR (*Ursus arctos*) IN GREECE

**BOUSBOURAS, DIMITRIS**, ARCTUROS NGO, Greece; **Georgiadis, Lazaros**, ARCTUROS NGO, Greece; **Giannatos, Giorgos**, University of Athens, Department of Zoology - Marine Biology, School of Biology, Greece; **Pilides, Charilaos**, ARCTUROS NGO, Greece

The major threat for the bear population in Greece according to the National Action Plan for the species was the human caused mortality. Appropriate pilot actions funded by EU were implemented by ARCTUROS NGO between 1994 to 2005, such as the provision of 188 Hellenic livestock guarding dogs (LGDs), the distribution of 187 electric fences for beehive and orchard protection, compensation of damages up to 67.000 € and 72 secondary forest road closures.
These interventions supported by strong public awareness campaign resulted in their acceptance leading to an initiative for action from stakeholders and state authorities. A network for distribution of LGDs was established, whilst beekeepers acquired electric fences on a wide scale. Both actions are going to be subsidized by the state under the framework of agro-environmental measures. Moreover the state compensation system adjusted by including more cases of carnivore related damages, covering 91% of the total estimated cost from the initial 55%. Additionally a new legislation permits the seasonal closure of forest roads for conservation purpose.
The increasing local people tolerance and the decrease of annual human related bear mortality from 14 to 6 resulted in the expansion of bear distribution and recolonization of areas once roamed historically.

### 410. NATURE VALUE OF TEMPORARY FRESHWATER HABITATS IN THE KISKUNSÁG (HUNGARY) WITH REGARDS TO THEIR BRANCHIOPOD AND MACROINVERTEBRATE COMMUNITIES

**BOVEN**, **LIESBET**, Laboratory for Aquatic Ecology, Belgium; **De Meester**, **Luc**, Laboratory for Aquatic Ecology, Belgium; **Stoks**, **Robby**, Laboratory for Aquatic Ecology, Belgium; **Brendonck**, **Luc**, Laboratory for Aquatic Ecology, Belgium

Temporary freshwater wetlands are among the many habitats of particular conservation concern that have been progressively lost from the European landscape. Large areas of 'high nature value farmland' are still found in Eastern Europe where agriculture is usually extensive. Many of these areas will, however, experience increasing agricultural intensity, negatively affecting species and habitat diversity. We present our observations on the branchiopod communities of temporary pools in the Kiskunsàg National Park (Hungary). These habitats are still largely unknown ecosystems. we compared habitats ranging from ephemeral to semipermanent. In 2005 and 2006, active communities were sampled and the dormant community was hatched. Preliminary identifications yielded a rather high regional cladoceran diversity (31 species over a total of 36 habitats) with some species that are rarely or only occasionally observed in most parts of Western Europe (e.g. Macrothrix rosea, Daphnia atkinsoni, Tretocephala ambigua, Polyphemus pediculus, Alonella excisa). As for the large branchiopods, regional species richness was relatively high too (10 species; 6 Anostraca; 2 Notostraca; 2 Conchostraca). The relationship between diversity and structure of the branchiopod communities and the hydroperiod of their habitats is discussed. Based on our results, the peculiar conservation value of temporary freshwater habitats in the Kiskunság is highlighted.

### 411. THE IMPORTANCE OF SOIL AND SITE CONDITIONS FOR LONG-TERM HABITAT SUITABILITY ASSESSMENT IN WILDLIFE CONSERVATION: CAPERCAILLIE HABITATS IN THE BLACK FOREST

**BRAUNISCH**, **VERONIKA**, Forstliche Versuchs- und Forschungsanstalt Baden-Württemberg, Germany; **Suchant**, **Rudi**, Forstliche Versuchs- und Forschungsanstalt Baden-Württemberg, Germany

Although key factors for vegetation composition and structure, soil and site conditions have received little attention as indirect predictors of habitat suitability in wildlife ecology. We evaluated the importance of these factors for the identification of areas with long term species-relevance on the example of capercaillie (Tetrao urogallus) in the Black Forest/Germany. Data from the state's site condition database, such as soil type, soil texture, humus type, nutrient status and hydrological regime were evaluated and aggregated to a site condition index, quantifying the potential to support the development of selected capercaillie-relevant vegetation types. An Ecological Niche Factor Analysis was used to assess the influence of site conditions on habitat selection. Additionally, the short- and long-term development of the capercaillie distribution range was evaluated with respect to the site condition status. Although capercaillie exhibited a great preference for areas with high site condition indices, its specialisation is rather moderate. The long-term decline of the distribution range corresponds significantly with the spatial pattern of suitable site conditions, the short-term development trend is similar. We interpret the results as an ongoing retreat from secondary to primary habitats, which should be considered when defining priority areas for conservation measures.

### 412. A HABITAT SUITABILITY MODEL FOR THE ENDANGERED LONGHORN BEETLE CERAMBYX CERDO LINNAEUS, 1758 (COLEOPTERA, CERAMBYCIDAE)

**BUSE**, **JOERN**, University of Lueneburg, Germany; **Assmann**, **Thorsten**, University of Lueneburg, Germany

The success of the European web of conservation areas Natura 2000 is heavily dependent on a broad biological knowledge of the protected species. The longhorn beetle Cerambyx cerdo is one of these protected species, suffered from an extreme decline all over Europe in the number of populations and population sizes during the last century. To understand the species-habitat relationships and to find those environmental variables responsible for habitat selection of C. cerdo we used habitat suitability modelling based on datasets from Central Europe. We computed stepwise logistic regression to create a habitat suitability model for a population in Lower Saxony, based on species presence and absence data. The relationship between species occurrence and habitat parameters was analysed on 216 oak trees. Our results show that the most important parameters, e.g. vitality of tree canopy, presence of oak sap, trunk diameter and the distance from the next colonised tree, are able to predict the presence of C. cerdo very well. A spatial validation procedure revealed very similar predictive power, indicating the general validity of our model. Factors detected in this study are considered to be significant for ensuring the long-term survival of this species in a European context.

### 413. REPLACEMENT COST: A PRACTICAL MEASURE OF SITE VALUE FOR COST-EFFECTIVE CONSERVATION PLANNING

**CABEZA**, **MAR**, University of helsinki, Finland; **Moilanen**, **Atte**, University of helsinki, Finland

Conservation is in direct competition with other forms of land-use, and therefore protection of biodiversity must be cost-efficient. Reserve-selection methods address this problem, providing an optimal set of sites that is not necessarily convenient in practice, when more flexible solutions are required. We introduce a novel concept for site evaluation,

Replacement Cost, which refers to the loss in solution value given that the optimal set cannot be protected and alternative solutions are needed. This cost has clear mathematical definitions in the context of benefit-function based reserve planning, and it can be assessed either in terms of loss of biological value or in terms of extra economic cost. We illustrate the concept with hypothetical examples and compare it to different variants of the often-used irreplaceability measure, demonstrating how replacement cost can show important differences among sites with otherwise similar value. This is because irreplaceability measures the likelihood of needing a site for achieving a particular conservation target, while replacement cost tells us at what cost can we exclude (or include) a site. We conclude that replacement cost analysis should prove useful in an interactive planning process, improving our understanding of the importance of a site for cost-efficient conservation.

### 414. ADVANCES IN THE GENETIC CHARACTERIZATION OF THE ENDANGERED EUROPEAN MINK (*MUSTELA LUTREOLA*) FOCUS ON EASTERN POPULATIONS

**CABRIA, MARIA TERESA**, University of the Basque Country, Pharmacy Faculty, Department of Zoology, Spain; **Gómez-Moliner**, **Benjamín J.** Universidad del País Vasco, Facultad de Ciencias, Laboratorio de Zoología, Departamento de Zoología y D.C.A., Spain; **Michaux, Johan R.** The Center for Biology and Management of Populations, France;**; Zardoya, Rafael.** Museo Nacional de Ciencias Naturales, Spain

The endangered European mink (*Mustela lutreola*) is distributed in three isolated groups, the West population (N-Iberian Peninsula and W-France) and two Eastern populations: NW-Russia and E-Romania. The control region of the mitochondrial DNA was sequenced to determine the genetic polymorphism of the e-mink populations. Different phylogenetic reconstructions and genetic diversity analyses were performed to evaluate the substructure stage of the populations and to establish the genetic variability of Eastern e-mink populations across the distribution range. The different genetic relationships of the extant e-mink subspecies were also studied. All analyses performed yield phylogenies of identical structure. The West population constituted a monophyletic clade, showing a total absence of mtDNA variation, as indicated in other studies. Romanian population showed low levels of polymorphism with the majority of the samples grouped in a single clade. The Russian populations presented the higher genetic diversity between e-mink populations showing a polyphyletic clade. The moderate genetic variability within the populations as well as non well-defined mtDNA phylogenies demonstrated a little genetic substructure associated to different geographical regions and river basins. The little geographic structure in the e-mink populations supported the hypothesis of a European recolonization process from a single glacial refugee previously proposed by others authors.

### 415. DEFINING THREATS AND CONSERVATION APPROACHES BASED ON THE POPULATION BIOLOGY OF A THREATENED ENDEMIC KNAPWEED IN CENTRAL TURKEY

**CAKAROGULLARI**, **DIDEM**, Middle East Technical University, Turkey; **Bilgin**, **Can**, Middle East Technical University, Turkey; **Vural**, **Mecit**, Gazi University, Turkey

Centaurea tchihatcheffii is a Critically Endangered annual weed with less than 30 km2 extent of occurrence in Ankara. The healthiest two subpopulations, totaling more than 1.5 million individuals, were studied for two years to estimate vital rates by monitoring marked individuals, to identify mutualists and predators and to investigate natural reasons for rarity and endangerment. There is no natural limitation on population persistence or distribution on aerated soils: High population density (18.5-63.2 individuals/0.5m2), persistent seed bank (20,000 viable seed/m2), high survival with premature deaths making up 2-20% of natural deaths mostly at the rosette stage, no density dependent mortality, high reproduction (1200-7000 seeds/m2) and promotion of growth on aerated soil. Neither significant damage by seed or pollen predators nor absence of pollinators (honeybees) and dispersal agents (ants) is the case. Lack of aeration lowers density and survival rate. The major threats are anthropogenic, i.e. cereal cultivation, collection, and land development. Conservation of remaining subpopulations within a reserve with controlled tillage should be considered as a high priority conservation strategy. Alternative cereal cultivation methods with reduced or no herbicide application would improve persistence elsewhere.

### 416. THE (RE)DISCOVERY OF STRIPED HYAENA IN TURKEY

**CAN**, **EMRE**, Middle East Technical University, Turkey; **Lise**, **Yildiray**, Nature Society, Turkey

Turkey is rich in carnivore species and limited information and expertise on carnivores has been an obstacle for effective conservation planning. Turkey hosts large carnivore species such as wolf, brown bear and Eurasian lynx. Leopard and Caspian tiger have been officially listed as pest species until 2003. The striped hyaena was considered to be non-existent in Turkey until when a local was identified to live-trap hyaenas to sell to a local zoo in South East Turkey in 2004. In fact, in 2001, almost 3 years before this incident, a widely published WWF Turkey study conducted by the authors had already documented the presence of hyaena, revealed its distribution and identified the urgent research and conservation priorities for the species. This study demonstrates the effect of the gap between scientists-scientists and scientists-managers and examines the mechanisms underlying the consideration of striped hyaena as non-existent by authorities and other stakeholders for years, while it was being utilized by the locals in South East Turkey. This study indicates that species do not get actually extinct when they are considered so and it is crucial to conduct proper field studies when assessing the status of a rare species in an area.

### 417. THE DECLINE OF THE BRITISH MARSH TIT: ASSESSING FORAGING BEHAVIOUR, WOODLAND STRUCTURE AND COMPETITION

**CARPENTER**, **JANE**, Edward Grey Institute for Field Ornithology, United Kingdom; **Gosler**, **Andrew**, Edward Grey Institute for Field Ornithology, United Kingdom; **Hinsley**, **Shelley**, Centre for Ecology and Hydrology, United Kingdom

The marsh tit, a strict deciduous woodland bird, has undergone a severe long-term decline in Britain of over 50% in the last 25 years. Possible reasons for this decline were investigated at two woodland sites in southern Britain.

Winter foraging behaviour of the marsh and blue tit was compared, using instantaneous time sampling. There were few differences in specific foraging behaviours, suggesting the two species compete for food resources. However, niche separation was observed; the marsh tit spent more time in the understorey, and showed different tree and shrub species usage. As the blue tit is dominant, this is probably a competitor avoidance mechanism.

Habitat characteristics were compared between areas with and without marsh tit breeding territories. Shrub numbers remained similar across territories, but differed between territories and non-territories, suggesting the amount of understorey is important in territory location. Foraging observations supported this, as the majority of visits were to understorey species.

We have demonstrated the year-round importance of the understorey layer for the marsh tit, probably due to niche separation. However, the decline of the understorey in British woodland is well documented, and moreover, interspecific competitors are increasing. These are thought to be important factors in marsh tit decline.

### 418. DIVERSITY AND COMMUNITY STRUCTURE OF THE ICHTHYOFAUNA OF LAKE VELA (PORTUGAL) AND RECRUITMENT PATTERNS OF PLANKTIVOROUS ALIEN TAXA

**CASTRO**, **BRUNO**, Universidade de Aveiro, Portugal; **Gouveia**, **Francisca**, Universidade de Aveiro, Portugal; **Cerqueira**, **Laura**, Sociedade Portuguesa de Vida Selvagem/ Portuguese Wildlife Society, Portugal; **Vingada**, **Jose**, Universidade do Minho, Portugal; **Goncalves**, **Fernando**, Universidade de Aveiro, Portugal

Freshwater systems in southern Europe are facing disruption in their fish communities due to the introduction of alien species, leading to displacement of the native cyprinid fish communities. The aim of this work was to study the fish assemblage of a eutrophic shallow lake (Lake Vela), with particular emphasis on the population dynamics of the introduced planktivorous/omnivorous species, which are now dominant in terms of abundance and biomass. Fish were sampled every month using a combination of electrofishing and fish nets (bag seine net), from May to October. The fish community of Lake Vela was poorly diversified and characterised by very high biomasses of omnivorous alien fish (mainly Lepomis gibbosus), which presented continuous recruitment during the summer. Furthermore, the only piscivore species registered was Micropterus salmoides, another alien species, whose adults were captured occasionally. The high production of omnivorous species and the low abundance of piscivores represent a structural feature that is usually assigned to fish assemblages of warmer areas (tropical lakes). Further knowledge on the impact of alien species on the Mediterranean fish communities is required, in order to promote adequate restoration measures.

### 419. COULD THE DISTRIBUTION AND BREEDING OF THREE SPECIES OF BIRDS OF PREY BE INDUCED BY PREY SPECIES ABUNDANCE IN NATURAL PARK OF SINTRA-CASCAIS (PORTUGAL)?

**CASTRO, LUIS**, Natural Park of Sintra-Cascais / ICN; Portugal; **do Carmo Isidoro**, **Maria**, R da Quinta, Portugal

The fauna of Natural Park of Sintra-Cascais (PNSC) includ three species of threaten birds of prey: Bonelli's eagle (*Hieraetus fasciatus*), peregrine falcon (*Falco peregrinus*) and sparrowhawk (*Accipiter nisus*). These raptors feed mainly on birds. This study aim is to know if prey density influence the occurrence of these raptors. Observations and nesting data of 2005 season were plotted in UTM 1x1 km grid. A survey of five prey species in PNSC was conducted in the same period and UTM grid. The methods were: transect lines by foot (turtle dove, wood pigeon); transect lines / fixed points (rock dove); transect lines by car (red legged partridge); latrines count (wild rabbit). Bonelli´s eagle, a global-threaten species, selected an area of high abundance of wood pigeon. The other prey species don´t seems to induce the occurrence of this eagle. Two pairs of peregrine falcon choose the two rock dove´s nucleus, but the northermost pair breed close to a partridge nucleus, an area with few doves. The rabbit influence on raptors ecology is not clear. This study confirmed the main role played by forest medium-size prey on Bonelli´s eagle and the selection of high density rock dove areas by the peregrine falcon to breed.

### 420. WETLAND DEGRADATION AT AEGEAN ARCHIPELAGO (GREECE) THREATENS ENDEMIC ISLAND SPECIES AND MIGRATING BIRDS

**CATSADORAKIS**, **GEORGE**, World Wide Fund for Nature WWF Greece, Greece; **Georgiadis**, **Nicos**, World Wide Fund for Nature WWF Greece, Greece; **Paragamian**, **Kaloust**, World Wide Fund for Nature WWF Greece Greece.

The wetlands of the Aegean islands are key habitats for the conservation of rare and endemic plant and animal genetic material and very important stop-over and refuelling sites for millions of migrating and wintering birds. Strangely, so far very few were described and mapped, let alone protected. We located 301 wetlands on 43 islands of which 187 were surveyed and their condition assessed. Most were small (1ha<), coastal and of varying salinity. Building and road construction, drainage, pollution, filling with rubble, over-pumping, over-grazing and poaching are main human activities that degrade these wetlands at an alarming rate. Their gradual degradation and destruction will affect severely a number of endemic aquatic, as well as terrestrial species and will probably increase significantly mortality of migrating birds, as these wetlands are used not only during migrations but also as the southernmost retreats in cases of heavy cold spells for wildfowl wintering at the continent. As the few remaining island wetlands suffer a tremendous pressure from urbanization due to increase in tourist installations, their overall conservation will not be possible since no national or European legislation covers their protection due to small size and dispersion and the compete ignorance of their overall role.

### 421. THE SAMD PROJECT: A DATABANK AND HABITAT SUITABILITY MODELS FOR THE MAMMALS OF SOUTHEAST ASIA

**CATULLO**, **GIANLUCA**, Istituto di Ecologia Applicata, Italy; **Marzetti**, **Ilaria**, Istituto di Ecologia Applicata, Italy; **Masi**, **Monica**, Istituto di Ecologia Applicata, Italy; **Rulli**, **Monica**, Istituto di Ecologia Applicata, Italy; **Savini**, **Simona**, Istituto di Ecologia Applicata, Italy; **Boitani**, **Luigi**, Università di Roma La Sapienza, Italy

The Southeast Asian Mammal Databank project (SAMD) is the result of a joined effort between the Istituto di Ecologia Applicata and the European Commission and aims at fulfilling the following objectives: i) to implement a species dataset with information on ecology, population threats, and conservation status of the mammals of Southeast Asia; ii) to develop detailed species distribution maps and habitat suitability models. Project activities started in 2002 and mammal data, initially excerpted from bibliography and available datasets, were discussed and amended by the leading experts in the course of two specific workshops held in the region. A total of 1070 mammal species were analysed and the related information was stored in a database. Species ecological data, along with a selection of GIS thematic layers, were used to build 867 habitat suitability models, part of which were validated through fieldwork activities carried out in the region in 2005. Mammal suitable areas were then used to build maps of species richness, to perform hot-spot analysis and to assess the functionality of the protected areas system. Only a partial overlap between high-value areas and the protected areas system was found, suggesting the need of urgent interventions to conserve local biodiversity.

### 422. CONFLICTS AND POSSIBILITIES OF CONFLICT RESOLUTION IN KARAGOL-SAHARA NATIONAL PARK IN TURKEY: A SOCIO-ECONOMIC ASSESSMENT OF "TOP TO BOTTOM" APPROACH

**CIRLI**, **OZLEM OGUN**, Middle East Technical University, Turkey; **Rittersberger-Tilic**, **Helga**, Middle East Technical University, Turkey; **Bilgin**, **Can**, Middle East Technical University, Turkey

The protected area concept was imported into Turkey from USA in late 1950s. Although the implicit objective of "nature without people" might be possible in countries with large stretches of wilderness, it often leads to displacement of locals and restriction of access in places where traditional economies utilize common or government-owned land. We studied the socio-economic and cultural dynamics of Kocabey and Meseli villages in KaragolSahara National Park (NP) in northeastern Turkey in 2004 and 2005 through literature surveys, secondary data collection, and semi-structured in-depth interviews with locals of diverse age and gender, NP wardens, local authorities and local NGOs. We assessed locals´ dependence on NP resources, the nature and reasons of conflicts and possible solutions.

Bypassing local communities in decision making has led to alienation, hostility and disruption of subsistence economy. Conflicts arose due to loss of traditional access rights, lack of compensation, and monopolization of any advantages derived from NP status by a privileged minority. We propose abandonment of “top to bottom” approach in favor of a radically different participatory approach which involves the local community at all stages of the process, finalizes management planning in early stages, introduces compensation, and assures equitable distribution of benefits to the whole community.

### 423. PROTECTED AND ENDEMIC SPECIES OF HERPETOFAUNA IN MONTENEGRO

**CIROVIC**, **RUZA**, Republic Institut for the protection of Nature, Yugoslavia

Compared with other biodiversity centers on Balkan Peninsula, Montenegro is the richest region. There are 15 species of amphibian and 39 species of reptiles. In Montenegro 8 species of amphibians and 24 species of reptiles are protected by the low. When we talk about IUCN categories there are 32 VU taksons, 12 EN, 3 CR, 2 EX, 4 DD, 1 CD and 1 LR taksons. Four species of amphibians are endemic species of Balkan, one species of amphibians and four species of reptiles are sub endemic species of Balkan, tree species of amphibians and eight species of reptiles are sub endemic species of former states of Yugoslavia and tree species of amphibians are local endemic species of Yugoslav former states. In this paper there are presented lists with amphibians and reptiles protected species. There are 6 potential protected species in that lists (Salamanda salamandra, Salamandra atra, Rana ridibunda, Rana graeca, Rana sqiperica and Caretta caretta).

### 424. DIFFICULTIES FINDING THEIR WAY HOME FOR DECLINING SPECIALIST SPECIES

**CLAVEL**, **JOANNE**, Museum National dHistoire Naturelle de Paris, France; **Julliard**, **Romain**, Museum National dHistoire Naturelle de paris, France

Many studies have showed a strong decline among very different groups of specialist species all over the world and in various ecosystems, when compared to generalist species. Understanding the mechanisms of decline of specialist species would be illuminating. I argue that individuals from generalist species should have a better knowledge of their immediate environment than individuals from specialist species. I tested this hypothesis by a homing experiment using radio-telemetry, carried out last winter in a large continuous forest on various species of Parus. Specialists took more time than generalists to come back at home.

### 425. SETTING PRIORITIES IN CONSERVATION - FROM REACTIVE TO PREVENTIVE

**COGALNICEANU**, **DAN**, University Ovidius Constanta, Romania; **Kalezic**, **Milos**, Institute of Zoology, Yugoslavia; **Dzukic**, **Georg**, Institute of Biological Research “Siniša Stankovic”, Yugoslavia

The conventional view in conservation is that species and populations at high risk of extinction are priority targets. Accepting that many populations and species cannot be saved from extinction requires that focus should shift from preventing extinction of endangered species, to preventing species and populations from becoming endangered. In support of our view we will discuss the distribution and status of several amphibian and reptile species. The present herpetofauna of Europe is the result of recent colonization, mostly from two glacial refugia, Iberian and Balkan. Many species still abundant in the Balkans are rare and endangered at their western and northern range limits (e.g. Bombina bombina, Pelobates fuscus, Zamenis longissimus, Lacerta viridis). Moreover, molecular studies have indicated that genetic diversity is also much higher in populations from the Balkans (e.g. Pelobates fuscus, Emys orbicularis). While significant conservation efforts are made to maintain endangered populations, with low genetic diversity and small changes of survival on medium and long-term, very little is done to protect core habitats with high habitat, species and genetic diversity in the Balkans. The development of networks of protected areas might allow in the future the mitigation of the present day fragmentation through repeated recolonization and genetic rescue.

### 426. IN VITRO CONSERVATION OF SOME ROMANIAN BRYOPHYTES

**COGALNICEANU**, **GINA CARMEN**, Institute of Biology, Romania; **Stoiculescu**, **Raluca**, Institute of Biology, Romania; **Stefanut**, **Sorin**, Institute of Biology, Romania

According to the Convention of Biological Diversity (art. 9) and to the Global and European Strategies for Plant Conservation, ex situ conservation protocols should be used to halt the current loss of plant diversity. This is the first initiative for ex situ bryophyte conservation in Romania. During the last 200 years of plant inventory activities in Romania 950 species of bryophytes were identified (740 mosses, 206 liverworts and 4 hornworts). Of these 17 species of liverworts and 91 of mosses are endangered and in urgent need for active protection and conservation. Our objectives are to establish protocols for the collection, micropropagation, and medium-term storage of threatened and rare Romanian bryophytes. The in vitro methodologies for regeneration and multiplication were established on common moss and liverworts. Out of the 24 bryophyte species tested, only 7 were successfully regenerated and stored in vitro: Asterella gracilis, Athalamia sp., Bucegia romanica, Conocephalum conicum. Marchantia polymorpha, Preissia quadrata, and Reboulia sp.

### 427. CARNIVORE X PEOPLE CONFLICT: AN EXPLORATORY STUDY INTO THE ATTITUDES OF A SAMPLE OF LOCAL PEOPLE TOWARDS THE CONSERVATION OF THE MANED WOLF

**Consorte-McCrea, Adriana**, Canterbury Christ Church University, Department of Geographical & Life Sciences, UK; **Nicholls, Michael**, University of Greenwich, Division of Learning, Enhancement, Access & Partnership, UK; **RUBIN, RONA**, Canterbury Christ Church University, UK.

Issues related to people X wildlife conflict are a worldwide concern for the conservation of endangered carnivore populations. This exploratory study is part of an ongoing research project about the conservation of an endemic endangered species of carnivore in a highly populated region within reminants of 2 global biodiversity hotspots, in southeast Brazil. As the maned wolf is forced out of its natural habitat by farming, it explores a variety of settings and food sources, increasing the risk of conflict with humans. Questionnaires were distributed to target groups at São Paulo Zoo, to examine: a) local people's beliefs about and attitudes towards the maned wolf, conservation, and conservation/education agents; b) conservation/education professionals' attitudes towards local people, maned wolf and conservation. Some of the results reinforce previous findings of a high level of misinformation concerning the maned wolf's ecology, and a lack of strong feelings against the wolf and conservation. Other results shed light on target groups' salient beliefs in relation to the maned wolf and conservation, and to other stakeholders. This is necessary in the development of future questionnaires and interviews, and crucial in the subsequent targeting of those beliefs in future education programmes aimed at individual target groups.

### 428. USE OF AN EXOTIC SPECIES (PROCAMBARUS CLARKII G.) TO ASSESS BIOAVAILABILITY OF HEAVY METALS IN THE GUADIAMAR RIVER (SW, SPAIN)

**CREHUET**, **MARÍA**, Universidad Autónoma de Madrid, Spain; **Alcorlo**, **Paloma**, Universidad Autónoma de Madrid, Spain; **Baltanás**, **Ángel**, Universidad Autónoma de Madrid, Spain; **Bravo, Miguel Ángel,** Universidad Autónoma de Madrid, Spain; **Montes**, **Carlos**, Universidad Autónoma de Madrid, Spain

In 1998 a mine accident caused the discharge of 6 Hm3 of sludge and acid water loaded with heavy metals into the

Guadiamar River (Seville, SW Spain) directly affecting an area of 4400 Ha. Heavy metals accumulated in soils, sediments, water, flora, fauna and therefore in food webs all through the Guadiamar catchment. Cleaning activities were immediately followed by a restoration plan which included a pollution monitoring plan. This study aims to assess the capability of an exotic species, the red swamp crayfish Procambarus clarkii, as bioindicator tool of heavy metal and metalloid contamination. Crayfish populations were monitored for abundance and heavy metal content (Zn, Pb, As, Cu, Cd) from 1999 to 2005 (sampled in spring and autumn) at a reference site upstream the mine and six sites downstream the mine. Results show a slow recovery of crayfish populations following cleaning activities which diminished heavy metal concentration in both sediments and water. Stable and moderately dense crayfish populations are nowadays found in the lower part of the 'Green Corridor' close to Doñana marshlands, but heavy metals are still traced in their tissues. Concentrations of metabolically non-essential, highly toxic metals (Pb, Cd and As) show less variability in crayfish. Their occurrence is related to their abundance in the sediments around and can be used to identify sites under pollution stress.

### 429. IMPACT OF MANAGEMENT PRACTICES ON THE GENETIC STRUCTURE OF CHAMOIS (GENUS RUPICAPRA)

**CRESTANELLO**, **BARBARA**, Centre for Alpine Ecology, Italy; **Pecchioli**, **Elena**, Centre for Alpine Ecology, Italy; **Martinkova**, **Natalia**, Institute of Vertebrate Biology, Czech Republic; **Vernesi**, **Cristiano**, Centre for Alpine Ecology, Italy; **Hauffe**, **Heidi Cristine**, Centre for Alpine Ecology, Italy; **Bertorelle**, **Giorgio**, University of Ferrara, Italy

Two species of chamois are generally recognized: Rupicapra pyrenaica in western Europe and R.rupicapra in central-eastern Europe and the Near East. A third species from the Apennines of central Italy, R.ornata, has been proposed. The genetic divergence between taxa, as well as the genetic variation within and between populations, frequently subjected to strong bottlenecks and/or restocking/reintroduction programs, is poorly understood. We used mitochondrial DNA sequences (cytb: 67 individuals, D-loop: 259 individuals) to study the genetic structure of 16 natural, restocked or introduced populations of chamois in Italy, Slovakia, Czech Republic and Spain. Firstly, the large genetic divergence between ornata and pyrenaica/rupicapra populations seems to support the species status of the Apennine chamois. Our results also show that the genetic structure of R.rupicapra is substantial even on a microgeographic scale, possibly as a consequence of female philopatry. In addition, wide-ranging levels of genetic diversity within populations reflect the different demographic and management histories of each. Finally, our analyses clearly indicate that past translocation practices have led to genetic introgression between different species. These results have important implications for the conservation and management of the chamois.

### 430. COMPARISON OF SAP FLOW, WATER STATUS OF FOUR TREES

**CSEJTEI**, **ÁGOSTON**, West-Hungary University, Hungary; **Beres**, **Csilla**, Berzsenyi Daniel College, Hungary; **Németh**, **László**, Berzsenyi Dániel College, Hungary

Sap flow of Quercus petraea, Quercus cerris, Fagus sylvatica and Carpinus betulus trees were studied under different water stress conditions. To investigate the water transport it was applied the folowing methods: direct injection of short half life cyclotron produced isotopes, thermometry method (heat balance), portable computer tomograph, high resolution medical computer tomograph (CT) and magnetic resonance technique (MRI). Good correspondence was found between patterns of water content of trunks and sap flow. Sap flow was higher in Turkey oak than in sessile oak, beech and hornbeam. Trunk signatures by CT and MRI appeared to different late the four species, the Turkey oak atem clearly more hydrated than other. The water storage reservoirs could play an inportant role in tree survival during extended periods of low soil water availability. Diurnal variations in the measured parameters under drought and humid conditions and the differences between the four species are discussed.

### 431. THE STATUS OF THE ENDANGERED HUNGARIAN SOUTHERN BIRCH MOUSE (SICISTA SUBTILIS TRIZONA) IN EUROPE

**CSERKÉSZ**, **TAMÁS**, Eötvös Lóránd University, Department of Systematic Zoology & Ecology, Hungary; **GUBÁNYI**, **ANDRÁS**, Hungarian Natural History Museum, Hungary; **Estók**, **Péter**, Bükk Mammalogical Society, Hungary; **Farkas**, **János**, Eötvös Lóránd University, Department of Systematic Zoology and Ecology, Hungary; **Horváth**, **Győző**, University of Pécs, Department of Animal Ecology, Hungary.

The Southern birch mouse Sicista subtilis (Pallas, 1773) is one of the rarest small mammals of Central Europe. Once it was a sporadic species of the Carpathian basin, but today it is endangered, and has disappeared from all but one of its known localities. The protection of this species is particularly important because it represents a fauna type, namely the turano-eremic, which has very few vertebrate elements in Europe. The results of our study clearly show that the S. subtilis has a stable population in the Borsodi-Mezoseg Landscape Protected Area which is the part of the Bukk National Park. This is the only known occurrence of the species and of the subspecies Sicista subtilis trizona (Petényi, 1882) in recent times. It is extinct in Austria. From Serbia its last data (Deliblat in South-East-Banat) were published in 1983. In Hungary an Action Plan has began in order to protect the species. The main tasks are the intensive research on the occurrence and on the population biology of the species, besides the protection of the known habitats.

### 432. POPULATION AND HABITAT STUDIES ON THE MEADOW VIPER (VIPERA URSINII RAKOSIENSIS MÉHELY 1893) IN THE HANSÁG (NW - HUNGARY) IN THE 2001-2005 YEARS.

**DANKOVICS**, **ROBERT**, Savaria Museum, Hungary; **Pellinger**, **Attila**, Ferto-Hanság National Park, Hungary; **Takács**, **Gábor**, Ferto-Hanság National Park, Hungary

The few remained habitats of the Meadow viper recently restricted to the national parks of Hungary. In the Fertõ-Hanság National Park these are threatened by their limited and dispersed territory, and the low population density. The Meadow viper in the 19th century was distributed nearly continuously along the meadows between Wiena and the Hanság area. The populations in Hungary decreased dramatically because of the intensive agricultural landuse, extension of planted forests, flood control and the accurate thinning of the individuals. It has disappeared from Austria by the end of the 20th century. Recent studies recorded the local subspecies from two localities. The samplings between 2001 and 2005 resulted in capture of 69 individuals 80 times. They were released instantly on the same spot after taking identity photographs. The botanical, vegetation structure of the two sites and the prey communities (Orthoptera, Amphibia, Reptilia) are monitored. The Fertõ-Hanság National Park fenced the two sites with electric lines to control the wild boar injury and grazing by sheep and/or moving was applied to maintain the vegetation structure. Based on our recent knowledge the increase of the extension of the suitable habitat, ensure the connection between the separate sites and establish a special reserved area are essential to garantee the survival of the subspecies.

### 433. RARE AND PROTECTED BIRDS AS A COMPONENT OF BIODIVERSITY OF WETLANDS IN THE NOTHERN PART OF UKRAINE

**DAVYDENKO**, **IGOR**, Kyiv Shevchenko University, Ukraine

In the wetlands of Forest (Polissya) and Forest-Steppe zones of Ukraine 170 wetland bird species are recorded according to the data for the last 150 years. Among them, 32 species are

included to the last edition of Ukrainian Red Data Book, 12 – in the IUCN Red List, 104 – in the Afro-Eurasian Waterbird Agreement bird list, and 108 are in the Supplement II to Bern Convention. Due to our investigations, which were carried out in the wetlands of these two zones during 1997-2005, it was recorded only 11 species, which are included in Ukrainian Red Data Book. They are: Black Stork (Ciconia nigra), Ferruginous Duck (Aythya nyroca), Goldeneye (Bucephala clangula), Osprey (Pandion haliaetus), White-tailed Eagle (Haliaetus albicilla), Crane (Grus grus), Black-winged Stilt (Himantopus himantopus), Oystercatcher (Haematopus ostralegus), Marsh Sandpiper (Tringa stagnatilis), Curlew (Numenius arquata) and Aquatic Warbler (Acrocephalus paludicola). And only 5 species from IUCN Red List, which were recorded: Ferruginous Duck (Aythya nyroca), White-tailed Eagle (Haliaetus albicilla), Corncrake (Crex crex), Great Snipe (Gallinago media) and Aquatic Warbler (Acrocephalus paludicola). Beside this, in these wetlands we recorded 53 bird species, which are included in the Afro-Eurasian Waterbird Agreement bird list, and 61 species from Supplement II to Bern Convention.

### 434. LANDSCAPE ECOLOGICAL RESEARCHES OF THE HABITAT PATTERN OF THE MICROREGIONS OF CSONGRÁD COUNTY, SOUTH-EASTERN HUNGARY

**DEÁK**, **ÁRON JÓZSEF**, University of Szeged, Hungary

The landscape ecological researches compared the habitat-pattern the microregions of Csongrád county with the morphological and soil-geographical characteristics with polygonal habitat-mapping. Data collection of naturalness, invasive species, regeneration potential, green corridor function, management has happened in 35 ha-sized hexagonal rasteric net too. The Dorozsma-Majsaian Sandlands has a specific habitat pattern: the carbonated humic sand soil covered flat dunes have sandy steppe-grasslands; the depressions have a fenhead-alcali-sodic foot type of vegetation connected to a regional level ground-water flow. The Molinia fens are situated in the north-western parts on meadow soils whereas the alcali-sodic vegetation in the south-eastern parts on solonchak and solonetz meadow soils. This pattern shows landscape-level gradient as the alcali-sodic vegetation appears in the eastern parts, whereas the Molinia fens in the mid-parts. The habitats of the Kiskunságian Loeslands consist of tiscicumic loess-steppe grasslands, alkali-sodic meadows, Artemisia grasslands and praematric Puccinellia meadows and alcali-sodic mud-vegetation. Artemisia grasslands appear just at the presence of loess-elevations in the landscape, the Peucedanum-Aster meadow-steppe appears at the edge of the floodplains. Achillea grasslands appear mainly in the secondary alcali-sodic grasslands connected to belt-banks. Homogenous ones are formed at 1,3-2 m deep groundwater-level on carbonated humic alluvial soils, whereas at 0,1-1,3 m deep groundwater-level on meadow solonetz they form mosaics with alcali-sodic meadows.

### 435. THE EFFECT OF MOWING ON A WET MEADOW OF NYÍRŐLAPOS (EAST-HUNGARY, HORTOBÁGY NATIONAL PARK)

**DEÁK, BALÁZS**, Ecological Institute of Debrecen University, Hungary; **Tóthmérész, Béla**, Ecological Institute of Debrecen University, Hungary

Traditional management (mowing and grazing) is a vital component of the development of puszta. Responses of *Bolboschoenetum maritimi eleochariosum* association on mowing were studied using group of plots composed of 10 plots of 2 m by 2 m size. There were three treatments: a control, a mowed and an abandoned area. Percentage cover of the vegetation was recorded three times a year during 2002-2005. Non-metric multidimensional scaling (NMDS), based on Bray-Curtis dissimilarity was used to explore the changes in species composition resulted in by mowing. Control plots were separated from the mowed ones, and the abandoned plots showed a moderate shift towards the control ones. We found significant differences in the number of species among the treatments. The mowed area was the most species rich ($p<0.001$), and the abandoned area was also significantly more species rich then the control area ($p<0.001$). We observed a consistent pattern each year. Our result suggests that mowing has an important effect on maintaining the species diversity of this wet meadow.

### 436. ELABORATION OF MANAGEMENT PLANS FOR PROTECTED PLANT SPECIES OF CYPRUS

**DELIPETROU, PINELOPI**, University of Athens, Department of Botany, Greece; **Andreou**, **Marios,** University of Athens, Department of Botany, Greece; **Georghiou**, **Kyriacos,** University of Athens, Department of Botany, Greece

Within the framework of a LIFE-NATURE-2004 project, monitoring plans were elaborated for the Annex II (Directive 92/43/EEC) priority plant species *Scilla morrisii*, *Arabis kennedyae*, *Chionodoxa lochiae*, *Pinguicula crystallina* intended to act as pilot studies for plant species monitoring of protected species in Cyprus.
The minimum requirements for monitoring were set based on the Directive 92/43/EEC (articles 1, 2, 3). These are: population viability analysis; area and extent of occupancy; threat assessment; habitat availability and quality.
The stages of the elaboration of the plans were: a) collection of existing information on the species' biology, taxonomy and distribution and on the habitats and land uses of their distribution area; b) identification of knowledge gaps; c) preparatory field work aiming to improve knowledge on species life cycle, phenology, population size, distribution pattern, habitat and threats; d) compilation of plan.
The monitoring plans include: a) summary of each species' biology, detailed population and distribution data, description of habitat and threats and assessment of its conservation status (new IUCN categories); b) establishment of monitoring parameters and methods and rationale; c) instructions for parameter estimation and analysis of results; d) literature; e) data forms.

### 437. A STUDY ON THE EVALUATION OF NATURAL AND CULTURAL RESOURCES AT CAMILI WATERSHED AREA WITH AN ENVIRONMENT CONSCIOUS TOURISM PLANNING APPROACH

**DEMIREL**, **ÖNER**, Karadeniz Technical University, Turkey; **Pirselimoglu**, **Zeynep**, Karadeniz Technical University, Turkey; **Sarikoç**, **Elif**, Karadeniz Technical University, Turkey; **Özdemir**, **Buket**, Karadeniz Technical University, Turkey; **Bekçi**, **Banu**, Karadeniz Technical University, Turkey

Introduction
Tourism which is regarded as an important sector in regional development has direct relation to the environment and natural resources and it is clear that the conflict between development and environment should be transformed into harmony. At this point, concept of ecotourism which is a type of tourism whose purpose is sustaining and renewing natural resources and systems and which is used as a tool to protect natural resources, comes to mind. Ecotourism aims at minimizing environmental damage and sharing the profit with the local residents.
However it should not be forgottten that only if natural resources that make up tourism are protected can economic profit be obtained. A plannning approach which integrates all elements of the environmental system in the organization of tourism activities should be followed. The integrated planning should have content that deals with the interaction of tourism with all other sectors at an area.
Material and Methods
Camili Watershed Area (CWA) is one of the privileged natural sites in our country, with its untouched natura, and with its high potential for tourism and recreation.
Several steps will be taken to prepare the tourism development plan for Camili watershed area. First, a through analysis of the interval characteristics of Camili will be conducted. The second step will involve an analysis of factors from the external environment that would affect the villege's tourism potential. Based on the internal and external analysis, the strengths and

weaknessses of the current situation will be identified. Once all components of the study will be completed, recommendations for tourism development will be made based on the findings of the qualitative and quantitative research.
Results and Conclusion
A tourism planning that would not destroy the rural structure of the area would both increase the touristic value of the area and would play an important role in the development of the area with the economic profit it would provide. In order to protect the creative resources of tourism, it is very important to apply serious policies towards protecting the natural environment.

**438. INVESTIGATION INTO THE POLLEN RESOURCES IN RUDERAL VEGETATION**

**DENISOW**, **BOZENA**, Agricultural University in Lublin. Poland, Poland

Over the centuries with industrialization and agriculture development lack of pollinators increased from the local to a global problem. Apart from the general pollution Apis mellifera – a chief pollinator of cultivated crops and the wild Apoidea are exposed to the shortage of food, mainly pollen. The aim of the studies was to estimate the pollen abundance of species in ruderal phytocenoses in Lublin, Poland (51010'N, 21030'E). The results showed significant variation in pollen amount between species, vegetation seasons and strong dependance on weather conditions. The pollen efficiency- the mass of pollen per area- depended on successional processes. The pollen flow starts with Tussilago farfara in mid March, peaks in June-July and ends with intensive flowering of Solidago sp. and Helianthus tuberosus. The possibilities to improve the feeding base for bees lie in stopping the trend of chemical devastation of ruderal weeds. The cutting (e.g along railways, roadsides) should be propagated after period of intensive blooming. The most valuable species (Rorippa austriaca, Bunias orientalis, Sisymbrium loeselii, Solidago gigantea) can be even grown on the waste lands of which surface increases rapidly now in Poland. Apart from food resources the ruderal flora create the possibilities for safe nesting of wild bees.

**439. CHARACTERIZATION OF MERCURY AND HEAVY METALS IN SEDIMENT OF AN ECOLOGICALLY IMPORTANT BACKWATER AREA OF RIVER TISZA(HUNGARY)**

**DEVAI, ISTVAN**, Wetland Biogeochemistry Institute, School of the Coast and Environment, Louisiana State University, USA; **DeLaune, Ronald D**., Wetland Biogeochemistry Institute, School of the Coast and Environment, Louisiana State University, USA; **Dévai, György**, Department of Ecology and Hydrobiology, Debrecen University, Hungary; **Aradi, Csaba**, Hortobágy National Park Directorate, Hungary; **Gőri, Szilvia**, Hortobágy National Park Directorate, Hungary **Nagy, Sándor Alex**, Department of Ecology and Hydrobiology, Debrecen University, Hungary; **Tálas, Zsuzsa**, Department for Water and Soil Protection, Ministry of Environment and Water, Hungary

Sediment from a representative and ecologically important backwater wetland under the influence of River Tisza (Hungary) was chemically characterized for sediment pollutants. Phosphine production potential, methyl mercury, mercury, and other heavy metals were determined along with other sediment chemical and physical properties. The wetland site, which is relatively isolated, represents an important bird reserve and nature conservation area. Phosphine production potential was low indicating that phosphine production was not a significant factor in phosphorus cycle of the backwater and its sediment. Methyl mercury and total mercury content was also low reflecting little mercury pollution in the sediment. Results of other heavy metal analysis in sediment showed that only copper was elevated with concentration slightly above the reported levels considered excessive in soils and sediments. Other sediment properties were in normal range except boron content, which was high. Results showed the site were relative unpolluted. Effort should be taken to insure sites be maintained in such condition for supporting the ecological function of the area. System should be monitored for additional nutrient and metal input to insure that the system remains environmental safe for future generations.

**440. POPULATION VIABILITY RISK MANAGEMENT (PVRM) FOR IN-SITU MANAGEMENT OF A TAXUS BACCATA L. POPULATION IN AUSTRIA**

**DHAR**, **AMALESH**, University of Natural Resources and Applied Life Sciences, Austria; **Ruprecht**, **Herwig**, University of Natural Resources and Applied Life Sciences, Austria; **Vacik**, **Harald**, University of Natural Resources and Applied Life Sciences, Austria

Population viability risk management (PVRM) is used for the development and evaluation of six in situ conservation strategies for the maintenance of a gene conservation forest of an English yew population (Taxus baccata L.) in Styria, Austria. As part of the PVRM the Analytical Hierarchy Process (AHP) is used to evaluate the conservation strategies with regard to the viability of the yew population. The viability of the population is evaluated based on the results of an analysis of the current environmental, social and economical state and a characterization of the ecological parameters of its population. All relevant factors are structured and prioritized according to their impact on the viability of the yew population applying the AHP .The most significant risk factors for the viability of the population are illegal cutting, browsing, tree competition, light availability and genetic sustainability. Effects of the six conservation strategies are determined through a qualitative assessment of the probability of a decrease of the yew population along with four different environmental scenarios. In this context strategy IV combining selective thinning, protection measures, game control and public relation activities seems to be the most effective. The combination of PVRM with the AHP allows the rational analysis of conservation strategies for this endangered tree species.

**441. ECOLOGY AND DISTRIBUTION OF THE ENDEMIC SPECIES ERYTHROGLOSSUM LUSITANICUM (CERAMIALES, RHODOPHYTA) ALONG ATLANTIC COAST OF THE IBERIAN PENINSULA**

**DÍAZ-TAPIA**, **PILAR**, Seaweeds Laboratory, Spain; **Berecibar**, **Estibaliz**, ALGAE-Marine Plant Ecology Research Group, Portugal; **Bárbara**, **Ignacio**, Seaweeds Laboratory, Spain; **Peña**, **Viviana**, Seaweeds Laboratory, Spain; **Cremades**, **Javier**, Seaweeds Laboratory, Spain

The NE Atlantic endemic species Erythroglossum lusitanicum was described by Ardré in the 70´s from two Portuguese localities. Since 1996 it has been also reported in Spain (Galicia), North of Portugal and Morocco. Nowadays data about this rare species is scarce since it grows in poorly known habitats. The aim of this work is to improve the knowledge on its distribution area, abundance, habitat and phenology along the Atlantic coasts of the Iberian Peninsula. From 2004 to 2006 over 30 new localities with E. lusitanicum were found in this region, with high abundance in 8 of them. It occurs mainly in wave-exposed coast at lower intertidal to upper subtidal forming dense tufts on sand-covered rocks and pools with Pterosiphonia ardreana, Jania longifurca and Rhodothamniella floridula. Occasionally, it grows on maërl and rocky bottoms up to 20 m depth. E. lusitanicum populations are present throughout the year. Only the tetrasporophyte stage is known, and it was collected from autumn to late spring. In this work, we prove that E. lusitanicum is widely distributed along the Atlantic Iberian Peninsula, where representative populations are unique on the European coast. Further intensive studies in selected populations and exploratory actions to complete its ditsribution area will be important targets for future conservation plans.

**442. PROTECTION OF THE RARE SPECIES OF THE VASCULAR PLANTS IN THE LENINGRAD REGION (RUSSIA, KARELIAN ISTHMUS)**

**DORONINA**, **ANNA**, Saint-Petersburg State University, Russian Federation

Leningrad region is the territory on the North-West of Russia. 98 species of the vascular plants from 201 included in the Red data

book of nature of the Leningrad region growing on the Karelian Isthmus. 19 species are included in the Red data book of Russia, 228 species–in the Red data book of the East Fennoscandia, 164 species–in the Red data book of the Baltic region and 37 species–in the Red data book of nature of Saint-Petersburg. The some rare species growing in the Leningrad region only or mainly on the Karelian Isthmus territory (Pulsatilla vernalis, Melica picta, Lycopodiella inundata, Tillaea aquatica, Caulinia tenuissima, Alisma wahlenbergii, Centaurium pulchellum). There are 37 protected areas (existing, under design and proposed) on the Karelian Isthmus. This is the net of the reserves and natural monuments which allow to protect various unique or typical landscapes with many rare plants, connected with the pine forests (Pulsatilla pratensis, Astragalus subpolaris, Dianthus arenarius), bogs (Drosera intermedia, Rhynchospora fusca, Carex livida), seaboards (Myrica gale, Tripolium vulgare), rocks (Asplenium septentrionale, Woodsia ilvensis, Silene rupestris), lakes (Nymphaea tetragona, Lobelia dortmanna, Isoëtes echinospora). «The Beryozovye Islands», «Mor'e», «Vaaramaenselka Ridge», «Prigranichny» are most important protected areas with botanical point of view.

### 443. IDENTIFICATION OF CRITICAL LIFE HISTORY STAGES IN THE LIFE CYCLE OF ENDANGERED SPECIES, DRACOCEPHALUM AUSTRIACUM L.

**DOSTALEK**, **TOMAS**, Faculty of Science, Charles University, Czech Republic

In this study I wanted to compare population dynamics of an endangered species, Dracocephalum austriacum L., in two distant regions (the Czech and Slovak Karst). I also wanted to estimate genetic diversity and assess the importance of genetic diversity for population dynamics of this species. Population dynamics was studied using analysis of population transition matrices from years 2003-2005. For estimating of genetic diversity I used allozyme analysis. In larger populations in the Czech and Slovak Karst the stochastic population growth rates are never significantly below 1 and so populations are not decreasing. Analysis of elasticities showed that transitions that most contribute to population growth rate are transitions of stasis. In Czech Karst it is mainly stasis of large plants and in Slovak Karst of small plants. This indicates that in both regions we have to try to maintain vitality of flowering small and large plants. Slovak populations showed higher genetic diversity within populations. Differences in genetic diversity among Czech populations were higher than among Slovak populations. There were small or even no genetic differences between regions. Genetic diversity has strong positive effect on seed set and this positively influences population growth rate. Decrease of genetic diversity by about 50 % resulted in 50 % decrease in seed production.

### 444. HABITAT VARIATION AND SPATIAL PATTERNS OF THE GREEK RAMSAR WETLANDS: A COMPARATIVE ANALYSIS

**DRAKOU**, **EVANGELIA**, Aristotle University of Thessaloniki, Greece; **Kallimanis**, **Athanasios**, Aristotle University of Thessaloniki, Greece; **Tsiafouli**, **Maria**, Aristotle University of Thessaloniki, Greece; **Pantis**, **John**, Aristotle University of Thessaloniki, Greece

We studied the presence and distribution of habitat types of the ten Ramsar wetlands of Greece. Our aim was to detect the spatial patterns at habitat and landscape level that are significant in the structure of wetlands. We used digital maps produced under the mapping of the Natura 2000 sites and calculated landscape and class metrics (for habitats) with FragStats software. The Hierarchical Cluster Analysis we performed, based on presence-absence data of habitats, separated the inland from the coastal wetlands. According to the results of Principal Components Analysis for landscape metrics, Effective Mesh Size and Cohesion Index played a significant role to the larger wetlands. Shannon Diversity Index was important for the distinction of the small wetlands and Splitting Index for deltas. Results of Correspondence Analysis on habitats depended on the class metric used. For example, when we used Class Area, lakes, rivers and lagoons formed separate groups. When we used Interspersion and Juxtaposition Index, wetlands were placed on a north-west gradient. Analyzing landscape patterns can be useful in management decisions. Altering the values of metrics, by means of management practices, can help us leading a site to the desirable state, at habitat as well as at landscape scale.

### 445. IMPACT OF HABITAT DEGRADATION ON THE SMALL MAMMAL COMMUNITY AND POPULATIONS ABUNDANCE IN RELICT MARSHLAND AREA

**DREMMEL**, **LÁSZLÓ**, University of Pécs, Hungary; **Dudás**, **Réka**, University of Pécs, Hungary; **Gondos**, **Mónika**, University of Pécs, Hungary; **Bálint**, **Diána**, University of Pécs, Hungary; **Horváth**, **Győző**, University of Pécs, Hungary

As part of the Hungarian Biodiversity Monitoring System a monitoring programme for small mammals, focussing specifically on the relict root vole (Microtus oeconomus), was conducted between 1999-2005. The grid method was used in the selected habitat, with CMR-trapping. As a result of human interference in the studied area (burning, grass cutting) accompanied by bad weather, the original homogenous sedge-marsh meadow started to degrade. In accordance with habitat changes, three periods were differentiated in the community-level comparison of small mammals: (1) area still near-natural, root vole being present in the area; (2) combined effect of burning, grass cutting and drought, with root vole disappearing, (3) the absence of antropogenic effects and the commencement of rainy weather improves habitat qualiy. Species changes between periods were measured with the Baroni-Urbani-Buser similarity index, to reveal the highest similarity of species composition between periods 2 and 3. Components of the initial community were highly different in the latter two periods, illustrated by the disappearance of the protected water shrew and the threatened root vole, and by the appearance of species preferring arid habitats. Species changes between periods were proved by McNemar-tests, with the highest chi2-value obtained for the root vole.

### 446. BIOSOZOLOGY: AN EUROPEAN VERSION OF CONSERVATION BIOLOGY OR A DISTINCT SCIENCE?

**ELIAS**, **PAVOL**, Slovak Agricultural University, Slovakia

Biosozology (from bio-life, sozo-to conserve, and logos-science) was established at the end of 20th century as a science of biodiversity conservation but some fields of the new science (e.g. phytosozology) were appeared erlier in the century. In Central Europe biosozology is a subject for some study programmes (obligatory or facultative courses) and internal textbooks were printed for the students. New journal Biosozology (Bratislava) has been produced since 2003 and the chief editor of the journal in her introductory paper called biosozology as a third millenium science. In last decade a discussion is running with nature conservation about the goals, content, relationships and priorities of biosozology. In USA conservation biology developed in discussions with wildlife biology and resource management and it was supported by Society for Conservation biology established in 1985. Journal Conservation Biology have been produced since 1987. Both biosozology and conservation biology are very close in scientific approach to protection and to conservation of populations, species, communities and ecosystems and in the effort to stop biodiversty losses by fragmentations and degradations of ecosystems, local populations and species extinctions etc. Differences and common features in goals and principles are discussed and an attempt to answer the question is presented.

### 447. ASSOCIATION OF THE SKYLARK, THE TREE SPARROW AND THE CORN BUNTING WITH FARMLAND HABITATS AND LANDSCAPES IN HUNGARY

**ERDŐS**, **SAROLTA**, Szent István University, Hungary; **Szép**, **Tibor**, College of Nyíregyháza, Hungary; **Báldi**, **András**, Hungarian Academy of Sciences and the Hungarian Natural History Museum, Hungary; **Nagy**, **Károly**, MME-Birdlife Hungary, Hungary

Many farmland birds are declining in large part of Europe, including the Skylark (Alauda arvensis), Corn Bunting (Miliaria calandra) and the Tree Sparrow (Passer montanus). The intensification of agriculture and changes in the landscape may cause these major declines. Our primary goal was to examine the effect of land use type and landscape structure (based on CORINE 50,000) on the abundance of these species in Hungary. In 1998 a common breeding bird-monitoring program (MMM) was started in Hungary. Our preliminary results showed species specific responses: the Skylark abundance negatively correlated with the number of patches and the total length of the edges in both 2.5x2.5 km squares and 5x5 km2. The Corn Buntings showed negative correlations only at the 2.5x2.5 km2 scale. In contrast, these landscape variables did not correlated with the abundance of Tree Sparrow.

### 448. THE NATURA 2000 NETWORK OF THE PANNONIAN REGION

**Érdy-Szekeres, Rozália**, Nature Conservation Office of the Ministry of Environment, Hungary; **Magyar, Gábor**, Nature Conservation Office of the Ministry of Environment, Hungary; **Varga, Ildikó**, Nature Conservation Office of the Ministry of Environment, Hungary; **Schmidt, András**, Nature Conservation Office of the Ministry of Environment, Hungary; **Házi, Judit**, Nature Conservation Office of the Ministry of Environment , Hungary ; **Bakó, Botond** Nature Conservation Office of the Ministry of Environment, Hungary; **VARGA, ZOLTÁN**, University of Debrecen, Department of Evolutionary Zoology,– HAS-DE Research Group for Evolutionary Genetics and Conservation Biology, Hungary

In 1997, the biogeographical subdivision of Europe was completed with six regions: Arctic, Boreal, Steppic, Pannonian, Black Sea, Anatolian. The Pannonian biogeographic region is justified by the presence of several typical Pannonian habitat types and biogeographically significant species. The Carpathian basin and within them the Pannonian region is nearly completely surrounded by the Carpathians, Alps and Dinarids. The general zonality breaks down and is re-arranged within the Carpathian arc. Along short distance gradients landscape-specific habitat-complexes arise. Accumulation of different faunal types is mostly typical for marginal areas of the basin. The mountainous and hilly surroundings of the basin are closely connected with the central lowland by climate-dependent dynamic faunal fluctuations. In the faunal dynamics there are significant Illyrian, Eastern-Alpine, Carpathian, Dacian, Holo- and Ponto-Mediterranean and Ponto-Pannonian influences.
The Natura 2000 network of the region consists of

(i) sites of HD Annex I habitat types, in large extension of priority habitat types as Pannonian rupicolous, loess, alkali and sandy steppic grasslands, xerothermic white oak and turkey oak forests, riverine gallery forests, etc.,
(ii) significant habitats of HD Annex II species, among them habitats of 34 invertebrate species included into the Annexes II-IV as typical faunal elements of the Pannonian region (Tertiary relict land snails Kovacsia kovacsi and Drobacia banatica, ground beetles Carabus hungaricus and C. hampei, steppic relict moths Phyllometra culminaria and Cucullia mixta lorica, endemic bush-crickets Isophya costata and Pholidoptera transsylvanica, etc.),
(iii) significant habitats of Annex I species of the Birds Directive, with particular regard to the species proposed by Hungary to this Annex, such as Aquila heliaca, Falco cherrug and Falco vespertinus. These sites often overlap with sites proposed under the Habitats Directive.

The NATURA 2000 network of the region also covers the areas of low-input land use which preserve a significant biodiversity. Since such areas lie mostly on the edges of the Pannonian region, a “ring”-like zone of transboundary protected areas should be designed around the inner parts. The development of this ecological network could effectively stabilize the environmental conditions of the Carpathian basin also during the probably climatic changes, and demonstrate that the conservation of natural ecosystems is the best fitted method of a preventive environmental protection.

### 449. THE STATUS OF TWO UNIQUE FOREST BATS MYOTIS ALCATHOE AND NYCTALUS LASIOPTERUS IN NORTH-EAST HUNGARY, WITH REFERENCE TO THEIR CONSERVATION

**ESTÓK**, **PÉTER**, Bükk Mammalogical Society, Hungary; **Gombkötő**, **Péter**, Bükk National Park Directorate, Hungary

N. lasiopterus and M. alcathoe are lesser-known species of forest-dwelling bats. Nearly 400 mist-nettings were conducted to collect data on the woodland bats of North-East Hungary. Research was focused mostly on Bükk Mountains and Mátra Mountains. We identified 3 new localities of N. lasiopterus in North-East Hungary, including the discovery of the only known significant Hungarian breeding population. Radio tracking showed that roosting females of that population preferred old beech forest areas (Aconito-Fagetum) in natural conditions. Lakes were another important component of their habitat as drinking places. M. alcathoe is exclusively known from different mountain forests. This species was mist-netted near small ponds and streams on 15 points of the Northern Hungarian Mountain Range, mostly in the Bükk Mountains. M. alcathoe preferred forested mountain valleys with small running and standing waters in different types of vegetation (Alnetum glutinosae, Querco petraeae- Carpinetum, Melitti-Fagetum etc.). M. alcathoe was also occurred near the entrances of 5 caves during swarming time. Conservation strategies for these species have to focus on avoiding habitat loss and fragmentation caused by logging and protecting small water bodies in forests. Clear cuttings have to be replaced by less invasive silvicultural methods like selection, ensuring continuous forest cover.

### 450. DETECTING IMPORTANT AREAS FOR THE CONSERVATION OF MAMMALS IN ANDALUSIA (SOUTH OF SPAIN)

**ESTRADA**, **ALBA**, University of Malaga, Spain; **Real**, **Raimundo**, University of Malaga, Spain; **Barbosa**, **A. Márcia**, University of Malaga, Spain; **Vargas**, **J. Mario**, University of Malaga, Spain

We detected important areas for the conservation of mammals in Andalusia after modelling the distribution of the 61 mammal species inhabiting in the region, on the basis of their presence/absence on a grid of 10 km x 10 km UTM cells (n=962). Using a favourability function and 30 variables related with the space, environment and human activity, we obtained favourability values for each species in each cell. Each favourability value can be understood as the grade of membership of the cell to the fuzzy set of cells that are favourable for the species, so we can use concepts and operations of fuzzy set theory to asses the conservation value of a territory. We calculated a richness index adding up the favourability values of each cell, so obtaining the cardinal of the fuzzy set of species for which this cell is favourable. By rescaling these values between 0 and 1 we obtained the grade of membership of the cells to the set of areas important for mammals due to species richness. We proceeded analogously for rarity, both in Andalusia and in Spain, and vulnerability, according to the UICN, the Spanish government, and the Andalusian government. We also performed the intersection and union operations to detect areas that are important for all criteria and for at least one of them, respectively. We present these results in maps.

### 451. THE FRAMEWORK DIRECTIVE OF WATER (2000/60/EC) IN THE INLAND LAKES AND WETLANDS OF THE PAÍS VASCO, SPAIN

**FERNÁNDEZ-ENRÍQUEZ, CARMEN**, Universidad Autónoma de Madrid, Departamento de Biología Vegetal y Ecología, Spain

The main goal of the Framework Directive of Water (2000/60/EC) is achieve good chemical and ecological status of bodies of surface water.
The Departamento de Ordenación del Territorio y Medio Ambiente del Gobierno Vasco, with the Universidad Autónoma de Madrid, have developped a monitoring network with the most important inland lakes and wetlands of the Comunidad Autónoma del País Vasco.
We set 13 types of inland lakes and wetlands who was bassed in aspects like climate, origins, water level fluctuation, depth, and water composition. We defined the quality indicators: biological, morphological and physical-chemical. For every type, we establish reference values for each indicator and for each ecological status class. With this methodology, we evaluated the ecological status of inland lakes and wetlands of the Basque Country. Moreover, we identified the causes of the wetlands deviation of the good ecological status and we propose actions to achieve or keep it (Gobierno Vasco, 2004 y Gobierno Vasco, 2005).
More than the 70% of the studied lakes and wetlands don´t reach the good ecological status. The transfer of the wetlands and their basins to public ownership seems the most efficient method to avoid water extractions and livestock access, and to correct morphological artificial alterations, and in that way, repair the most important impacts.

### 452. PROSPECTS OF OPTIMAL ANNUAL ROUTINE MODELS IN CONSERVATION BIOLOGY

**FERÓ**, **ORSOLYA**, University of Debrecen, Hungary; **Barta**, **Zoltán**, University of Debrecen, Hungary; **Houston**, **Alasdair I.**, University of Bristol, United Kingdom; **McNamara**, **John M.**, University of Bristol, United Kingdom; **Hedenström**, **Anders**, Lund University, Sweden

Here we discuss why optimal annual routine approach can serve as a new and effective method in conservation biology. In these models we consider the long-term reproductive success when determining the state-dependent optimal strategy. Therefore, by running simulations based on this strategy we can realistically predict the response of populations to hypothetical environmental challenges. Also, this individual-based approach allows us to investigate whether state variables (for example energy reserves) can predict the forthcoming population trends. To illustrate this principles, in a case study we examine the possible consequences of food reduction along the avian migratory routes.

### 453. PLANNING NEW HIGHWAYS ON LARGE CARNIVORE TERRITORIES – THE WOLF CASE IN PORTUGAL

**FERRÃO DA COSTA**, **GONÇALO**, Grupo Lobo, Portugal; **GUERRA**, **ANA**, Grupo Lobo, Portugal; **Eggermann**, **Julia**, - Universität Bochum, Fakultät Biologie, Germany; **Petrucci-Fonseca**, **Francisco**, Grupo Lobo, Portugal

The wolf (Canis lupus) is nowadays the biggest carnivore in Portugal, with a population of around 300 individuals. One of the main aspects affecting the viability of the Portuguese wolf population is the development of transport infrastructures. Habitat loss, barrier effect; direct mortality, disturbance and increasing human activity are the main impacts observed. A-24 and A-7 are two new highways under construction in the surroundings of Alvão/Marão Natura2000 Site where 5-6 wolf packs inhabit. During EIA procedures several measures were undertaken to minimize the roads impact in the wolf population: 1) route alignment alterations; 2) enrichment of crossing structures; 3) suitable fencing of the highways; 4) mitigation of visual and noise disturbance in sensible locations. Also some compensation measures are being applied such as the improvement of wolf prey's habitat in the area. To assess the efficiency of these mitigations measures and the evolution of the wolf population, a three-phases monitoring program (before, during and after construction) is been carried out by Grupo Lobo (a Portuguese NGO). Good communication between governmental entities, NGO´s and universities is essential in early stages of any new road project, in order that accurate information could reach road designers and wise decisions can be made.

### 454. EFFECTS OF TRAMPLING ON A THREATENED MEDITERRANEAN COASTAL PLANT

**FARRIS**, **EMMANUELE**, University of Sassari - Italy, Italy; **Ceccherelli**, **Giulia**, University of Sassari, Italy; **Filigheddu**, **Rossella**, University of Sassari, Italy

Tourism activities in Mediterranean protected coastal areas need a careful examination to estimate potential negative effects on biodiversity. This investigation aims to estimate tourist trampling effects on the population structure of Anchusa sardoa (Illario) Selvi et Bigazzi (Boraginaceae), a Sardinian sandy coastal endemic living only at Porto Conte Regional Park (811'E, 4034'N), along a coastline of 1.5 Km. A hierarchical sampling design was carried out to analyse spatial-temporal variability of the species cover, adult, sapling and seedling abundance. 3 sites were chosen, one with high and two with low tourism frequentation, at each site 3 areas were randomly selected and at each area eight 50x50 cm quadrats were taken. Samplings were performed before (April), during (June) and after (September) tourist presence in 2005. Asymmetric analyses of variance showed a significant effect of tourism through time, which results to be negative on cover and adult density. In the high frequentation site, total density (meanSE in 0.25 m2) ranged from 7.170.82 individuals in April to 1.040.22 in September, whereas in low frequentation sites it varied from 43.214.48 individuals in April to 18.621.62 in September. This research can support the management of a threatened rare species in a sensitive coastal tourism area

### 455. HABITAT FEATURES AND DISTRIBUTION OF THE FIRE SALAMANDER: FROM STREAM QUALITY TO LANDSCAPE STRUCTURE

**Ficetola**, **Gentile Francesco**, Universtià degli Studi di Milano, Italy; **Mazzoleni**, **Ilaria**, Università degli Studi di Milano, Italy; **Nudo**, **Laura**, Università degli Studi di Milano, Italy; **MARZIALI**, **LAURA**, Università degli Studi di Milano, Italy; **Rossaro**, **Bruno**, Università degli Studi di Milano, Italy; **De Bernardi**, **Fiorenza**, Università degli Studi di Milano, Italy

Both aquatic and terrestrial habitat are needed for semiaquatic species, however they can have different importance for the survival of populations. Moreover, it is important to discriminate the role of composition and configuration of upland habitat, and to evaluate the shape of the species-habitat relationships, i.e., if there are threshold effects. We studied the fire salamander Salamandra salamandra in 77 streams and surrounding landscapes in northern Italy. The presence of the fire salamander was significantly associated with wood cover in a buffer of 400m around the breeding streams. Suitable terrestrial habitat seems to be more important than aquatic habitat for the presence of the species; moreover, water quality was frequently lower in landscapes with low wood cover, suggesting that the quality of breeding and post-breeding habitat are not independent. The effect of landscape composition was more strong than those of configuration in determining the distribution of the fire salamander. The relationship between frequency of the fire salamander and wood cover was strictly linear, without any threshold pattern or plateau. We emphasise the critical importance of large amount of high quality, terrestrial habitat around streams for the conservation of semiaquatic herpetofauna.

### 456. RESULTS OF THE HUNGARIAN BIODIVERSITY MONITORING SYSTEM: HABITAT MAPPING, MOSSES AND MACROFUNGI

**FODOR, LÍVIA**, Ministry of Environment and Water, Authority for Nature Conservation, Hungary; **Török, Katalin**, Institute of Ecology and Botany of HAS, Hungary; **Horváth, Ferenc**, Institute of Ecology and Botany of HAS, Hungary; **Ódor, Péter**, Eötvös Loránd University, Department of Plant Taxonomy and Ecology, Hungary; **Papp, Beáta**, Hungarian Natural History Museum, Department of Botany, Hungary; **Pál-Fám, Ferenc**, University of Kaposvár, Department of Botany and Plant Production, Hungary; **Siller, Irén**, Szent István University, Faculty of Veterinary Science, Department of Botany, Hungary; **Szurdoki, Erzsébet**, Eötvös Loránd University, Department of Plant Taxonomy and Ecology, Hungary

The Hungarian Biodiversity Monitoring System (HBMS) is a national programme for observing biological diversity in Hungary, supervised by the Authority for Nature Conservation of the Ministry of Environment and Water. In order to standardise monitoring activities, 10 projects focusing on specific targets have been formulated, detailed guidance (protocols) for each component has been elaborated and tested. The protocols contain guidelines for the selection of sampling plots, descriptions of the sampling methods and data analyses. In the frame of HBMS, field sampling of selected components started in 1998. The programme expanded and developed in the last eight years. During 2003-2005 a review process was carried out in order to analyse the effectiveness of the running projects and feasibility of developed protocols. As a result, meta-databases have been prepared and datasets were analysed regarding several selected components. The poster demonstrates the main conclusions of the review process and the first results of data analysis regarding habitat-mapping, mosses and macrofungi with diverse examples and main conclusions.

### 457. TOWARDS A CO- MANAGEMENT AND GOOD GOVERNANCE OF WILD BOAR IN GARGANO NATIONAL PARK (ITALY)

**FRASSANITO**, **ANNA GRAZIA**, University of Rome La Sapienza, Italy; **Perna**, **Angelo**, Gargano National Park, Italy

The wild boar (Sus scrofa) is the mammal which has achieved an optimal evolutionary success, thanks to its biological characteristics. For this reason, this species has reached a high population density in many Italian areas. This study is a human dimension study in the Gargano National Park, where the wild boar causes many problems to agricultural activities. We analyzed the data concerning the reimbursements for the damages created by the wild boar in the protected area and listened to the different parts involved through direct questionnaires. The results underline three types of problems created by the animal: 1. Damages to the fauna. 2 Damages to the agriculture. 3. Conflicts among the Park and the collective actors. The lack of a strategy to contain the wild boar damages has created a series of conflicts among the parts of interest, increasing the events of poaching. In conclusion, this study proposes the GUIDELINES toward a co-management of the wild boar problem in the Gargano National Park: 1. Studies about wild boar distribution and population density in the protected area. 2. Damages monitoring plan. 3. Human dimension program.

### 458. SEAWEEDS, BIODIVERSITY AND COASTAL PROTECTION: A CASE STUDY ON GALICIAN COAST (N.W. IBERIAN PENINSULA)

**FREIRE**, **ÓSCAR**, Universidade da Coruña, Spain; **Cremades**, **Javier**, Universidade da Coruña, Spain; **Barbara**, **Ignacio**, Universidade da Coruña, Spain; **Peña**, **Viviana**, Universidade da Coruña, Spain; **Diaz**, **Pilar**, Universidade da Coruña, Spain; **Lagos**, **Veronica**, Universidade da Coruña, Spain; **Baamonde**, **Sergio**, Universidade da Coruña, Spain

The Galician coast (NW Spain) is a region with biogeographical relevance due to its mixed features and floristic richness. The Seaweeds team of the University of A Coruña develops a network of research lines and programs on the Galician Flora and benthic vegetation. These investigations include the catalogue of floristic diversity and types of vegetation as well as the biology and evaluation of different exploitable resources. Specific actions involve the study of the biological pollution processes and the environmental impact by alien species, the assessment of the conservation status and disturbance on biogeographically interesting species and protected communities as maërl beds. Regarding applied studies, the aim of another set of topics is the use of seaweeds in monitoring programs and environmental bioremediation. In the present communication, all action lines of our research team are explained in detail as regards to objectives, methodology, main profits and interrelations with other lines. Our aim is attempt to support the important role that seaweeds can play in many aspects of the conservation in marine ecosystems.

### 459. THE LAST ROCK PATRIDGE IN SOUTH ITALIAN PENINSULA, STATUS AND VIABILITY OF POPULATION

**Fulgione**, **Domenico**, University of Naples Federico II, Italy; **Valore**, **Monica**, Istituto di Gestione della Fauna, Italy; **Carpino**, **Filomena**, Istituto di Gestione della Fauna, Italy; **Zaccara**, **Anna Teresa**, Istituto di Gestione della Fauna, Italy; **RIPPA**, **DANIELA**, Istituto di Gestione della Fauna, Italy

In the past years the Rock Partridge (Alectoris graeca orlandoi) populations of Italian peninsula are considered a separated subspecies or a Management Unit. Really they are not connected and strongly isolated from the species range, actually localized around the North Italy. They need of a management action by means of small southern populations and their spot distribution. We carried out some analysis on four populations of these Phasianids and we noted a strong impoverishment of variability, a little or absent gene flow and strong pressures by illegal hunting and habitat transformation. In a predictive model of viability, based on the actual genetic, ecological and reproductive data, we suggest the necessity of remarkable actions reversing this strong decline.

### 460. ECOLOGICAL AND GENETIC CHARACTERIZATION OF ITALIAN HERE POPULATION LIVING SYMPATRICALLY WITH BROWN HERE

**FULGIONE**, **DOMENICO**, University of Naples Federico II, Italy; **Caliendo**, **Maria Filomena**, University of Naples Federico II, Italy; **Troisi**, **Sabatino Rosario**, Istituto di Gestione della Fauna, Italy; **Fusco**, **Lucilla**, Istituto di Gestione della Fauna, Italy; **De Filippo**, **Gabriele**, Istituto di Gestione della Fauna, Italy

In the Cilento and Vallo di Diano national Park (South Italy) an endemic species of hare, Italian hare (Lepus corsicanus) is living. In the past, alloctonus brown hare (Lepus europaeus) was introduced in the same areas, in order to hunting management policy and since the presence of autoctonous species was unknown. By means of ecological pressure these circumstances may represent a warning for endemic and rare brown hare. From various years our group study these populations; in this contribute we report the results of ecological analysis, habitat selection, and genetic study, gene flow and variability. A remarkable discrimination among the two species population having very low gene flow is noted. Our hypothesis is that this separation would be supported by a clear ecological differentiation. This separation could be changing during the time, since environmental modifications could be trigger hybridization events, as reported by other research. Then we think necessary to activate some management actions for protecting and preserving this species

### 461. CONTINENTAL ISLAND INDUCED BY ANTHROPOGENIC LANDSCAPE FRAGMENTATION IN LACERTIDS: A CASE OF STUDY

**FULGIONE**, **DOMENICO**, University of Naples Federico II, Italy; **Salvi**, **Yari**, Istituto di Gestione della Fauna, Italy; **Della Paolera**, **Assunta**, Istituto di Gestione della Fauna, Italy; **La Femina**, **Valentina**, Istituto di Gestione della Fauna, Italy; **Daniello**, **Biagio**, University of Naples Federico II, Italy; **Guglielmi**, **Serena**, University of Naples Federico II, Italy

The isolation of the animal populations depends on the permeability that landscape offers to the spread of the individuals and the gene flow. Such permeability is strongly connected to the fragmentation and can lengthen the real distance among between two neighbouring populations. Studying this topic in Lacertidae populations of Podarcis sicula, we have detected isolation processes ascribing to the fragmentation and anthropogenic habitats transformation. The integration of landscape methodologies, like GIS, and genetic hypervariable markers, has allowed to individualize clear continental islands in a matrix of hostile landscape to the spreading populations. Such processes would have inducted microevolutionary differentiation so significant and rapid arising conspicuous morphological and genetic variations.

### 462. VARIATION IN GENETIC DIVERSITY IN THE EUROPEAN GROUND SQUIRREL (*SPERMOPHILUS CITELLUS*)

**GEDEON, CSONGOR, I.**, Department of Ethology, Eötvös University, Hungary; **Millesi, Eva**, Department of Ethology, Institute of Zoology, University of Vienna, Austria; **Hoffmann, Ilse**, Department of Ethology, Institute of Zoology, University of Vienna, Austria

Loss of genetic diversity is a central aspect of conservation genetics because of its importance in maintaining evolutionary potential and individual fitness. Habitat fragmentation usually leads to the isolation of small populations and forestalls migration, moreover reduces heterozygosity level. Different features of the isolations may have had the consequence of different genetic structure.
Non- invasive sampling will be done on ground squirrels between March and June 2006. We will investigate the within- and among-population genetic diversity using 14 microsatellites to survey ~150 individuals from 4 localities and ~20 mounted animals from museums. The study areas will include 2 physically separated, large suslik populations from Hungary, and 1-1 from Austria and Romania. In addition, we will include 2 small, isolated populations to study the direct effect of isolation on genetic diversity. Briefly, we expect higher level of diversity in large than in small isolated populations and larger heterogenity between than within populations. Genetic info on susliks will let us make conclusions which can affect management policies, especially concerning habitat preservation and translocation. I am convinced that we need to focus our conservational efforts below the species level to stem further losses of genetic resources.

### 463. CONSERVATION MANAGEMENT IN *NATURA 2000* SITES OF CYPRUS

**GEORGHIOU, KYRIACOS**, Department of Botany, University of Athens, Panepistimiopolis, Greece; **Delipetrou**, **Pinelopi,** Department of Botany, University of Athens, Panepistimiopolis, Greece; **Hadjicharalambous**, **Helena,** The Goulandris Natural History Museum, Greek Biotope/Wetland Centre, Greece; **Arapis**, **Thomas,** OIKOS – Nature Managenment Ltd., Greece; **Kardakari**, **Niki,** OIKOS – Nature Managenment Ltd., Greece; **Panayiotou, Charalambos,** ATLANTIS Consulting Cyprus Ltd., Cyprus; **Antoniou**, **Antonis,** Environment Service Ministry of Agriculture, Natural Resources and Environment, Cyprus; **Tsintides, Takis,** Forestry Department, Ministry of Agriculture, Natural Resources and Environment, Cyprus

A LIFE-NATURE-2004 project for the implementation of urgent and/or pilot actions in order to secure a favourable conservation status for priority habitat types and species in five pSCIs (three of which are also SPAs) in Cyprus has been running since November 2004. The targeted Annex I (Directive 92/43/EEC) habitat types are *Posidonia beds**, *Zizyphus mattoral**, *Vernal pools**, *Alnus orientalis* riparian woodland*, *Quercus infectoria* woodland*, *Pinus nigra* forest*, *Serpentinofilous grasslands** and *Peat grasslands**. The targeted species are the Annex II (Directive 92/43/EEC) species *Scilla morrisii**, *Arabis kennedyae**, *Chionodoxa lochiae**, *Pinguicula crystallina** and *Coluber cypriensis* and 38 Annex I (Directive 79/409/EEC) bird species. The main actions are: (a) elaboration of management and monitoring plans and pilot monitoring implementation; (b) enhancement of the populations of two plant species; (c) expansion and/or re-establishment of four habitats; (d) study and enhancement of the regeneration of the black pine forest; (e) protection of *Posidonia* beds by the installation of anchoring system; (f) improvement of habitat conditions for *Hieraaetus fasciatus* and wetland birds; (g) protection by demarcation, fencing and signposting of most of the targeted habitats and species; (h) development of a Data Information System for the protected areas of Cyprus; (i) public awareness and interpretation actions.

### 464. GENETIC EVIDENCE OF INTROGRESSION AND PLEISTOCENE RANGE EXPANSION IN THE CRITICALLY ENDANGERED BALEARIC SHEARWATER

**GENOVART**, **MERITXELL**, IMEDEA (CSIC-UIB), Spain; **Oro**, **Daniel**, IMEDEA (CSIC-UIB), Spain; **Juste**, **Javier**, EBD (CSIC), Spain; **Bertorelle**, **Giorgio**, Universita di Ferrara, Italy

We use a genetic approach to evaluate conservation status and understand the history and demography of a critically endangered seabird, the Balearic shearwater, Puffinus mauretanicus. This species is endemic to the Balearic archipelago in the Mediterranean region and conservation concerns are related to the limited number of breeding pairs, which recently dropped to less than 2,000, the low adult survival rate, and the possible hybridization with a sibling species, the morphologically smaller Yelkouan shearwater (P. yelkouan). We sampled almost the entire breeding range of the species and analysed the genetic variation at two mitochondrial DNA regions: cytochrome b and the control region. No genetic evidence of population decline was found, since the species showed a relatively high genetic diversity. The pattern of genetic variation pointed to a demographic expansion, possibly explaining the weak population structure found in this philopatric species. Some colonies showed a high imbalance between immigration and emigration rates, suggesting spatial heterogeneity in the quality of patches. Genetic evidence of maternal introgression from the sibling species was confirmed, but almost only in the most North-Eastern colony, Menorca. The genetic anayses integrated with a morphometric analysis, allow us to suggest that hybridization is probably not a very recent or ongoing event.

### 465. ELEVEN-YEAR VEGETATION SUCCESSION IN AN EXPOSED DANUBE RIVERBED IN THE SZIGETKÖZ REGION, HUNGARY

**Gergely, Attila**, Corvinus University of Budapest, Department of Landscape Preservation and Reclamation, Hungary; **HAHN, ISTVÁN**, Lorand Eötvös University, Department of Plant Taxonomy and Ecology, Hungary

Rapid vegetation succession was observed in the riverbed exposed on the diversion of the Danube in the Szigetköz in 1992. On new gravel bars of 50-100 m width various woody and herbaceous vegetation types developed in few years and arranged in zones determined by hydrology and topography. Pioneer riverbed weed associations of simple physiognomy was soon replaced by willow scrub and then by white willow gallery forest on lower terrain. In higher elevations tall forb associations dominated by *Urtica dioica* and *Solidago gigantea* became typical, while at the highest terrain weedy dry grassland of perennial grasses established. In this grassland, a new woody

vegetation of *Acer negundo* also grew up. Species replacement was fastest in the lowermost willow zone: an initial drop in species number was followed by a slower increase under the willow stand mostly due to the enrichment of the herb layer. The highest species richness was recorded in summer-dry open grasslands on highest terrain. More than 150 species has been encountered in the area so far, although total species number decreases every year. In the new terrestrial zone certain species of high nature conservation value has established (e.g. *Ribes nigrum*), but invasive species also intrude these habitats.

**466. PHOTO-TRAPPING SURVEY FOR CARNIVORES IN TERMESSOS N.P. AND SURROUNDING PROTECTED AREAS IN SW TURKEY**

**GIANNATOS, GIORGOS**, University of Athens, Department of Zoology - Marine Biology, Greece; **Albayrak, Tamer**, Akdeniz Üniversitesi Fen-Edebiyat Fakültesi, Turkey; **Erdogan, Ali**, Akdeniz Üniversitesi Fen-Edebiyat Fakültesi, Turkey

The Termessos NP and its surrounding protected areas considered one of the most important faunal areas in Turkey especially for larger mammals. The present study is the first systematic survey for carnivores in the region and the most intensive photo-trapping yet undertaken in Turkey. The cameras were activated by line triggered mechanism with pressure pads and were baited to attract the target animals. The cameras were set in 28 locations and captured 1024 trap days of data for the period between 14 July and 25 December 2005. The wild animals captured included red fox, badger, caracal, wild boar, few follow deer in a large enclosure, few hares and tortoises. Due to the use of baits and the type of camera triggering the analysis was considered only for carnivores and wild boars. In the area the few species of wild terrestrial carnivores survive at low densities, while the most widespread larger mammal was the wild boar. The most important finding in the area is the presence of a small number of caracals, a critically endangered animal in Turkey. This caracal population is most probably isolated since it is surrounded by high mountains, large urban area and intensively used landscape.

**467. FERN RARITY ANALYSIS AT DIFFERENT SPATIAL SCALES IN MONCAYO MOUNTAIN (SPAIN)**

**GIL GIL, TERESA**, Gestión Ambiental S.A., Spain; **Molina Martín, Carlos**, Actividades, Estudios y Proyectos en el Medio Ambiente S.L., Spain; **Gómez García, Daniel**, Instituto Pirenaico de Ecología Jaca CSIC, Spain

Moncayo mountain constitutes a remarkable biodiversity enclave in the Iberian Peninsula with an outstanding botanical information (35.000 records). This makes this area very suitable for floristic analysis. Pteridophyta are little considered in rarity studies in spite of being well known from a taxonomic and corologic point of view.
We have studied rare fern taxa at different spatial scales (European, Iberian Peninsula, Regional and local) taking into account habitats vulnerability.
In Moncayo, Pteridophyta make up 3% of the whole flora (38 taxa, 9 families) There are rare taxa: at local level (53% <3 populations (*Blechnum spicant, Cheilanthes acrostica*), at region level (11% <3 populations (*Polystichum lonchitis, Criptogramma crispa*) and also at both levels (*Cystopteris dikeiana*).
In this mountain, the main habitat for Pterydophyta is cliff fissures and screes (60,5% taxa), widely represented and with no threats identified. Secondly, forest (34,2% taxa), habitat slightly disturbed by current forest management. Finally, wet-grasslands (5,3% taxa), habitat in regression by lack of livestock and scrub invasion.
Regarding conservation management, it would be advisable to establish co-ordinate measures between the two existing protected areas in Moncayo (Natural Park and Natura 2000 area) in order to avoid local extinction of species with little populations and of threatened habitat by land use changes.

**468. EFFECTS OF FOREST COMPOSITION AND CONFIGURATION ON BIRD SPECIES RICHNESS IN CATALONIA (SPAIN)**

**GIL-TENA**, **ASSUMPCIÓ**, University of Lleida - ETSEA, Spain; **Torras**, **Olga**, University of Lleida - ETSEA, Spain; **Saura**, **Santiago**, University of Lleida - ETSEA, Spain

There is a growing need of knowledge about how landscape ecological processes and spatial characteristics may influence biodiversity distribution patterns. To provide further insights into this topic, we analyzed the influence of forest composition, structure and spatial configuration on forest breeding bird species richness in Catalonia (NE Spain). Bird species richness was obtained for 2,923 UTM 1 x 1 km cells where specific surveys were performed within the Catalan Breeding Bird Atlas 1999-2002. Forest characteristics were extracted from the recent Spanish Forest Map (scale 1:50,000) through GIS, including new efficient tools specifically developed to obtain shape indices as a potential biodiversity indicator related to the degree of human influence in the landscape. We identified the forest characteristics with a higher influence in forest breeding birds distribution in Catalonia, which were forest canopy cover, development stage and tree species diversity, together explaining as much as 56% of total variance in the distribution of specialist forest bird species richness. Some shape indices provided significant correlations with species richness, but were correlated with other forest composition characteristics and did not improve overall results. We conclude providing general guidelines that may be relevant to manage the forest ecosystem for biodiversity conservation

**469. COMPLEMENTARY HOTSPOT INVENTORY – A METHOD FOR IDENTIFICATION OF IMPORTANT AREAS FOR BIODIVERSITY AT THE FOREST STAND LEVEL**

**Gjerde, Ivar** , Norwegian Forest Research Institute, Norway; **SAETERSDAL, MAGNE**, Norwegian Forest Research Institute, Norway; **Blom, Hans H**., Norwegian Forest Research Institute, Norway

Forest stands are the basic planning units of managed forest landscapes, and the structural composition of these units is important for conservation of biodiversity. We present a methodological approach for identification of important structural and environmental features of forest stands, and discuss problems associated with fine-scale conservation of biodiversity. Based on a gap analysis and a synthesis of results from research on spatial distribution of forest species, we developed a habitat inventory approach (Complementary Hotspot Inventory, CHI), that is currently used in forestry planning in Norway. The CHI identifies fine-scale hotspots for 12 habitat types that are further classified according to positions along main environmental gradients (productivity and humidity). Consisting of different substrates in different environments, these habitats to a large degree support different species assemblages. By incorporating both the hotspot and the complementary approach, the CHI produces data tuned for later conservation measures. The high spatial resolution of data facilitates the use of conservation measures at different spatial scales, from single-tree retention to forest reserves.

**470. DEAD WOOD - ALIVE FOREST. CASE STUDY ON THE BRYOFLORA FROM THE UPPER BASIN OF THE ARIES RIVER (ROMANIA)**

**GOIA, IRINA**, Babes-Bolyai University, Department of Taxonomy and Ecology, Romania

Bryophytes inhabiting on dead wood are species requiring special conditions: high air and soil humidity and shadow. This species are strongly affected by forest exploitation, habitat fragmentation and removal of dead wood. In the upper basin of the Aries river (ca. 600 $km^2$) a high biodiversity has been recorded on dead wood (177 bryophyte species and 11 bryophyte communities). Two species are listed in the European

Red list of Bryophytes: *Lophozia ascendens* (rare) and *Buxbaumia viridis* (vulnerable). Other species has a low occurrence in Romania. Very few species are saprolignicolous, but their presence is the result of substrate cover and changes initiated by the corticolous bryophytes and ending with humicolous communities. Each different succesional stage means other ecological properties, during their short-term existence. Conservation of this high bryophyte flora and communities require a scientifical management of the forest, providing corridors between the fragments of different types of forest, conserving old trees from different species and dead wood (falled branches, truncs, stumps or standing truncs) on different rotting degree uniform distributed in the forests and along corridors.

### 471. THE ALIEN WATER HYACINTH IN A PORTUGUESE SHALLOW LAKE: HOW IT AFFECTS MICROALGAE AND CLADOCERANS AT DIFFERENT SEASONS OF THE YEAR?

**Goncalves**, **Ana M.M.**, Universidade de Aveiro, Portugal; **Almeida**, **Ana S.**, Universidade de Aveiro, Portugal; **Pereira**, **Joana L.**, Universidade de Aveiro, Portugal; **GONCALVES**, **FERNANDO**, Universidade de Aveiro, Portugal

In Portugal, the alien water hyacinth (Eichornia crassipes) is one of the threats to freshwater ecosystems, being a concerned and actual problem to the environment, leading to strong socio-economic impacts. The aim of this study was to evaluate the effects of the presence that introduced species in three freshwater green algae (Chlorella vulgaris, Pseudokirchneriella subcapitata and Pandorina morum) and in an indigenous cladoceran species (D. longispina). The experiments were based in successive dilutions of water samples collected in summer and winter seasons, at two selected sites in a Portuguese shallow lake: within an E. crassipes bed (H water) and without it (F water). The growth of microalgae was inhibited by both H and F summer water. The growth of C. vulgaris and P. subcapitata was stimulated in the first dilutions whereas the growth of P. morum was inhibited by winter F water. In winter, H water showed the opposite trend. On the other hand, cladoceran species life history parameters were significantly stimulated by H and F water being it more noticeable in summer F water. Results suggest that algae and cladoceran responses are conditioned by nutrients availability and the presence of E. crassipes.

### 472. POPULATION GENETICS STRUCTURE OF ENDANGERED SPOTTED SUSLIK (SPERMOPHILUS SUSLICUS) IN TWO HABITATS WITH DIFFERENT LEVELS OF CONNECTIVITY

**GONDEK**, **ALEKSANDRA**, Institute of Nature Conservation, Polish Academy of Sciences, Poland; **Konopinski**, **Maciej**, Institute of Nature Conservation, Polish Academy of Sciences, Poland

Habitat loss and fragmentation usually impede the exchange of genetic material between neighbouring populations. As a result we observe a reduction of the level of variation and an increase in the genetic structure between populations. This effect can be even more pronounced in populations at the edge of a species range. The loss of genetic variation can have important consequences on the long-term viability of populations. Over the last 50 years the population of spotted suslik in Poland have lost more than 2/3 of its original numbers mostly due to changes in land use. Currently, there are only 7 isolated colonies left and the species is considered highly endangered. In contrary, in the Eastern part of its range, spotted suslik exists in a habitat with high levels of connectivity and forms metapopulation structure. We used 11 microsatellite loci to determine the genetic structure of 10 populations that suffered strongly from habitat loss, and 4 populations from a continuous habitat. In the edge populations studied, we demonstrated extremely high and significant levels of pairwise Fst, indicating the existence of strong barriers to gene flow and reduced levels of genetic variation. In contrast, the populations from the Eastern part of the range showed higher levels of inter-population variability despite the detected recent bottlenecks and significantly weaker genetic structuring. The results prove that a high level of genetic diversity can be maintained in a habitat with high levels of connectivity, even if the population faces frequent reductions in population size.

### 473. INTRA-SPECIFIC VARIATION IN LEAF ATTRIBUTES OF QUERCUS SUBER L. UNDER DIFFERENT RAINFALL REGIMES

**GOUVEIA**, **ANTONIO**, University of Coimbra, Department of Botany, Portugal; **Freitas**, **Helena**, University of Coimbra, Department of Botany, Portugal

The Mediterranean forests are rapidly changing; how trees will respond and adapt to these changes is largely unknown. It is necessary to increase the basic knowledge on the mechanisms controlling the development of native forest species, their interrelations, as well as their responses to environmental stresses. The cork oak (Quercus suber L.) is one of most important forest species in Portugal, occupying circa 700 000 ha of the national territory, subjected to annual rainfall regimes ranging between 500 and 1300 mm. Its distribution encompasses the entire country, although it is in the south, where it is more abundant, in an agro-silvo-pastoral system called the Montado. In order to investigate the intra-specific variation in Q. suber, at the tree and leaf level, under different rainfall regimes, we undertook a field campaign following the distribution of the cork oak, in Portugal, collecting leaf and tree morphological data from over 40 sites. We have measured tree morphological attributes, such as height, diameter at breast height, and crown diameter. At the leaf level, we have measured and calculated several traits, such as thickness, specific leaf area, and density. Besides annual rainfall regimes we have also tried to correlate tree and leaf variation with mean annual temperature, altitude, soil type, stand density, and land use management.

### 474. SIMULATING DISPERSAL OF CAPERCAILLIE IN THE ALPS

**GRAF**, **ROLAND F.**, UFZ - Centre for Environmental Research Leipzig-Halle, Germany; **Kramer-Schadt**, **Stephanie**, UFZ-Centre for Environmental Research Leipzig-Halle, Germany; **Grimm**, **Volker**, UFZ-Centre for Environmental Research Leipzig-Halle, Germany

The ability of animals to move between habitat fragments is a key determinant of the viability of spatially structured populations. Simulation models have become a cost-effective approach to investigate and predict dispersal dynamics. Capercaillie in central Europe live in patchy and often small populations embedded in a mosaic landscape with a complex topography. This setting results in a heterogeneous dispersal pattern. We simulated capercaillie movements with an individual-based, spatially explicit dispersal model to get a more realistic measure of connectivity than with distance or buffer measures. We used a landscape comprising discrete habitat patches that we derived from a statistical habitat suitability model, dispersal habitat, other forests and open land. Our dispersal model relies on the assumption that moving individuals are guided by their visual perception of the landscape. Therefore, we let single movement steps happen within a perception window, in which we tested all grid cells for accessibility or visibility from the starting location. The connectivity measured by the dispersal model differs significantly from simple distance measures, especially where barriers such as high mountain chains or large valleys occur between patches. We use data from genetic analyses for different regions to validate our model assumptions.

### 475. HABITATS AND BIRD COMMUNITIES IN AGRAS LAKE, MACEDONIA, GREECE

**GRIGORIADIS, N**. National Agricultural Research Foundation, Forest Research Institute, Greece; **Kazantzidis, S**., National Agricultural Research Foundation, Forest Research Institute, Greece**; Dimalexis, A**., National Agricultural Research Foundation, Forest Research Institute, Greece

Agras lake has been proposed for inclusion in the European Network of Protected Areas, known as “Natura 2000” (LIMNI

AGRA, GR1240004), in accordance to the Habitat Directive 92/43/EEC and the Directive for Birds 79/409/EEC. The wetland can be divided based on functional criteria into a core area, which is mainly covered by water and includes wetland communities, and a peripheral zone where terrestrial ecosystems primarily dominate. The habitats present in the core area are of great ecological significance not only because one of them is classified as a priority habitat (Calcareous fens with *Cladium mariscus* and *Carex davalliana*), but also because they are resting or nesting habitats for a large number of migratory birds. The following vegetation types are distinguished: Natural eutrophic lakes with Magnopotamion or Hydrocharition-type vegetation (3150), Mediterranean tall-herb and rush meadows (Molinio-Holoschoenion) (6420), Calcareous fens with *Cladium mariscus* and *Carex davalliana* (7210*), and reed bed communities (72A0). At least 150 bird species have been recorded in the area so far. Among them 16 are included in the Annex I of the Bird Directive while three are globally threatened (*Pelecanus crispus*, *Phalacrocorax pygmaeus* and *Aythya nyroca*). Most of them are passerine species (43.3%) and waterbirds (28.7%). The breeding species represents a percentage of 60% of the total bird species recorded in the area while the staging and the wintering species are fewer (21.3% and 20.0% respectively).

### 476. THE ROLE OF PATCH SIZE AND ISOLATION TO CARNIVORE RELATIVE ABUNDANCE IN A OAK WOODLAND LANDSCAPE

**GRILO**, **CLARA**, Faculdade de Ciências da Universidade de Lisboa, Portugal; **Cruz**, **Marta**, Portugal; **Bissonette**, **John**, USGS Cooperative Fish & Wildlife Research Unit, Utah State University, United States; **Santos-Reis**, **Margarida**, Faculdade de Ciências da Universidade de Lisboa, Portugal

Carnivores have characteristics that make them particularly vulnerable to landscape changes. To assess the effects of habitat fragmentation on carnivore diversity (CD) and relative abundance (CRA) we conducted surveys in 42 oak woodland patches that varied in size and degree of isolation. In each patch we established 10-15 scent stations. For each patch the CRA was expressed as the total number of visits recorded divided by the total operative scent stations. Three variables were calculated to characterize the degree of isolation: DminP - distance from the focal patch to the closest oak woodland patch, DminLP - distance from the focal patch to the larger oak woodland patch, % of habitat adjacent to the focal patch. Spearman's rank correlation coefficient was used to ascertain the relationship between visitation index and continuous variables. Patch size had significant positive correlations with the carnivore diversity index in general, and red fox relative abundance in particular. DminP had significant negative correlations with stone marten, Egyptian mongoose and red fox relative abundance and the carnivore diversity index. Red fox, stone marten and genet relative abundance and the carnivore diversity index had significant negative correlations with DminLP. Badgers were positively influenced by the presence of oak woodland in the adjacent habitat.

### 477. IS IT POSSIBLE TO IMPROVE FOREST HABITAT FOR MARTENS MARTES SPP. AND TAWNY OWL STRIX ALUCO BY PROVIDING ARTIFICIAL SHELTERS?

**GRYZ**, **JAKUB**, Warsaw Agricultural University, Poland; **Krauze**, **Dagny**, Warsaw Agricultural University, Poland

In most cases forests in Central Poland are heavily transformed and do not provide enough shelters connected with old stands (such as hollows or broken, rotting trunks). Small animals (e.g. hole-nesters, bats Chiroptera, dormice Gliridae) utilize small nest boxes which are commonly hung by foresters. Thus, there arises a question concerning the possibility of improving habitat for bigger animals (martens Martes spp. or tawny owls Strix aluco). In January 2005, in 4 forest areas in Central Poland, 41 nest boxes of different sizes and types were hung. Their inner linear dimensions (measurements of the square bottom, height up to the lower edge of the entrance and the diameter of the entrance) were as follow: - for 18 nest boxes of E-type (25x50x15 cm) - for 4 nest boxes of D-type (17x27x8,5 cm) - 7 "chimneys" 25x70 cm, fixed at 30° angle with their tops open. Additional 10 boxes of type E and 2 of type D were modified - their half-mooned shaped entrance was enlarged and reaches the roof of the box. Nest boxes were placed at different height (from 6 to 16 m above ground). During first year of exposition 3 boxes were occupied by martens (at least one was pine marten Martes martes), 13 by tawny owls, 2 by great tits (Parus major) and 10 by wasp and hornets. These preliminary results show that nest boxes can be surrogate shelters for martens and tawny owls.

### 478. KARYOTYPE ANALYSIS IN ORTHRIAS ANGORAE (STEINDACHNER, 1897)

**GUL**, **SULEYMAN**, University of Kafkas, Turkey; **Kaya**, **Taylan**, Kafkas University, Turkey; **Nur**, **Gökhan**, Kafkas University, Turkey; **Aksu**, **Pinar**, Kafkas University, Turkey

Karyotype analysis was performed in Orthrias angorae (Steindachner, 1897) (Fam: Balitoridae) by investigating the number and structures of their chromosomes. The fish used in this study were caught with fishing nets from the Kura-Aras river basin and taken to the laboratory. Fishes were injected intraperitoneally (i.p.) with doses of 0.01 ml/g body weight of 0.6 % solution of colchicine and left for 190 minutes before sacrification. It was determined that O. angorae had 2n=50 chromosomes by metaphase investigation. Their karyotypes were determined as being composed of 7 metacentric, 7 submetacentric and 11 acrocentric chromosome pairs with NF:78. We were unable to identify any sex-related chromosomes in this species.

### 479. ECOLOGICALLY IMPORTANT AREAS OF NORTHERN PART OF CYPRUS

**GÜNDÜZ, Şerife**, Girne American University, Turkey

The objective of the research project was to designate Ecologically Important Areas in North Cyprus with the aim to provide the necessary data enabling the authorities to prepare plans for their protection.
The survey on Ecologically Important Areas was conducted in the entire region of North Cyprus covering 3.298 $km^2$ during 2002 and 2004. A detailed study on the fauna and flora including the main geological, geographical and climatic factors of the area was undertaken. As a result twenty-one different Ecologically Important Areas were identified, mostly characterized by the presence of endemic and endangered plants and plant societies. These ecologically important areas are, namely, Limnitis, Kalo Horio(Kapouti), Coast of Ayia Irini, Coast of Liveras, Coast of Orga, Panagra, Kambyli, Kanly Keuy, Geunyeli, St. Hilarion, Bufavento Castle, Kantara Castle, Ronnas Bay, Ayios Philon, Cape Andreas, Klidhes Island, Salamis Ruins, Salamis Salt Marshes, Silver Beach and Glapsides, Kouklia (Ammohostus), Forest Areas of the Northern Range.
This study represents a fist but necessary study to initiate the development of protection measures. Further studies need to concentrate on threats facing these areas, in particular from housing and tourism and to develop sound measures for protection. In addition, the surveys should be intensified to areas that are currently not sufficiently represented.

### 480. TERRESTRIAL HABITAT USE OF GREAT CRESTED NEWTS (TRITURUS CRISTATUS) IN SOUTH-CENTRAL SWEDEN

**GUSTAFSON**, **DANIEL H**, Örebro University, Sweden; **Malmgren**, **Jan C**, County Administration of Örebro, Sweden

We conducted a study to examine the terrestrial habitat and micro-habitat use of the great crested newt (Triturus cristatus). T. cristatus is a threatened amphibian, subject to species action

plans in Sweden and other European countries. However, its terrestrial habitat is not well known and must be investigated further, to be able to perform proper conservation measures. In the present study, radio transmitters were used to track 30 individuals on two different locations, for 3-4 weeks after migration from aquatic to terrestrial habitat. At both investigated areas, more than 75 % of the newt founds were positioned within 120 m from the pond where reproduction occurred. The longest migration distance of a single newt was 180 m. Newts stayed for longer periods in areas with high amounts of dead wood or high cover in moss, field and tree layer. As hide-out structures they most often used tree roots and dead logs. In conclusion, the most important terrestrial area for the crested newt probably lies within 200 m from an aquatic habitat, at least if it encloses suitable terrestrial habitat. Our results imply that the terrestrial habitat should contain high vegetation cover in several layers and high quantities of dead wood.

### 481. IMPACT OF DAMMING AND POLLUTION ON FISH FAUNA OF THE MOSONI DANUBE REACH

**GYÖRE**, **KÁROLY**, Research Institute for Fisheries, Aquaculture and Irrigation, Hungary; **Lengyel**, **Péter**, Research Institute for Fisheries, Aquaculture and Irrigation, Hungary

Impacts of the Mosonmagyarovar dam (rkm 85+100) and of the treated wastewater of Gyor (rkm 8+350) on fish community structure were studied in the 124-km long Mosoni Danube. Two sampling sites were chosen above the dam (10+13 km), four between the dam and the wastewater inlet (13+11+14+13 km), and one below the inlet (5 km). We determined the fish catch per hour and per 1000 m by electric fishing and calculated alpha-diversity. The fish community consisted of 30 species. Above the dam, 28 species (2226 ind.), below the dam, 17 species (667 ind.) were detected, 14 occurred in both sections. Of the seven legally protected species, six occurred in the upstream section, and one downstream. Upstream, 97 fish were caught per 1000 m, while downstream, 12. More rheophilic fish were caught in the shoaly, fast-flowing upstream section than below the dam. In species number, the rheophilic:neutrophilic:stagnophilic ratio was 12:16:0 above the dam and 4:13:0 below it. Considering the abundances, these ratios were 1251:975:0 and 189:478:0, respectively. Worsening of water quality below the wastewater inlet is shown by the increased abundance of roach (Rutilus rutilus) compared to the upstream sections. Below Gyor, three species made over 95% of the fish community: roach (Rutilus rutilus – 43.8%), bleak (Alburnus alburnus – 34.5%) and ide (Leuciscus idus – 17.0%).

### 482. ALIEN AND INVASIVE PLANT SPECIES IN SKADAR LAKE NATIONAL PARK (MONTENEGRO)

**HADZIABLAHOVIC**, **SEAD**, Republic Institution of the Protection of Nature, Yugoslavia

The Skadar Lake is a transboundary wetland, with the northern half in Montenegro and the southeastern half in Albania. The Montenegrin part of the Lake is a National Park. The List of alien and invasive plants of this area quotes all the vascular plants occurring within the National Park boundaries. It includes naturalized alien and invasive taxa while cultivated occurring taxa were left. The main data sources for the drawing up of the list were: the main flora which treat the territory of Montenegro – Concpectus Florae Montenegrinae (Rohlena 1942); all floristic published works has been used as working inventory. The authors personal unpublished data were also used. Basing upon this survey, Skadar Lake National Park has 39 species with 2 subspecies which belong to 33 genera and 20 families. As very dangerous species with great negative impact on biodiversity of this area we can underline: Paspalum distichum subsp. paspalodes, Ambrosia artemisiifolia, Ailanthus altissima, Solanum eleagnifolium, Amorpha fruticosa, Opuntia ficus-indica etc. The UTM distribution maps of all alien and invasive species registered in this area will be presented.

### 483. CRAYNET - CONSERVATION OF EUROPEAN CRAYFISH, A CHALLENGE INVOLVING EVERYBODY, FROM THE CITIZEN TO STAKEHOLDERS, SCIENTISTS AND DECISION MAKERS

**HAFFNER, PATRICK,** Département Ecologie et gestion de la biodiversité, USM 0304 Inventaire et suivi de la Biodiversité, Service du patrimoine naturel (SPN), Muséum national d'Histoire naturelle, France; **Souty-Grosset, Catherine,** UMR-CNRS6556 Génétique et Biologie des Populations de Crustacés, France; **Noël, Pierre,** Muséum National d'Histoire Naturelle DMPA, France; **Holdich, David,** Aquatic consultant, England; **Reynolds, Julian,** University of Dublin, Trinity College, Dublin, Ireland; **Schulz, Ralf,** Institute of Environmental Sciences, University Koblenz-Landau, Germany; **Blech, Susanne,** Institute of Environmental Sciences, University Koblenz-Landau, Germany

Crayfish conservation produces benefits arising from the protection of the aquatic environment and from the maintenance of both food sources and cultural heritage The strong message of CRAYNET is: if anyone, of whatever status (scientist, manager, stakeholder, decision maker, legislator, citizen) wants to act for the restoration of good freshwater environmental quality and particularly for the management of indigenous crayfish, he or she must be first be able to identify them! Our 'Atlas of Crayfish in Europe' provides relevant details, descriptions and useful references. Because of their cultural heritage, crayfish are 'flagship species' that appeal to the public and are suitable for communicating conservation concerns; CRAYNET has diversified the means of dissemination through a series of leaflets entitled "Save the European Crayfish" (N°1: "Your health is linked with the survival of our crayfish!"; N°2: "Beware of the crayfish plague!"; N°3: "Save our habitat"; N°4: "Tradition, exploitation and conservation of crayfish"). A poster "Crayfish of Europe" gives in a single view the best pictures of indigenous (ICS) and non indigenous Crayfish species (NICS) and a booklet "Identifying native and alien crayfish species in Europe" is directed particularly towards managers, decision makers and third-level students.

### 484. PERENNIAL POLYPORES AS INDICATORS OF OVERALL POLYPORE SPECIES DIVERSITY

**HALME**, **PANU**, University of Jyväskylä, Finland; **Sippola**, **Anna-Liisa**, University of Lapland, Finland; **Kotiaho**, **Janne**, University of Jyväskylä, Finland; **Hottola, Jenni,** University of Helsinki; Finland; **Junninen**, **Kaisa,** University of Joensuu; Finland; **Kouki**, **Jari,** Natural History Museum of University of Jyväskylä; Finland; **Lindgren**, **Mariko,** University of Helsinki; Finland; **Mönkkönen, Mikko**, University of Jyväskylä; Finland; **Penttilä**, **Reijo,** Finnish Environment Institute; Finland; **Renvall, Pertti**, Natural History Museum of Kuopio; Finland; **Siitonen, Juha**, Finnish Forest Research Institute; Finland; **Similä, Maarit,** Metsähallitus; Finland

Many polypores are specialized in their requirements for substrate and environment, and are used to indicate for the continuity of coarse woody debris or forest canopy. The use of polypores as indicators is restricted by the limited appearance of annual fruitbodies, which mainly occur from August to November in the Boreal zone. We studied whether perennial polypores can be used as surrogates for overall polypore diversity or richness of red-listed species. Our data included 1469 sample plots, ranging from southern to northern boreal zone in Finland. Results show that the richness of perennial species explains about 70 % of the variation in the species richness of annual species, and 67 % of the species richness of annual threatened species. A fairly small number of occurrences of perennial species (17-19) was needed for relatively reliable conclusions ($r = .61$) on annual species richness. However, the limit to predict the diversity of annual red-listed species was higher (29-35 occurrences, $r = .57$). The explanatory power of perennial species prevailed despite of the area of sample sites. The effects of forest type and biogeographical area on the correlation between annual and perennial species richness are discussed. We argue that perennial polypores can be used as an indicator group to get reliable information on the local species richness of polypore flora in boreal forests.

### 485. ARTIFICIAL BURROWS, A TOOL FOR OBSERVING OVER-WINTERING HUNGARIAN MEADOW VIPERS (*VIPERA URSINII RAKOSIENSIS)*

**HALPERN, BÁLINT**, MME BirdLife Hungary, Hungary; **Péchy, Tamás**, MME BirdLife Hungary, Hungary; **Molnár, Zoltán**, Budapest Zoo and Botanical Garden, Hungary; **Kunsch, György** , Budapest Zoo and Botanical Garden, Hungary; **Sós, Endre**, Budapest Zoo and Botanical Garden, Hungary; **Molnár, Viktor**, Budapest Zoo and Botanical Garden, Hungary

Hungarian meadow vipers (*Vipera ursinii rakosiensis*) use rodent burrows for hiding, and also over-wintering. Artificial burrows were developed to provide seminatural conditions in the outside enclosures of the Hungarian Meadow Viper Conservation Centre, running a breeding program in order to save this endangered snake species. The burrows were made of clay, and contain connection pipes and chambers, that is dig into the soil 80 cm deep, in a 45 degree angle. First year 18 vipers safely over-wintered in these artificial burrows. Next winter we checked the hibernating animals (39 individuals) by using a pipe-camera provided by REMS Hungary (flexible endoscopy). Picture quality made it even possible to identify certain animals. Most of the animals chose the deepest chamber, and only 3 snakes were found in one of the upper chambers. Five snakes were found solitary, all the other snakes formed aggregations of 2-4 animals. Several burrows were shared with newts (*Triturus vulgaris*), and in one occasion sand lizard (*Lacerta agilis*). These results suggest the possible use of common hibernacula by this snake species, a previously not observed phenomenon. The number of burrows, suitable for over-wintering, can be a limiting factor, therefore we started to test installation 'in situ' as well.

### 486. INVASION OF PINUS STROBUS IN THE BOHEMIAN SWITZERLAND NATIONAL PARK (CZECH REPUBLIC): CONSEQUENCES FOR THE NATIONAL PARK MANAGEMENT

**HÄRTEL**, **HANDRIJ**, Bohemian Switzerland National Park Administration, Czech Republic

White pine (Pinus strobus), an alien species of the Czech flora (native in the North America), has been cultivated in Europe since the beginning of the 18th century. The structure of natural plant communities in the sandstone rock area of the Bohemian Switzerland National Park in the Czech Republic has been dramatically changed by the invasion: P. strobus is able to overgrow native P. sylvestris and moreover, the vascular plants, mosses and lichens gradually completely disappear as a consequence of very dense and shady stands of P. strobus and of the thick detritus layer. Using the vegetation relevés (methods of the Zurich-Montpellier school) in comparable habitat types invaded and non-invaded rock forest vegetation has been compared statistically. The results confirmed statistically significant correlations between cover of P. strobus and decrease in abundance and cover of the native species in the herb and moss layers. The invasion of P. strobus in the Bohemian Switzerland National Park is a crucial problem for the national park management and represents a difficult dilemma between the natural succession concept for national parks (according to the IUCN criteria) on one hand and a need of permanent control of the P. strobus invasion on the other hand.

### 487. COEXISTENCE OF DIFFERENT DORMOUSE SPECIES (GLIRIDAE, RODENTIA) IN HUNGARY

**HECKER**, **KRISTÓF**, Szent István University, Institute of Environmental and Landscape Management, Hungary; **Bakó**, **Botond**, Ministry for Environment and Water, Hungary

Aim of this study was to find areas where the three dormouse species live together in Hungary: hazel dormouse (Muscardinus avellanarius), forest dormouse (Dryomys nitedula) and fat dormouse (Glis glis). These habitats are very important for the conservation of the species. We used data from museum collections, faunal publications, nest box colonies and own field work to show the areas where we found coexisting dormouse species. We proved dormouse species in 230 quadrats of the 10x10 km UTM grid in Hungary, from which in 51 we found hazel and fat dormouse, in 8 hazel and forest dormouse and in 16 all three species living in the same quadrat. These were form the mountainous parts of the country. Then we compared the common distribution map with the map of the forested areas of Hungary (CORINE – Land Cover). This comparison resulted that the quadrats where dormouse species occurred together were dominated mostly by sessile oak (Quercus petraea) but in some were only forests of locust (Robinia pseudo-acacia). This would mean that even woods with non-native tree species can provide good habitats for dormice.

### 488. MOLECULAR TRACKING OF CRANGONYX PSEUDOGRACILIS: REAL TIME ENVIRONMENTAL MODELLING OF AN ALIEN SPECIES' INVASION OF BRITISH WATERWAYS

**HEINZ**, **ELISE MICHELE**, Middlesex University, United Kingdom; **Kett**, **Steve**, Middlesex University, United Kingdom; **Naase**, **Mac**, Middlesex University, United Kingdom; **House**, **Margaret**, Middlesex University, United Kingdom.

Crangonyx pseudogracilis is one of several freshwater amphipod species currently invading slow-flowing and lentic waterbodies throughout Europe associated with widespread ecosystem deterioration. Since its initial UK colonisation its spread has been neither deliberately promoted nor curtailed, so this species presents an opportunity to examine phylogeographic consequences associated with invasion of an isolated but heterogeneous neutral aquatic milieu. This study uses microsatellite markers to reconstruct a genealogy and infer historical patterns of gene flow between populations and meta-populations. Phylogenetic trees will be constructed using distance and maximum parsimony methods, permitting determination of rate and extent of genomic differentiation occurring in relation to spatial and temporal isolation and specific environmental factors. GIS mapping in conjunction with multivariate analyses will be used to produce predictive models of likely future spread of C. pseudogracilis and other non-indigenous species with similar dispersal potential, and associated genomic consequences. Such models will enable detailed and effective predictions regarding invasive amphipod spread within European waterways, permitting quantified assessment of future colonisation risk and the targeting of management towards preservation of native species and ecosystem integrity.

### 489. RESTORATION OF EGRETS FORAGING HABITAT BY WINTER-FLOODED RICE FIELDS

**HIRAI**, **TOSHIAKI**, Tohoku University, Japan; **Ito**, **Toyoaki**, Tohoku University, Japan

The Kabukuri-numa marsh and its surrounding rice fields in Miyagi Prefecture of Japan were designated as a Ramsar site in November 2005 because they are both important over-wintering habitats for geese such as Anser albifrons. The rice fields are approxicimately 130 ha, and among of which 20 ha (15%) were winter-flooded for conservation of geese. During the present study, we found that winter-flooded rice fields are also important habitats for egrets foraging during summer. Two species of egrets (Egretta alba and E. intermedia) concentrated in the winter-flooded fields and fed predominantly on loaches (Misgurnus anguillicaudatus) there. Loaches occupied 80.3% and 67.4% in the diet of E. alba and E. intermedia, respectively. The density of loaches was five times higher in the winter-flooded fields than in the unflooded fields. The density of tubifexes (aquatic Oligochaeta) as potential prey for loaches was also five times higher in the winter-flooded fields than in the unflooded fields. From these results, it is suggested that mass occurrennce of tubifexes by winter-flooding greatly increased the number of loaches and consequently enhanced the quality of egrets foraging habitat.

### 490. EAZA CAMPAIGN FOR EUROPEAN CARNIVORES

**HJORT**, **PERNILLE**, Copenhagen University, Denmark

Background: The European carnivores have historically been eradicated from large areas of Europe. One species, the Iberian Lynx (Lynx pardinus) is critically endangered, and some populations of Brown Bear (Ursus arctos), Wolf (Canis lupus), Lynx (Lynx lynx) and Wolverine (Gulo gulo) are fragmented and endangered. Where large carnivores survive, they tend to occupy fragmented and human dominated landscapes, thus the future fate of the large carnivores depends on people's willingness to coexist with them at a local level. The EAZA Zoo members have 125 million visitors a year. This makes an EAZA campaign for European carnivores an ideal way to create awareness about predators in Europe, and the conservation activities needed and going on.
Aims: The campaign can help by linking science with policy and practice, because general public acceptance and knowledge about carnivores will put pressure on politicians and make future conservation projects less complicated. The campaign can help by collecting funds for conservation projects.
Method: Collect and present reliable biological, historical and anthropological data about the five big European carnivore species. Developed fact-sheets and examples from case-studies are used to make the conflicts between predators and people more accessible. New initiatives for education have been developed, eg. children problemsheets.

### 491. THE BIOLOGY, DISTRIBUTION AND CONTROL OF INVASIVE HERACLEUM SPECIES IN ESTONIA

**HOLM**, **BERT**, Estonian University of Life Sciences, Estonia; **Ööpik**, **Merle**, Estonian University of Life Sciences, Estonia

The presentation gives an overview on the biology, history and introduction of alien invasive Heracleum species and focuses on the methods and results of control tests and distribution data collection of these in Estonia. Finally it presents the Estonian long-term control strategy of these species. In former SU the main goal was to cultivate the Heracleum species for silage production. Elsewhere they where distributed mainly because esthetical characteristics, but the problems concerned with Heracleum species are similar anywhere. The elective spraying of the leaves of H. sosnowskyi with Roundup Bio generally did not cause the death of the plant similar to the cutting of the flowers in early flowering stage. The result of such spraying is the reduction of seed numbers and their germination rate but it is probably not enough to prevent replenishment of the seed bank. The cutting of flowers should be postponed until the formulation of first seeds. The distribution database of invasive alien Heracleum species in Estonia was put together and based on that the control strategy was composed. The main methods are glyphosate-based herbicide spraying and cutting the roots of plants. As the less intensive methods the ploughing and collecting of seeds after maturation are recommended. The predicted cost of control programme is given.

### 492. IN VITRO CONSERVATION OF SOME ROMANIAN RARE PLANTS

**Holobiuc**, **Irina**, Institute of Biology, Bucharest, Romania, Romania; **Blindu**, **Rodica**, Institute of Biology, Bucharest, Romania, Romania

In Romania, the number of the recorded plants species with different degree of vulnerability is over 1400. The diminishing of the genetic resources of the plants strongly imposed the development of new conservation techniques. In the case of the endangered plant species with reduced number of individuals, seed sterility and low intrapopulational variability, the in vitro techniques represent the only viable conservation method. The species studied were: Dianthus callizonus Schott et Kotschy, Dianthus tenuifolius Schur, Cerastium transsilvanicum Schur, Dianthus spiculifolius Schur., Dianthus superbus L. ssp. alpestris Kablik ex Celak., Dianthus glacialis subsp gelidus (Schott,Nyman et Kotschy) Tutin (Fam. Caryophyllaceae), Hieracium pojoritense Wol., Artemisia tschernieviana Besser, Doronicum carpaticum (Griseb. et Schenk) Nyman, D. orientale Hoffm.(fam. Asteraceae), Primula halleri J.F. Gmelin (fam Primulaceae), Veronica multifida L. ssp capsellicarpa (Dubovik) A. Jelen (fam Scrophulariaceae), Astragalus pseudopurpureus Gusul. (fam Fabaceae), Campanula carpatica Jacq. (fam Campanulaceae), Armeria maritima ssp. alpina Willd.(fam. Plumbaginaceae). In all species studied were performed aseptic tissue culture, the in vitro reactivity and behaviour were different. There were established efficiently in vitro micropropagation protocols. For the species with high multiplication rates, medium-term conservation methods were elaborated. In vitro plant material represents the start point of rare species ex situ collection.

### 493. TRAFFIC PASSAGES IN THE LANDSCAPE PARK GORICKO (SLOVENIA): THEIR FUNCTION AND USE BY EURASIAN OTTER (LUTRA LUTRA)

**HÖNIGSFELD ADAMIC**, **MARJANA**, LUTRA, Institute for Conservation of Natural Heritage, Slovenia

Eurasian otter (Lutra lutra) is endangered mammal species, listed in Appendix II of the EU Bern Convention (82/72/EEC) as well as in Annex II and Annex IV of the EU Habitats Directive (92/43/EEC). The high sensitivity of the area Goricko and presence of natural values, among them also European otter, were powerful arguments enough to demand monitoring process for European otter and its habitats during and after construction works (5 years, 1998 - 2003) for a new railway. Different mitigation measures for benefit of the otters were proposed: a long underpass along the watercourse running under the railway station, dry shelves, stones and rocks along the underpasses, etc. The use of the traffic structures (bridges, underpasses) belonging to new built railway and those belonging to the parallel road passages was monitored using standard method on average periods of two month. Not only structures designed especially for otters were immediately and regularly used by the otters, they also took the advantage of some structures designed for other species. There was no significant difference in otter behavior before and after the disturbances. The otters have disappeared only for the time of the most extensive works and returned immediately after the disturbance ceased.

### 494. DIVERSITY AND CONSERVATION SITUATION OF CAVE-DWELLING BATS IN CHIAPAS, MEXICO

**HORVÁTH, ANNA**' El Colegio de la Frontera Sur (ECOSUR), Department of Terrestrial Ecology and Systematics, Mexico; **Aguirre-Bonifaz, Yuridia**, El Colegio de la Frontera Sur (ECOSUR),Department of Terrestrial Ecology and Systematics, Mexico; **Chávez-Gloria, Carlos**, El Colegio de la Frontera Sur (ECOSUR), Department of Terrestrial Ecology and Systematics, Mexico; **Martínez-Castellanos, Rafael**, Instituto Montebello, Mexico; **Pérez-Macías, Oscar**, El Colegio de la Frontera Sur (ECOSUR), Mexico; Department of Terrestrial Ecology and Systematics, **Vidal-López, Roberto**, Instituto de Historia Natural y Ecología (IHNE), Dirección de Investigación, Mexico

Caves are essential refuges for many species of bats. Near 50% of the 134 species of bats in Mexico occupy caves for diurnal refuge and reproduction sites. The goal of our work was to determine cave-dwelling bat diversity and the situation of caves in the Montebello and Selva Lacandona regions, south of Mexico. 30 caves were surveyed during a two year period, realizing diurnal visits inside the caves to observe roosting bats, using visual searching and a bat detector. We took information of humidity and temperature and also evaluated the conservation conditions of each cave. We capture emerging and returning bats at night in the entrance and inside the caves. We find 27 species of five families (Emablonuridae, Mormoopidae, Phyllostomidae, Vespertilionidae, Molossidae) using caves which represent nearly 50% of the bat fauna known for the area. Our results show that the largest caves shelter the highest bat diversity (15 species); and probably due to their location and

large entrances, these caves also present the most intense human disturbances, mostly religious use by the local people. The humidity and temperature were not determinant factors in bat diversity. Caves are an important refuge for the majority of bat species in the area and due to the intense human use of this habitat, cave conservation must be a priority in the regional development planning.

### 495. ECOLOGICAL TREE CHARACTERS OF A NEAR-NATURAL OAK FOREST (VÁR-HEGY FOREST RESERVE, HUNGARY)

**HORVÁTH**, **FERENC**, Institute of Ecology and Botany, Hungarian Academy of Sciences, Hungary; **Bölöni**, **János**, Institute of Ecology and Botany, Hungarian Academy of Sciences, Hungary; **Mányoki**, **Gergely**, University of Pécs, Hungary; **Mázsa**, **Katalin**, Institute of Ecology and Botany, Hungarian Academy of Sciences, Hungary; **Jelitai**, **Edit**, Hungary; **Aszalós**, **Réka**, Institute of Ecology and Botany, Hungarian Academy of Sciences, Hungary

In the 1970s and 80s a serious oak decay occured throughout the pannonic xero-mesophil hilly oakwoods of northern Hungary, which induced remarkable changes in stand structure. Designation of strict forest reserves in the 90s gave an opportunity to study changes of stand structure of these old, unmanaged forests have been left for free development since the 80s. The aim of the study was to describe ecological stand structure of the sessile oak, turkey oak (Quercus petraea, Q. cerris) dominated forest. Samples on stand structure were taken in 216 sampling points of „FOREST+n+e+t", with attributes of tree individuals: as geographical position, species identity, dbh (=5 cm), social category according to Kraft, shape features, health condition, estimation of dead wood and decay phases; and of stand characteristics. The trees through their lifecycle, according to their age, growing and health condition has different demands on ecological conditions and quantity of resources, and provide different kind and amount of resources and habitats to other livings, ie. fulfill different ecological roles within the forest stand. Therefore an ecological analysis and classification of each tree individuals (about 7700) were done. The trees were classified into twelfe „ecological tree characters" like as „healthy giant".

### 496. SPATIAL PATTERN OF SMALL MAMMALS IN PROTECTED FOREST AND REFORESTATION AREA

**HORVÁTH**, **GYŐZŐ**, University of Pécs, Hungary; **Csonka**, **Gergely**, University of Pécs, Hungary; **Kardos**, **Roland**, University of Pécs, Hungary; **Sárfi**, **Nikoletta**, University of Pécs, Hungary; **Mányoki**, **Gergely**, University of Pécs, Hungary; **Molnár**, **Dániel**, University of Pécs, Hungary

Small mammals are adequate temperate forest indicators for detecting habitat changes and fragmentation due to logging, and for tracing effects of replanting and spontaneous forest regrowth. Research was performed in two plots in Lankóci-erdo (South-Hungary): Grid A — strictly protected, closed alder gallery-forest (Paridi quadrifoliae-Alnetum); Grid B — neighbouring reforestation area. Small mammals were captured in two 1-ha grids (11x11) using CMR. For describing vegetation we used transects, quadrats and plots (4 & 100 m2), estimating and characterising understorey vegetation and canopy at trap stations. We investigated small mammal space use as a function of vegetation structure, and also seasonal migration and habitat changing. Small mammal community was richer in the reforestation area, dominant species determining the structure of the communities in both areas. The spatial pattern of the existing three character species (Apodemus agrarius, Apodemus flavicollis, Clethrionomys glareolus) was determined by differences in vegetation coverage of different levels, and by temporal changes in population sizes. Migration to another habitat was observed in the two Apodemus species in autumn, whereas bank vole emigration from the closed forest due to population growth caused partial population translocation to the reforestation area. Striped field mice preferred high-coverage patc

### 497. IDENTIFICATION OF TEMPORARY SETTLEMENT AREAS OF NON-BREEDING IMPERIAL EAGLES IN HUNGARY

**HORVÁTH**, **MÁRTON B.**, MME BirdLife Hungary, Hungary; **Kovács**, **András**, MME BirdLife Hungary, Hungary; **Demeter**, **Iván**, MME BirdLife Hungary, Hungary

Nonbreeder juveniles and immatures of several raptor species are spending most of their time on some relatively small, well-defined temporary settlement areas. Our objective was to prove that such temporary settlement areas of the globally threatened Imperial Eagle Aquila heliaca are existing in Hungary. We targeted to define and localise the most important settlement areas, where conservation efforts should be increased. We have used four different GIS databases for the identification process: 1) monitoring database, with almost 3000 observations of immature birds; 2) ringing-recovery database, with 56 recoveries of injured or dead immature birds; 3) satellite tracking database, with almost 1000 locations of 8 tagged juveniles; 4) radio tracking database, with 241 locations of 15 tagged juveniles. We have used the 2,5 km x 2,5 km UTM grid to localise the most important areas. Based on the four databases we have classified the 15216 UTM squares of Hungary to five categories of importance and defined the borders of the most important temporary settlement areas. The identified areas have key importance of conservation of Imperial Eagles in Hungary, since their local threatening factors are influencing mostly the survival rate of nonbreeders, therefore the recruitment rate of the breeding population.

### 498. EFFECT OF GRAZING ON SPIDERS AT THE HORTOBÁGY NATIONAL PARK IN HUNGARY

**HORVÁTH**, **ROLAND**, University of Debrecen, Hungary; **Szalkovszki**, **Ottó**, University of Debrecen, Hungary; **Szinetár**, **Csaba**, Berzsenyi College, Hungary; **Tóthmérész**, **Béla**, University of Debrecen, Hungary

The effect of grazing on the assemblages of ground-dwelling spiders were studied by pitfall traps at the Hortobágy National Park. There were two research site, characterized by different grazing regimes: (1) Angyalháza was intensively grazed by sheep, while (2) Pentezug was grazed by horses and native cattles. There were four vegetation types in both area (salt meadow, salt stepp, salt stepp with open soil surface, and degraded salt stepp). Traps were emptied from April until October during 2004 every 3 weeks. There were 8 traps in each vegetation type. During the study we trapped 82 spider species and 4363 individuals. The following rare species were identified (Gnaphosa rufula, Micaria rossica, Titanoeca veteranica). The ordination of the spider assemblages showed that the spider assemblage was different at the intensively grazed site. The indicator species analysis (IndVal) revealed that there are significant character species for both sites; the following species were significant character species for the grazed areas: Lycosa singoriensis, Haplodrassus dalmatensis, Meioneta rurestris, while Haplodrassus signifier, Trachyzelotes pedestris, Pachygnatha degeeri, Alopecosa pulverulenta, Drassyllus lutetianus were significant character species for the moderately grazed sites.

### 499. HISTORICAL FRAGMENTATION AND ITS EFFECTS ON MITOCHONDRIAL GENETIC DIVERSITY IN ISLAND POPULATIONS OF PODARCIS ERHARDII

**Hurston, H**., University of New Orleans, U.S.A; **Bonanno, J**., University of New Orleans, U.S.A; **Foufopoulos, J**., University of Michigan, U.S.A.; **Valakos, S**., University of Athens, Greece; **Pafilis, P**., University of Athens, Greece ; **ANTHONY, N**., University of New Orleans, U.S.A

Late Pleistocene land bridge islands in the Aegean make ideal natural experiments, especially when the fragmentation

sequence and time since isolation can be deduced from known sea level rises. We predict that island age, island area and distance to the nearest land mass will have an effect on genetic diversity and potentially compromise evolutionary potential. The Aegean rock lizard *Podarcis erhardii* was selected as our model organism because it is widely distributed throughout the Aegean islands and is believed to be a very poor disperser, making it a sensitive indicator of fragmentation history. If over water dispersal is limited, then younger, larger islands will have more genetic diversity than older, smaller islands. In order to address these predictions we sequenced 400 bp fragment of cytochrome b from 15-20 individuals from 13 islands. Preliminary analyses indicate that larger islands retain a greater amount of genetic diversity than smaller islands, with many small islands fixed for one haplotype. Ectoparasite loads also appear higher in older islands, consistent with the hypothesis that loss of genetic variation in old, isolated populations may compromise parasite resistance. Due to the lack of adequate resolution, future work will use microsatellite markers to quantify the underlying genetic variation within populations that mitochondrial sequences are unable to resolve.
The project is co-funded by the European Social Fund and National Resources (EPEAEK II) PYTHAGORAS.

### 500. DISRUPTIVE INFLUENCE OF ALIEN SPECIES AND EUTROPHICATION ON LITTORAL INVERTEBRATE COMMUNITIES IN THE EASTERN BALTIC SEA

**Ia**, **Tsyplenkina**, Zoological Institute of RAS, Russian Federation; **Gubelit**, **Julia**, Zoological Institute of RAS, Russian Federation; **Pankova**, **Elizhabeth**, St-Petersburg State University, Russian Federation

Littoral zone of the easternmost part of Baltic Sea, the Neva Estuary, being very productive zone for feeding of fish and birds, is strongly influenced by “macroalgal blooms” and invasive species. Littoral communities were monitored in order to assessment of effect by the unfavorable factors on invertebrates. Recent invaders to the Neva Estuary, the amphipods Gmelinoides fasciatus and Pontogammarus robustoides are dominant species in the terms of biomass, averaging locally to 73 % of total benthic biomass. During temporary hypoxia (0.62–2.8 mgl-1) in littoral habitats due to decomposition of drifting filamentous algae (mainly Cladophora glomerata), 4-10-fold decreases in abundance of amphipods, oligochaetes and aquatic insects were recorded. We conclude that intensive eutrophication in littoral zone of the Neva Estuary can negatively affect abundance of intolerant species and structure of invertebrate community through deterioration of oxygen conditions and increase of nutrients during decomposition of drifting algae (July-August). In addition, densities of benthic invertebrates (oligochaetes, isopods and insects) were related to densities of the invasive species at different habitats of the estuary. At amphipod densities >10 000 ind.m-2, the densities of other benthic invertebrates were very low (50-300 ind.m-2). The predation by invasive amphipods is another factor affecting invertebrate communities.

### 501. POPULATION SIZE AND DISTRIBUTION MODELLING FOR THE ENDANGERED CANARY ISLANDS STONECHAT: IS THE ACTUAL SPA NETWORK ENOUGH TO GUARANTEE ITS SURVIVAL?

**Illera**, **Juan Carlos**, University of East Anglia, United Kingdom; **Seoane**, **Javier**, Universidad Autónoma De Madrid, Spain

The Canary Islands stonechat (Saxicola dacotiae) is a narrow-range bird species endemic to the semiarid island of Fuerteventura. The goal of this study was to update the status of this species and to develop predictive distribution maps, in order to ascertain whether the actual SPA network is enough to support the main suitable habitats of this bird. During the stonechat’s breeding period we performed 1067 random 500m line-transects. We then used distance sampling techniques to estimate the number of individuals living in Fuerteventura. We also modelled the distribution and abundance of the Canary Islands Stonechat over the whole of Fuerteventura (to a 1 km2 spatial resolution) using a common set of predictor variables. Generalized additive models (GAMs) were built with the presence-absence and abundance of the species as the response variables. The design-based estimate of population size is 5,179 individuals. After comparing the actual SPA network with our models of distribution and abundance we detected that around 60% of suitable areas for the Canary Islands Stonechat are now outside of the SPA network. Because of increasing destruction and alteration of suitable habitats a move to include these areas in the SPA network seems urgent in order to guarantee the survival of this bird species in a short time.

### 502. CONSERVATION METHODS OF HUNGARIAN NATIVE ORCHIDS AND IDENTIFICATION OF SYMBIOTIC MYCORRHIZAL FUNGI

**ILLYÉS**, **ZOLTÁN**, Eötvös Loránd University, Hungary; **Eszéki**, **Eszter**, Eötvös Loránd University, Hungary; **Ouanphanivanh**, **Noémi**, Eötvös Loránd University, Hungary; **Garay**, **Tamás**, Eötvös Loránd University, Hungary; **Halász**, **Krisztián**, Corvinus University of Budapest, Hungary; **Geösel**, **András**, Corvinus University of Budapest, Hungary; **Lukács**, **Noémi**, Corvinus University of Budapest, Hungary; **Bratek**, **Zoltán**, Eötvös Loránd University, Hungary

Germination and cultivation of native Hungarian orchids as well as isolation and identification of the symbiotic fungi are part of our research activity. Studied orchid species are: Anacamptis pyramidalis, Cypripedium calceolus, Dactylorhiza incarnata, D. maculata, D. majalis, Epipactis atrorubens ssp. borbásii, E. cf. bugacensis, E. helleborine, E. microphylla, E. palustris, Gymnadenia conopsea, Hammarbya paludosa, Liparis loeselii, Ophrys scolopax, O. sphegodes, Orchis coriophora, Orchis laxiflora ssp. palustris, O. morio, O. purpurea, Platanthera bifolia. Asymbiotic germination and cultivation experiments with 17 species are carried out. One of the most important aim of the substrate (mod. MS, mod. Fast, Debergh) optimalisation was to reduce the level of poliphenols. Symbiotic fungi were isolated and identified on 10 species with different methods: direct identification by sequencing the PCR amplified fungal ITS from orchid root, isolation from root-segments or pelotons from adult plants and from protocorms. Molecular taxonomic examination based on the nrITS sequence were done in more than 80 of the 300 Rhizoctonia-like isolates. ITS sequences examinated were highly similar to sequences of the genera: Tulasnella, Ceratobasidium, Thanatephorus, Sebacinaceae. Symbiotic germination were carried out with 13 species on fungal (mod. PDA) and symbiotic medium (mod. Pfeffer agar).

### 503. THE STATUS BIRDS CONSERVATION STATUS IN CEAHLAU NATIONAL PARK (ROMANIA)

**ION**, **CONSTANTIN,** University “Al. I. Cuza” Iasi, Faculty of Biology, Zoology- Ecology Department, Romania, **Ion, Iordache,** Romania

The scope of our work was to estimate and monitories the conservation status of birds in Ceahlau National Park (situated in Oriental Carpathians Mountains). We used visual and auditiv transects methods for our study, between 2000- 2006. We inventoried 122 species of birds, which represent one of the greatest diversity from our Romanian national parks. 45 species are mentioned in Birds Directive annexes of European Committee, which show the big importance of Ceahlau Mountain as a breeding and rest area for vulnerable species of birds. Unfortunately, in the last two year the birds’ life is threatened by increasing of uncontrolled tourism, building of illegal constructions and chaotic cut of trees. We consider that is immediately need to exists a strong connection between Administration, NGOs, Forestry Department, Tourism Factors for stop degradation of conservation status birds in Ceahalu National Park.

**504. MODERN STATUS OF THE WHITE-BACKED WOODPECKER DENDROCOPOS LEUCOTOS IN EUROPE AND SUCCESS FOR A NEW METHOD FOR THE RESTORATION OF THREATENED POPULATIONS**

**IOVCHENKO**, **NATALIA P.**, Biological Institute of St. Petersburg University, Russian Federation

The White-backed Woodpecker is declining or endangered in most areas in Europe. The species is threatened not only as a result of habitat loss, but also because the populations are too small, and sparsely distributed with little inter-population exchange. The transfer and introduction of birds has become urgent for the protection of such populations. On account of some aspects of its biology and behaviour the most reliable way is the use of hand-raised birds. In 2000, we took 2 nestlings in order to hand-raise them and to check the potential to introduce them into wild populations. Both birds were successfully raised. One of them was given to Moscow Zoo and another female was released in April 2002. It formed a pair with a free-living male and they successfully raised young. The pair bred at the same territory in 2003 and 2004 too. We elaborate all the problems and techniques of this method from taking the nestlings up to releasing the bird into the wild. Hand-raised birds can serve to increase numbers and establish normal sex-ratio of extant populations, and create new territories where a species has disappeared. The method may improve the viability of small, especially isolated populations, which are always threatened owing to the loss of genetic variability and the negative effects of in-breeding. The results of our study are useful also for breeding birds in captivity.

**505. ATTITUDES TOWARD CONSERVATION AND ANIMAL CONTROL – A SURVEY OF SWEDISH PUBLIC OPINIONS**

**ISAKSSON**, **DANIEL**, Göteborg University, Sweden; **Wallander**, **Johan**, Göteborg University, Sweden; **Lundqvist**, **Lennart**, Göteborg University, Sweden; **Andersson**, **Malte**, Göteborg University, Sweden

Protection of threatened species relies on biologically sound management methods and on public acceptance of these methods. Management sometimes includes controlling populations of certain species in order to increase populations of other species. Such methods may be considered controversial, and it is important to be aware of public attitudes toward these actions. We surveyed the Swedish public's attitudes towards conservation and animal control. In late 2004, mail surveys were sent out to 3000 individuals and the response rate was 64%. Over 70% of the respondents agreed that all threatened animals should be actively protected. In addition, support for control was higher if an animal posed a threat to a threatened species (66% support) or to traffic (66%), than if it posed a threat to domestic cattle (58%) or to game species (21%). When asked to what extent we should control twelve listed animals, the support for control varied greatly. There was low support for controlling foxes (12%) and badgers (17%), but higher support for controlling crows (33%), gulls (28%), and mice and rats (68%). The use of non-lethal control methods was not supported if those methods are more expensive than traditional lethal methods. We conclude that there is public support for using animal control in Sweden as a management tool to protect threatened species.

**506. PHYLOGENETIC LINEAGES OF BROWN TROUT IN GACKA RIVER, CROATIA**

**JADAN**, **MARGITA**, Ruder Boškovic Institute, Croatia; **Což-Rakovac**, **Rozelindra**, Ruder Boškovic Institute, Croatia; **Hacmanjek**, **Mato**, Ruder Boškovic Institute, Croatia; **Strunjak-Perovic**, **Ivancica**, Ruder Boškovic Institute, Croatia; **Topic-Popovic**, **Natalija**, Ruder Boškovic Institute, Croatia

Genetic variation of brown trout, Salmo trutta L., has been extensively studied throughout Europe. Such studies have demonstrated five distinct phylogenetic lineages defined by mitochondrial DNA (mtDNA) control region sequences. Croatia is an important geographic region where no systematic studies of genetic variation have been made. MtDNA control region variation from 9 individuals originating from Gacka River were analysed, in order to assess their phylogenetic lineages affiliation, and address the question of autochthony of populations in the river. Based on a sequencing of the 334 bp fragment at the 5 end of the mtDNA control region, two haplotypes were identified. Although Gacka River is a part of the Adriatic drainage, 4 individuals (45) were assigned to Atlantic haplotype Ad1 and 5 individuals (55) were assigned to Danubian haplotype Da2. The presence of Atlantic and Danubian haplotypes primarily reflects introgressioon stemming from the stocking of hatcheryreared fish, although natural status could not be excluded. These results are of great importance for future adequate management and conservation of natural brown trout populations in this region.

**507. LANDSCAPE MATRIX AND TOAD PRESENCE: TOWARD A TOOL FOR ASSESSING CONNECTIVITY EFFECTS**

**Janin, Agnes**, Lyon1 University, Ecology of Fluvial Hydrosystems, France; **Lena, Jean-Paul**, Lyon1 University, Ecology of Fluvial Hydrosystems, France; **Delacourt, Christophe**, Lyon1 University and Ecole Normale Supérieure de Lyon, Earth Sciences, France; **Allemand, Pascal**, Lyon1 University and Ecole Normale Supérieure de Lyon, Earth Sciences, France; **JOLY, PIERRE**, Lyon1 University, Ecology of Fluvial Hydrosystems, France;

The complex life cycles of most European anurans leads to seasonal migrations between terrestrial and aquatic habitats. We took advantage of these migrations to investigate the impact of landscape configuration on presence at a given pond. The principle of the study was to weight the migration potential of an individual according to the resistance of each habitat type and to draw potential migration areas around each studied pond. We worked with the common toad. We assigned to each landscape patch a type of land use by analysing Asters satellite photographs by means of an Arcview SIG. By attributing a resistance coefficient to each type of land use, we established friction maps from which we drew potential migration areas. Resistance coefficients were selected through model calibration using 150 ponds from southwestern France. We then validated the model by predicting the presence of toads in ponds with resistance coefficient selected with other ponds (crossed validation).
This procedure allowed us to successfully assess the impact of landscape on toad presence by using a tool that is transposable to services in charge of landscape management. This tool could be extended to wider connectivity problems and could be used for a sustainable management of landscapes.

**508. THE REMOVAL OF ILLEGALLY INTRODUCED POPULATIONS OF SIGNAL CRAYFISH IN WEST SWEDEN**

**JANSSON**, **TOMAS**, Rural Economy and Agriculture Societies of county Värmland, Sweden; **EDSMAN**, **LENNART**, Swedish Board of Fisheries, Sweden

In the Swedish counties Värmland and Dalsland there are still homogenous areas with relatively numerous native noble crayfish populations remaining. Legal introductions of the crayfish plague-carrying, North American signal crayfish are few. In this region, bordering Norway, a Swedish Norwegian INTERREG-project is actively working with conservation and sustainable use of the noble crayfish. In the last years many illegal introductions of signal crayfish, carrying crayfish plague, have been discovered. These introductions are close to viable populations of noble crayfish, thus threatening conservation work. Eradication of unwanted crayfish populations is generally known to be very difficult, but some of these introductions are known to be very recent and the populations are not established. We present methods and results from three cases, where chock liming to raise pH and intensive fishing efforts have been utilised, to try to heavily suppress or eradicate the populations of

signal crayfish and remove the threat for the noble crayfish in the area. Initial results are positive although treatments probably have to be repeated to be successful.

### 509. IMPACTS OF A CONCENTRATED FOOD RESOURCE ON SOCIAL AND SPATIAL ORGANIZATION THAT MAY INFLUENCE DISEASE TRANSMISSION IN THE BLACK-BACKED JACKAL.

**JENNER**, **NICOLA**, Institute of Zoology (ZSL), United Kingdom

Over the last decade, an increasing number of emerging infectious diseases have been reported, but there is a significant lack in understanding processes of emerging disease transmission in wildlife and the ecological parameters governing them. Black backed jackals (Canis mesomelas) are an important vector for disease and are susceptible to pathogens including rabies and canine distemper virus (CDV). Despite jackal abundance across Southern Africa, very little is known about ecological parameters that drive ecological flexibility, and consequences for social and spatial organization, parameters presumed to influence disease transmission and pathogen persistence. On the Skeleton Coast in Namibia jackals feed primarily on Cape fur seals. Densities are exceptionally high near seal colonies allowing pathogens to circulate with high prevalence. By conducting behavioural observations and GPS tracking of focal groups I tested the relative importance of a concentrated resource in determining spatial (territoriality, home range) and social organization (group size, composition). Results indicate that the food resource is critical in determining home range and group size, however, kinship is also an important driver. This research highlights the importance of investigating host behaviour and spatial organisation as a means of determining susceptibility to and impacts of emergent disease.

### 510. EMPETRUM NIGRUM SSP. NIGRUM IN IBERIAN PENINSULA. HABITAT SUITABILTY MODELS AS A TOOL FOR CONSERVATION AND MANAGEMENT

**JIMÉNEZ-ALFARO**, **BORJA**, Universidad de Oviedo, Spain; **Bueno Sánchez**, **Alvaro**, Universidad de Oviedo, Spain; **Fernández Prieto**, **José Antonio**, Universidad de Oviedo, Spain

Empetrum nigrum ssp. nigrum is a circumboreal plant, which distribution area spreads over main european mountains. In Iberian Peninsula this plant is only located in cantabrian mountains, and four populations are currently known, living in high slopped peaks, close to several ski resorts. Looking for new populations is a very difficult role, and future conservation plans will need adecuate cartography to be developed. Thereby, habitat suitability models can be used as an effective tool for conservation. We mapped all populations using GPS, and presence/absence data was collected whitin the extent of presence of the plant. A broad approach was used to define suitable areas for the plant in cantabrian range, by using DOMAIN and GARP algorithms with GIS and only presence data for 1x1 km grid, using WORLDCLIM model as climate variables. A fine-scale approach (15 meters grid) was also developed, by using topographic variables and logistic regression method (GLM). We determine the dependence of the plant to some restrict environmental factors at both scales. Climatic changes and specifical habitats (derived by pleistocene glaciations) were defined as main threat factors for the plant. An habitat suitability map was finally performed, in order to be used for management plans.

### 511. AREAS OF ENDEMISM IN CANTABRIAN MOUNTAINS (NORTH SPAIN). RELATION WITH NATURAL RESERVES NETWORK

**Jiménez-Alfaro**, **Borja**, Universidad de Oviedo, Spain; **BUENO SÁNCHEZ**, **ALVARO**, Universidad de Oviedo, Spain; **Fernández Prieto**, **José Antonio**, Universidad de Oviedo, Spain; **Alonso Felpete**, **Ignacio**, Universidad de Oviedo, Spain

Cantabrian mountains include several massifs with altitudes over 2.000 meters, which have been traditionally considered as centers of speciation in this area. Current biogeography have been stablished in order to this premise, and different biogeographical units identified in correspondence with historical floristic relationships. However, neither quantitative nor spatial analysis have been developed in this territory, or applied in conservation activities. We used GIS tools to define areas of endemism (AOE) in cantabrian range, in order to be linked with present natural reserves network. We used distribution data of 70 cantabrian plant endemisms by using a 10x10 km squares grid. Areas of endemism were estimated from two perspectives. First, an endemism density per grid unit was used to create a density GIS layer. Second, affinity and relationships among different areas were analyzed from a presence / absence matrix, performing a parsimony analysis of endemicity (PAS), and parsimonious cladograms used to define a second GIS layer. Afterwards, both map layers were crossed to natural areas network in the territory. Resultant maps show strong correlations between areas of endemism and present natural reserves, but different conservation levels of nature reserves are not correlated to endemic hotspots relevance.

### 512. RARE PLANT GLADIOLUS IMBRICATUS RESPONSES TO COASTAL AND RIVER FLOODPLAIN MEADOW MANAGEMENT

**JÕGAR**, **ÜLLE**, University of Tartu, Estonia; **Moora**, **Mari**, University of Tartu, Estonia

Due to the abandonment of traditional small-scale farming, the number and size of semi-natural grasslands have dramatically declined in Europe and plant species of semi-natural grassland communities are therefore faced with habitat loss, population fragmentation and isolation. In two separate management experiment, the effect of biomass removal (grazing, mowing (hand vs. machinery), spring burning) in comparison with non-managed control was estimated on the natural population density and life stage structure (in coastal meadow) and experimentally added seed recruitment (in river floodplain meadow) of a rare species Gladiolus imbricatus. The population density increased in response to the mowing treatment but not in response to the grazing. All management regimes shifted the population structure towards a dynamic state where juvenile stages dominate, while the unmanaged control retained regressive population structure. All mowing treatments increased the seed recruitment compared with spring-burning and non-managed treatment in river floodplain meadow. We conclude that mowing is an optimal management regime for G. imbricatus in both, coastal-and river floodplain meadow. However, since extensive mowing of meadows is not sometimes possible for technical or socio-economic reasons, alternation of mowing and grazing in the same areas may contribute to improved status of G. imbricatus.

### 513. EIGHTEEN YEARS OF TREE MORTALITY AND STRUCTURAL CHANGE IN AN EXPERIMENTALLY FRAGMENTED NORWAY SPRUCE FOREST

**JÖNSSON**, **MARI**, Mid Sweden University, Sweden; **Fraver**, **Shawn**, Mid Sweden University, Sweden; **Jonsson**, **Bengt Gunnar**, Mid Sweden University, Sweden; **Dynesius**, **Mats**, Landscape Ecology Group, Uminova Science Park, Umeå University, Sweden; **Rydgård**, **Mats**, The County Administration of Västra Götaland, Sweden; **Esseen**, **Per-Anders**, Umeå University, Sweden

In 1986 five circular forest fragments (1/16, 1/8, 1/4, 1/2 and 1 ha) were isolated through clearcutting within an old-growth Picea abies forest in northern Sweden. Results from 1986 to 1991 were previously published, showing very high tree mortality and structural degradation of the fragments (Esseen, 1994). In the present study we re-inventoried these fragments to evaluate mortality patterns and structural changes occurring from 1991 to 2004. Mortality rates remained elevated (2.0%) compared to control plots in nearby unfragmented forest (mean 0.7%). Mortality was independent of fragment size or spatial distribution of trees within fragments, but increased with increasing tree

diameter, resulting in smaller-diameter, more homogenous stands. Standing death (45% of dead trees, 1991-2004) replaced uprootings (72%, 1986-1991) as the dominant mode of mortality. Numbers of poor-vigor trees, dying trees, and standing dead trees increased in fragments. Results show that the adverse edge-related changes to forest structure and function persist eighteen years following isolation of small fragments. Elevated tree mortality resulted in increased coarse woody debris deposition and an overall loss of structural diversity within the living-tree component. The forest fragments largely fail as remnants intended to maintain interior conditions, but may function as valuable tree retention patches, providing structural diversity to the regenerating forest.

### 514. TOPOLOGICAL CONSTRAINTS ON THE DYNAMICS OF WASP-WAIST ECOSYSTEMS

**JORDÁN**, **FERENC**, Collegium Budapest, Hungary; **Wyatt**, **Tim**, Consejo Superior de Investigaciones Científicas, Instituto de Investigaciones Marinas, Spain; **Liu**, **Wei-Chung**, Insititute of Biomedical Sciences, Acdemia Sinica, Taiwan

Small pelagic fish species like anchovy or sardines are of high ecological and economical importance. As marine food webs are fished down, these small pelagics tend to be more exploited and overfished. It is not yet very well known what the possible effects of their collapse can be, therefore there is an urgent need to outline a theoretical framework for understanding their dynamics. These fish occupy very special position in food webs, ensuring energy transfer between speciose lower and higher levels, while forming narrow “wasp-waists” poor in number of species. Our purpose was to quantify the interaction structure of model food webs of equal complexity but different levels of „wasp-waistedness”. We analysed the topological properties of the webs by characterising every direct and indirect interactions between individual species, as well as by assessing the relative positional importance of each species in each web. We found that (1) if longer indirect chain effects are considered, indirect effects can well be stronger than direct ones, and (2) interactions between coexisting wasp-waist species are stronger than the average. Based on the topological properties of the networks, our results describe constraints acting on the dynamical behaviour of wasp-waist ecosystems.

### 515. HABITAT SELECTION OF THE EURASIAN OTTER *LUTRA LUTRA* IN FISHPONDS IN THE HORTOBÁGY NATIONAL PARK IN EASTERN HUNGARY

**JUHÁSZ, KRISZTINA**, Department of Hydrobiology, University of Debrecen, Hungary; **Végvári ,Zsolt**, Hortobágy National Park Directorate, Hungary; **Nagy, Sándor Alex**, Department of Hydrobiology, University of Debrecen, Hungary

The Eurasian Otter is a strictly protected predator species of key conservational importance in Hungary, therefore it is highly important to study its habitat selection strategy. The habitat selection of this species was studied in 34 active fishponds of nearly 3,000 hectares.
During the field study 19 numeric variables of each fishpond, as well as seven categorical variables were recorded. The independent variable was the number of otter tracks per total dyke length for each fishpond. In order to reduce the number of numeric variables principal components analysis was performed on the above-mentioned 17 variables. As a result, five independent factors with eigenvalues greater than 1.00 were extracted. The effects of these variables on the dependent variable was analysed by computing Spearman’s correlation coefficients. The effects of categorical variables were analysed by performing Mann-Whitney test. As a result, the density of otter tracks was positively, significantly correlated with a factor with its maximum in smaller fishponds with a high density of young fish in the wintering ponds. Besides the density of otter tracks was significantly higher far from human sttlements, indicating the importance of active fishponds situated in national parks in the conservation of this species.

### 516. SELECTION OF DEN SITES BY WOLVES IN FINLAND

**KAARTINEN**, **SALLA**, Finnish Game and Fisheries Research Institute, Finland; **Kojola**, **Ilpo**, Finnish Game and Fisheries Research Institute, Finland

Newborn survival is an important parameter in mammalian population dynamics and dens are essential for the successful raring of offspring. We examined the selection of den sites by expanding wolf population in Finland. We found 26 dens belonging to 12 packs where at least one wolf had been collared as part of a long-term ecological study of the wolves in the study area. One den for each pack was randomly selected for further analysis. Our focus was on the location of dens in terms of their distance to human constructions such as buildings and roads, also natural factors were considered. We expected denning sites to be located further away from human constructions than the random sites and aggregated towards the centre of the territory. We also expected to find some kind of preference for certain forest types. We found that den sites were not located in certain forest types and the distance to human constructions was not a significant factor in determining the den location. Instead our results indicated that hiding cover was the most important factor for den site location. It seems that wolves in Finland do not need protection of certain forest types to enhance denning possibilities.

### 517. A SYSTEMATIC REVIEW OF THE EFFECTIVENESS OF JAPANESE KNOTWEED (FALLOPIA JAPONICA) CONTROL METHODS

**Kabat**, **Tamara**, University of Birmingham, United Kingdom; **Pullin**, **Andrew**, University of Birmingham, United Kingdom; **STEWART**, **GAVIN**, University of Birmingham, United Kingdom

Japanese knotweed (Fallopia japonica) was introduced into the UK in the 1800s as an ornamental and fodder plant. Due to its highly invasive, vigorous and persistent nature, Japanese knotweed is important to control and has been covered in UK legislation as ‘controlled waste’, restricting its handling and planting. An estimated £1.56 billion would be required to eradicate Japanese knotweed across all infestation in Britain. The plant has also become a problem in many European countries, USA, Canada, Australia and New Zealand. Various methods including mechanical and chemical controls have been utilised in an attempt to manage this weed, but to date there has been no critical evaluation of the evidence for their effectiveness. Systematic review methodology was used to critically appraise evidence for the effectiveness of currently used methods for both control and eradication. The review also examines aspects of mechanical and chemical control, such as frequency, timing and duration of application, and specific differences between types and techniques of mechanical and herbicide application methods. The review has relevance for both onground management and government organisations involved in Japanese knotweed control policy.

### 518. THE IMPLEMENTATION PROCESS OF THE NATURA 2000 NETWORK IN CYPRUS

**KADIS, COSTAS,** Frederick Institute of Technology, Nature Conservation Unit, Cyprus; **Christodoulou, Charalambos,** Forestry Department, Ministry of Agriculture, Natural Resources and Environment, Cyprus; **Kari, Katerina,** Atlantis Consulting, Cyprus; **Georghiou, Kyriacos,** University of Athens, Faculty of Biology, Department of Botany, Greece

Within the framework of the implementation of the EU Habitats and Birds Directives in Cyprus, a biodiversity scientific assessment validated the rich biological diversity of the island. This assessment showed that 47 habitat types of the Habitats Directive Annex I can be found in Cyprus, while five additional habitat types were included in Annex I, following a relevant proposal by the Cyprus authorities. With respect to flora and fauna, the Annex II of the Habitats Directive includes 18 plant

taxa of Cyprus, all new additions, and 17 animal species of Cyprus, out of which 6 are new additions to Annex II. Moreover, a total of 109 bird species occurring in Cyprus are included in Annex I of the Birds Directive, six of which are new additions proposed by Cyprus. To this date, Cyprus has proposed 31 Sites to be included in the NATURA 2000 Network as SCIs and seven sites as SPAs, covering 12.8% of Cyprus' territory. These sites will be managed according to special management plans. Five such plans are being carried out through a LIFE Nature Project. Eight additional plans are under way, within the framework of a relevant call announced recently by the Environment Service of Cyprus. The implementation of the NATURA 2000 Network in Cyprus is monitored by a Scientific Committee, which operates under the Law for the Protection of Nature and Wildlife.

### 519. TALL WHEATGRASS FIELD AS SOURCE HABITAT OR ECOLOGICAL CORRIDOR?

**KÁLMÁN**, **ZOLTÁN**, University of Pécs, Hungary; **Soós**, **Nándor**, University of Pécs, Hungary; **Csete**, **Sándor**, University of Pécs, Hungary; **Pál**, **Róbert**, University of Pécs, Hungary; **Horváth**, **Győző**, University of Pécs, Hungary

The development and use of biomass resources for bioenergy has become critical priority in Europe. Energygrass plantations change the character of agricultural lands; „green islands" of extensive, high-cover monocultures with little disturbance (one crop annually) are created. Two hypotheses were analysed: vast fields meant primarily resource-habitats for small mammals, increasing their populations by autumn, which in turn results higher density. Edge-effect at the boundaries of neighbouring habitats influences the structure of small mammal communities in the tall wheatgrass plantation and also migration between patches. In 2005 capture-recapture surveys were done in tall wheatgrass fields in South-Hungary. Small mammals were monitored in plot P7 (60 ha) using two sampling grids (242 traps), yielding a total of 9 small mammal and 1 carnivore species in four months. The distribution of character populations (M. arvalis, A. agrarius, A. flavicollis) among neighbouring plots and the separating edges showed seasonal variation determined by the coverage of vegetation types and by resource dissimilarities. All these were significantly influenced by tall wheatgrass cutting and by harvesting activities and post-harvesting cultivation of the neighbouring land. The single cutting of energygrass in late August prevented the autumn density growth of small mammals and altered their spatial

### 520. POPULATION DECLINE OF THE ENDANGERED FISH SPECIES *VALENCIA LETOURNEUXI* IN WESTERN GREECE – STRATEGIES FOR CONSERVATION

**KALOGIANNI, ELENI**, Hellenic Centre for Marine Research, Institute of Inland Waters, Greece; **Giakoumi, Sofia**, Hellenic Centre for Marine Research, Institute of Inland Waters, Greece; **Zogaris, Stamatis**, Hellenic Centre for Marine Research, Institute of Inland Waters, Greece; **Barbieri, Roberta**, Hellenic Centre for Marine Research, Institute of Inland Waters, Greece; **Stoumboudi, Maria TH.,** Hellenic Centre for Marine Research, Institute of Inland Waters, Greece; **Zimmerman, Brian**, Zoological Society of London, United Kingdom; **Economou**, **Aliciviades N.,** Hellenic Centre for Marine Research, Institute of Inland Waters, Greece

In order to assess the current population status of the endangered freshwater fish *Valencia letourneuxi*, an imperative for the formulation of any future conservation measures, an ichthyological survey was undertaken, with the two-fold objective to assess the species' presence in the aquatic systems of Western Greece and to inventory the current human impacts on these systems. This survey of a total of 98 sites showed that the species original geographical range has been restricted significantly, with the populations of the Ionian Islands and the Peloponnese being extinct or near extinction and those of Western central Greece and Ipeiros in a vulnerable state. Anthropogenic factors seem to contribute at various degrees to the degradation or loss of this species habitat in the different aquatic systems previously encountered, factors such as, in Corfu Island, the exhaustion of the water resources to cover urban water supply, or, in the Peloponnese riverine systems, the operation of dams.
Given the increasing exploitation of water resources for industrial, agricultural and touristic development, the most suitable strategy for the conservation of this species, which exhibits narrow habitat specificity and local rarity, seems to be the initiation of small scale habitat protection plans for the surviving populations.

### 521. REGIONAL CLIMATIC AND AGRONOMIC CONDITIONS DETERMINE THE SUCCESS OF AN AGRI-ENVIRONMENTAL SCHEME. RESULTS FROM THE SWISS ALPS.

**KAMPMANN**, **DOROTHEA**, Swiss Research Station for Agroecology and Agriculture, Switzerland; **Herzog**, **Felix**, Swiss Research Station for Agroecology and Agriculture, Switzerland

The persistence of multifunctional services of agricultural landscapes relies largely upon biological diversity. Agri-environmental schemes (AES) achieve the protection of farmland biodiversity with different degrees of success. Does the success of an (AES) depend on climate and regional agronomic conditions? We grouped 12 Alpine municipalities according to altitude and main economic characteristics and mapped plants on randomly selected conventionally managed meadows (CM) and meadows of the AES (EM) (n=216). We compared species richness of CM and EM and quantified the impact of management type and site conditions on species composition. Species richness of EM was higher than of CM in all municipality groups. Variance in species composition was well explained only in municipality groups with important farming. The success of the AES must also be seen beyond species conservation, depending on municipality settings we found: (i) At lower altitudes with important farming the AES preserves species rich and botanical complimentary sites. (ii) At higher altitudes with important farming, AES-payments allow a continuation of traditional low-input farm-ing. Anticipated undesirable polarization of land-use intensity is being prevented. (iii) At higher altitudes with tourism as an important economic activity, payments might be protecting the attractive landscape scenery.

### 522. CORRELATIONS BETWEEN GREY WOLF (CANIS LUPUS) POPULATIONS IN NEIGHBOURING RANGING AREAS IN SOUTHEASTERN SLOVAKIA AND NORTHEASTERN HUNGARY

**KAPUSI**, **FELÍCIA**, University of Debrecen, Hungary; **Kiss**, **Viktória**, University of Debrecen, Hungary

After the general extermination of wolf (Canis lupus Linnaeus, 1758) in Europe in the 20th century only its sporadic occurences could be heard in Hungary. Nowadays the species has been recolonising naturally in this country. Due to protective actions populations of the wolf became stronger and began to expand south. Wolf populations in Southeastern Slovakia are potential source for re-colonisation of Northeastern parts of Hungary. During our research taking hunting statistics, the quantitative and qualitative analysis of big games' populations as a basis. We tried to find answers to that when the recolonisation started, what kind of factors had an effect on it, how strong the correlation with the Slovakian populations. On the basis of our results the presentation gives an overview about changes in habitat use, effects of hunting season, wolf population dynamics (wolf density, ungulate density) predator-prey interactions in Southeastern Slovakia. Researching its relationship with the Hungarian wolf population and prey viability. We also studied whether the observed individuals have already settled down or only migrating ones. If these fascinating animals have settled ultimately down in this region, it would undoubtedly increase the rich biodiversity of Hungary and widen its ecological palette.

### 523. CONSERVATION MEASURES FOR FALCO ELEONORAE* IN GREECE (LIFE2003NAT/GR/000091)

**KARRIS**, **GEORGE**, Hellenic Ornithological Society, Greece; **Dimalexis**, **Tasos**, Hellenic Ornithological Society, Greece; **Xirouchakis**, **Stavros**, Natural History Museum of Crete, Greece

The 4 year LIFE Nature project aims to co-ordinate and implement high priority actions for Falco eleonorae, proposed in the species E.U. Action Plan, for the effective, long-term conservation of the species in Greece. About 90% of its global population breeds within the EU and >75% in Greece. With more than 3/4 of its world population occurring in the Greek archipelago, Eleonoras falcon is by far, the most important bird species hosted in the country. Hellenic Ornithological Society (BirdLife-Greece), in collaboration with the Natural History Museum of Crete, the Royal Society for the Protection of Birds and the Greek Ministry of Rural Development, promotes the implementation of species conservation actions in 9 of the species most significant Greek SPAs. Important project actions include the implementation of the first complete global population census, the implementation of an effective monitoring scheme for Eleonoras falcon, the establishment of a clearing-house mechanism for the species, to co-ordinate conservation, research and monitoring actions, the assessment of primary causes of mortality (e.g. agrochemical pollution in the foraging grounds), the enhancement of breeding habitat quality and species breeding performance through pilot management measures such as rat eradication in uninhabited islets, and the implementation of public awareness campaigns.

### 524. MACROMYCETES FROM ECCF PROJECT REGISTERED IN MONTENEGRO

**KASOM**, **GORDANA**, Republic Institut for the protection of Nature

Project of ECCF, leading by Peter Otto, for Mapping and monitoring of threaten fungi in Europe (50 threatened fungal species, including all 33 species candidates for listing in Appendix 1 of the Bern Convention) was realized, also, in Montenegro. From the List of the ECCF Project, in Montenegro was registered 11 species (Phylloporus pelletieri (Lév.) Quél., Strobilomyces strobilaceus (Scop.: Fr.) Berk., Hygrophorus marzuolus (Fr.: Fr.) Bres., Amanita caesarea (Scop.: Fr.) Pers., Gomphus clavatus (Pers.: Fr.) Gray, Hymenochaete cruenta (Pers.: Fr.) Donk, Hydnellum suaveolens (Scop.: Fr.) P. Karst., Pisolithus arhizus (Scop.: Pers.) S. Rauschert, Bovista paludosa Lév., Sarcosphaera coronaria (Jacq.) Boud., Helvella atra Holmskj.: Fr.) from wich three species (Bovista paludosa Lév., Gomphus clavatus (Pers.: Fr.) Gray, Sarcosphaera coronaria (Jacq.) Boud.) are candidates for listing in Appendix 1 of the Bern Convention. The paper deals with the data of distribution of these species in the territory of Montenegro with UTM distribution maps. The species are also proposed for the protection in the national level.

### 525. DIVERSITY PATTERNS OF ORTHOPTERA, LEPIDOPTERA AND SMALL TERRESTRIAL BIRDS IN TZOUMERKA MOUNTAINOUS AREA, GREECE

**Kati**, **Vassiliki**, University of Ioannina, Greece; **PAPAIOANNOU**, **DIMITRIOS-HARALAMBOS**, University of Ioannina, Greece; **Grill**, **Andrea**, University of Neuchâtel, Institute of Zoology, Switzerland; **Dimopoulos**, **Panayotis**, University of Ioannina, Greece

A biodiversity assessment and conservation project is launched for the mountainous area of Tzoumerka in North-western Greece, focusing on the distribution patterns of 12 different biological groups. Preliminary data are presented for three of them – Orthoptera, Lepidoptera and small terrestrial birds. We sampled 11 different habitat types, including fir forests, black pine forests, oak forests, scrubs, stony grasslands, subalpine grasslands and pastures, as well as agricultural land. Preliminary sampling involved time-constraint visits for the invertebrate groups and point counts of 10 minutes duration for birds. A total of 64 Orthoptera species, 38 butterfly species and 70 bird species were recorded in these different land types, during the year 2005. Community composition differed according to land-use type for all the three taxonomic groups studied. For Orthoptera and Lepidoptera the richest-in-species sites included the subalpine pastures and grasslands. These habitats were also important for the conservation of small terrestrial birds, because very were not very species-rich but they included 10 species of conservation concern. However, the most species-rich habitat for birds was the traditionally cultivated agricultural land at low altitude, hosting 11 species of conservation concern. Diversity patterns congruence and conservation issues are discussed.

### 526. PREDICTING BIODIVERSITY OF DYNAMIC URBAN BROWNFIELDS: A LANDSCAPE MODEL APPROACH

**KATTWINKEL**, **MIRA**, Carl von Ossietzky Universität Oldenburg, Germany; **Biedermann**, **Robert**; University of Oldenburg, Institute of Biology and Environmental Sciences, Landscape Ecology Group, Germany**; Kleyer**, **Michael**, University of Oldenburg, Institute of Biology and Environmental Sciences, Landscape Ecology Group, Germany

Urban brownfields provide habitats for rare and endangered species. Due to abandonment, succession, and destruction by redevelopment these habitats underlie dynamic changes. We developed a landscape model to analyse the effects of spatiotemporal configuration of abandoned industrial sites on plants and phytophagous insects in Bremen, Germany. Main goal is to identify settings which support high biodiversity on the landscape scale while accepting local extinction. Plot-based habitat models quantify the relationship between abiotic soil parameters, disturbance regime, successional age, landscape context (the surrounding vegetation structure), and the occurrence of species. The extension of these models to the landscape scale allows the investigation of spatially explicit scenarios. Thus, the effects of different spatial configurations (e.g. scattered versus clustered brownfield sites in an industrially used matrix) and time schedules for redevelopment on both single species and overall biodiversity can be compared. The results reveal that site age is a strong predictor in both plant and insect habitat models and furthermore a driving factor for vegetation structure. Additionally, regional species composition is determined by the spatiotemporal dynamic of the landscape. This spatially explicit information should enable urban planning to maintain biodiversity of industrial areas.

### 527. IMPACT OF LARGESCALE DAM CONSTRUCTION ON MOVEMENT CORRIDORS OF LARGE MAMMALS IN ARTVIN, NORTHEASTERN TURKEY

**KAYA**, **BANU**, Middle East Technical University, Turkey; **Turak**, **Ayse**, The Turkish Foundation for Combating Soil Erosion, for Reforestation and the Protection of Natural H, Turkey; **Bilgin**, **Can**, Middle East Technical University, Turkey

The Turkish Lesser Caucasus harbors many endemic or threatened species. We have investigated the impact of a series of dams planned on River Coruh on the potential movement corridors for wild goat, lynx and golden jackal. By processing digital layers of elevation, slope, streams, population density, vegetation cover and settlement pattern using fuzzy suitability functions, we produced habitat suitability models with GIS for each species. Protected areas and dams were integrated to the models while developing friction surfaces. Using minimum cost pathways, we identified corridors that connect source populations for each umbrella species at the landscape level. These corridors were than analyzed for distance, cost and suitability composition. Comparisons before and after dam construction revealed an increase in the cost of optimum paths for all three species (up to 4619.0%), although in some cases they were of shorter length. Habitat suitability along optimum paths generally decreased (4.58% on average). For lynx and wild goat, the proposed dams severely increase corridor cost

between already weakly linked current population sources. Considering the significance of these consequences and that 35.44% of the planned reservoir area (78km2/sup) is prime habitat for golden jackal, we suggest an evaluation of possibilities to improve habitat linkages, including humanmade ones.

### 528. NEED FOR LANDSCAPE-SCALE CONSIDERATIONS IN PROTECTING SMALL FOREST RESERVES

**KENDERES**, **KATA**, Eötvös University, Hungary; **Standovár**, **Tibor**, Eötvös University, Hungary

In this presentation we asses the feasibility of stand-scale biodiversity conservation in the Oserdo Forest Reserve, an unmanaged beech stand in Hungary. We performed a GIS analysis using a series of archive aerial photographs to study the dynamics in the canopy. In addition, we made field study of regeneration – the prerequisite of long-term persistence – in 27 gaps selected by age and size criteria. Our results show that during the studied 25 years mean gap size and total gap area increased. We found that the amount (mean = 45541 individual/ha) of seedlings and saplings is sufficient for successful regeneration. However, current high game density impedes the growth of regeneration into the canopy (no regeneration in the 0.5–2 m height zone), and also changes species composition due to selective browsing. We conclude that, not only reserve size (less than minimum dynamic area), but also game browsing (controllable only at the landscape scale) reduce the chance of long-term survival of this protected stand and associated forest-dwelling species. These negative effects could be counteracted by applying nature-based forest management techniques in the surrounding landscape, which would also improve the quality of game habitat (hence reducing browsing pressure).

### 529. THE CHOUGH ON OUESSANT : A SOCIETY-NATURE INTERACTION INDICATOR MODELLED WITH MULTI-AGENT SYSTEM.

**KERBIRIOU**, **CHRISTIAN**, Muséum National dHistoire Naturelle, France; **Rouan**, **Mathias**, Université de Bretagne Occidentale, France; **Levrel**, **Harold**, Muséum National dHistoire Naturelle, France

The threatened chough population of the Iroise Biophere Reserve (France) is affected by two mains socio-economic changes: development of ecotourism and abandonment of traditional agriculture. Both influenced Chough feeding habitat areas : (1) The decline of sheep grazing have lead to a fallow land process (2) Tourist trampling of coastal habitat can create favourable feeding habitat, but high frequentation can destroy grass cover and produce irreversible damage. Chough young survival in August appear strongly correlated with to tourism disturbance. Because pressures are of various origins (tourist, sheep farmers, vegetation dynamics), because stochastic aspects are not negligible (small population size) and because spatial effect are presumably important, a Multi-Agent System was built. Chough population was modelled using a spatially explicit individual-based model. This allows assessing management program through simulations. Without habitat restoration, what reflects the recent situation, population is expected to decline slowly what has been observed in the last thirty years. The restoration program recently launched predicted to stabilize the population at the current level. However, we show that alternative scenarios focusing on the spatial distribution of restored areas could double the current chough population size. Multi-Agent System represent an effective information tool to tackle interdisciplinary sustainable development question.

### 530. RESTORATION OF SALMON (SALMO SALAR L.) IN LITHUANIAN RIVERS

**KESMINAS**, **VYTAUTAS**, Institute of Ecology of Vilnius University, Lithuania; **Virbickas**, **Tomas**, Institute of Ecology of Vilnius University, Lithuania

In Lithuania, salmon stocks have been heavily depleted as result of damming River Nemunas - main river course in 1960s. According to historical date, salmon used to spawn in 16 rivers in Lithuania, but only River Žeimena and Neris supported wild stocks. Since 1997 salmon restoration plan have been launched. Measures used to reach the targets include stocking, constructing of fish ladders, protection of spawning grounds and fishery regulations. To-date extensive salmon juveniles and adult migration monitoring activities, stocking and natural spawning assessment programs have been carried out regularly. During the last decade the number of salmon migrating to the Nemunas River basin varied in the range 3,400 - 7,800 individuals. The potential salmon smolt production capacity in Lithuania rivers consist of 180,000 individuals, however, the actual production ranges within 4,500-7000 ind. The wild smolt density in the index River Žeimena remains low (2,45 ind/100m2). Extensive stocking programs have been started in other salmon rivers, where original salmon stocks have been destroyed. Since then density of stocked salmon parr has increased, and in some rivers their densities as high as 11,3 ind/100m2 have been observed. The restocked salmon have spawned successfully in all rivers.

### 531. EXTINCTION AND REINTRODUCTION OF THE CORSICAN RED DEER IN CORSICA

**Kidjo, Nicolas**, Comportement et Ecologie de la Faune Sauvage, I.N.R.A. Toulouse, France; **Feracci, Gérard**, Parc Naturel Régional de Corse, France; **Bideau, Eric**, Comportement et Ecologie de la Faune Sauvage, I.N.R.A. Toulouse, France; **Gonzalez, Georges**, Comportement et Ecologie de la Faune Sauvage, I.N.R.A. Toulouse, France; **Marchand, Bernard**, Université Pascal Paoli, UFR de Sciences et Techniques, France; **AULAGNIER, STEPHANE**, Comportement et Ecologie de la Faune Sauvage, I.N.R.A. Toulouse, France

The Corsican red deer, *Cervus elaphus corsicanus*, has been extirpated from Corsica by 1970, when the Sardinian population was below 250 individuals. An action plan to conserve this critically endangered subspecies was then agreed by both Sardinian and Corsican authorities. The choice of reintroducing Sardinian deer in Corsica relied on past descriptions and historic data suggesting a joint origin in the two Mediterranean islands. Initiated by the Natural Regional Park of Corsica (PNRC), the reintroduction was supported by several environmental authorities such as the Regional Direction of Environment (DIREN), the Environment Bureau of Corsica (OEC), the National Game and Wildlife Office (ONCFS), the National Forest Office (ONF),… Since the transfers of animals from Sardinia (1985, 1987, 1994), the Corsican population of deer has been regularly increasing in three large captive breeding enclosures: Quenza, Casabianda et Ania di Fium'Orbu. Three localities were chosen by the PNRC team for the first reintroduction attempts in the wild: Quenza in 1998 and 2002, Chisà in 1999, and Santo Pietro di Venaco in 2004. After each release some individuals were radiotracked, and then wild populations are regularly monitored; in 2005 ca. 200 Corsican red deer were estimated to live in the wild in Corsica.

### 532. A SEVEN-YEAR STUDY OF ORTHOPTERA-ASSEMBLAGES IN THE VILLÁNY HILLS, HUNGARY

**KISFALI**, **MÁTÉ**, University of Debrecen, Hungary; **Nagy**, **Antal**, Hungarian Academy of Sciences - University of Debrecen, Hungary

The Villány Hills, which situated in Hungarian part of Praeillyricum zoogeographical region, has rich Orthoptera fauna with many Mediterranean species. This fauna and the compositional changes of assemblages have been studied since 1997. Characteristic species and assemblages that can be used in monitoring and management of main habitat types were determined based on the data from 1999 to 2005. Assemblages could be divided into three types, in which composition showed correlation with the structural complexity of the vegetation. The effect of base stone (dolomite, limestone) was detectable only in closed habitats. In the mosaic of rocky grassland and shrubs,

almost all the species (34/35) was found, and we found five characteristic species for these habitats. We found that common abundance ranks of the common species varied greatly on a year-by-year basis, while ranks of the rare species were highly predictable. Our results indicate that temporal variability of Orthoptera-assemblages cannot be neglected in monitoring studies.

### 533. RESULTS OF AMPHIBIAN AND REPTILE MONITORING BETWEEN 2001 AND 2005 WITHIN THE FRAME OF THE HUNGARIAN BIODIVERSITY MONITORING SYSTEM

**KISS**, **ISTVÁN**, Szent István University, Gödöllo, Hungary; **Babocsay**, **Gergely**, Hebrew University of Jerusalem, Israel; **Bakó**, **Botond**, Ministry of Environment and Water, Hungary; **Dankovics**, **Róbert**, Savaria Museum, Szombathely, Hungary; **Kovács**, **Tibor**, Eötvös Loránd University, Hungary; **Szénási**, **Valentin**, Ministry of Environment and Water, Hungary

Monitoring of amphibians and reptiles in Hungary started in 2001 within the frame of the Hungarian Biodiversity Monitoring System (HBMS). Initially, localities from five geographical regions (?rség-Vendvidék, Pilis-Visegrád Mountains, Ócsa, Gödöll? Hills, Aggtelek Karst) were monitored and in 2005, a locality near Fehér-tó, Kardoskút was added. Methods of monitoring followed the Protocol for Amphibians and Reptiles of HBMS. Both conventional (counting along transects or shorelines at daylight) and novel observational techniques (using torch-lights at night, trapping, etc.) were used at most sites and the efficacy of the techniques was tested. Where possible, observations were made eight to ten occasions annually. Observations were more frequent during the breading season between early March and late May. Except four reptile species, which were not included in HBMS and Rana lessonae, all species of the Hungarian herpetofauna were recorded. Summarizing our data led to an impro ved Protocol that sets guidelines enabling comparisons at levels of communities and landscapes. We evaluated species richness, species composition and dominance, seasonal alteration in observability of species, temporal and spatial fluctuations in abundance. We added a conservation value to each species to determine herpetofauna-based conservation value of each locality.

### 534. CENTRIC DIATOMS OF SOME EUROPEAN PROTECTED AREA (CROATIA, ROMANIA AND SPAIN)

**KISS, KEVE.T**., Hungarian Danube Research Station of the Inst.Ecol.Bot. of Hung.Acad.Sci., Hungary; **Ács, É**., Hungarian Danube Research Station of the Inst.Ecol.Bot. of Hung.Acad.Sci., Hungary; **Buric, Z**., University of Zágreb, Faculty of Science, Croatia; **Gligora, M**., University of Zágreb, Faculty of Science, Croatia; **Grigorszky, I**., Debrecen University, Hydrobilogical Department, Hungary; **Plenkovic-Moraj, A**., University of Zágreb, Faculty of Science, Croatia; **Rosa-Miracle, M.**, Departamento de Microbiología y Ecología Edificio de Investigación Universitat de València Campus de Burjassot, Spain; **Sandu, K**., Institute of Biology Bucharest, Romanian Academy, Romania; **Szabó, K.É**., Hungarian Danube Research Station of the Inst.Ecol.Bot. of Hung.Acad.Sci., Hungary; **Vicente, E**., Departamento de Microbiología y Ecología Edificio de Investigación Universitat de València Campus de Burjassot, Spain

Centric diatom communities of were studied in a few dozen of different lakes in Croatia, Romania and Spain during the last years. Several lakes are situated on protected areas, National Parks, Natura 2000 sites of these countries. The aim of these investigations was first to determine of centric diatom communities of lakes, then to analyse the species composition from a nature conservation point of view. We elaborated a typology of habitats based mainly on substrate, mineralization, water regime and climatology. Then, within the resulting types of environments, we pretend to establish different categories of their ecological status based on nutrients and chlorophyll concentration and other variables related to nature protection. Several lakes were never investigated for centric diatoms, therefore new species was found for Romania for example in Danube Delta (Lake Erentsuk - *Thalassiosira gessnerii*). Several similarities were found in carstic lakes of Croatia (Lake Plitvice – dominant species: *Cyclotella plitvicensis*) and Spain (Lake Marquesado – dominant species: *C. plitvicensis*). We can mention *Cyclotella hispanica*, described from Lake Banoles (Spain), which is probably endemic species (never found in other countries in Europe). Several species were found which are rare in Europe and are listed in Red List of algae.

### 535. ROLES OF LAND COVER AND CLIMATE IN DETERMINING SPECIES RICHNESS OF DECLINING, STABLE AND INCREASING BUTTERFLIES IN BOREAL AGRICULTURAL LANDSCAPES

**KIVINEN**, **SONJA**, Finnish Environment Institute, Finland; **Luoto**, **Miska**, University of Oulu, Finland; **Kuussaari**, **Mikko**, Finnish Environment Institute, Finland; **Saarinen**, **Kimmo**, South Karelia Allergy and Environment Institute, Finland

We studied how species richness in groups of butterfly species with differing population trends is affected by land cover and climate in boreal agricultural landscapes. We built generalized linear models using land cover, climate and geographical location as explanatory variables for species richness of declining, stable and increasing butterflies in 10-km squares in Finland. Variation in species richness was partitioned between the explanatory variable groups using partial regression and contributions of explanatory variables were examined using hierarchical partitioning. Climate and geographical location explained the largest part of variation in species richness of all trend classes. However, land cover explained more variation in species richness of declining butterflies and climate in species richness of increasing butterflies compared to other groups. Species richness of declining butterflies was particularly related to grassland, stable butterflies to forest and increasing butterflies to arable land and field-forest mosaic. The results indicate notable potential for further changes in the distribution of increasing species with warming climate. The relation of declining butterflies to strongly decreased grassland habitats suggests their weaker ability to benefit from favourable changes in climate compared to stable and increasing species.

### 536. MEAT QUALITY OF ENDANGERED GOOSE AND TURKEY BREEDS AS A CONSERVATION RELEVANT PARAMETER

**KOHLSCHUETTER**, **NIELS**, University of Bonn, Germany; **Bellof**, **Gerhard**, University of Applied Science Weihenstephan, Germany; **Schmidt**, **Eggert**, University of Applied Science Weihenstephan, Germany; **Wicke**, **Michael**, University of Goettingen, Germany; **Hafez**, **Mohamed**, Free University of Berlin, Germany; **Zarin**, **Sarah Sakineh**, University of Bonn, Germany; **Koepke**, **Ulrich**, University of Bonn, Germany

Suitable conservation strategies for endangered domesticated breeds hinge on knowledge of their special traits and benefits. We compared the performance of endangered goose and turkey breeds with common hybrid breeds focussing on meat quality as a marketing factor in a strategy for cost efficient on-farm conservation. The animals were reared under equal feeding and housing conditions. In comparison with the endangered breeds, the body weights of the hybrid breeds of both species were heavier and showed a lower food conversion ratio. No clinical problems were noted for both species. The endangered goose breed showed a higher drip loss, while the meat of the endangered turkey breed had less cooking loss, a higher shear force and was preferred in a sensory test. Differences in body weight gain and meat quality between the two goose breeds were small. The endangered turkey breed had half the weight of the hybrids, but showed advantages in meat quality. The comparable body weight gain of both geese breeds is a promising aspect for future conservation strategies via marketing. However, the conservation of the endangered turkey breed requires more cost intensive strategies.

### 537. LONG-TERM MONITORING IN CENTRAL EUROPEAN FORESTS – A CASE STUDY FOCUSED ON THE IMPACT OF DEER

**Kolbek**, **Jirí**, Institute of Botany, Academy of Sciences of the Czech Republic, Czech Republic; **PETRÍK**, **PETR**, Institute of Botany, Academy of Sciences of the Czech Republic, **Bílek**, **Ondrej**, Institute of Botany, Academy of Sciences of the Czech Republic, Czech Republic; **Boublík**, **Karel**, Institute of Botany, Academy of Sciences of the Czech Republic, Czech Republic; **Cerný**, **Tomáš**, Institute of Botany, Academy of Sciences of the Czech Republic, Czech Republic; **Vítková**, **Michaela**, Institute of Botany, Academy of Sciences of the Czech Republic, Czech Republic

Changes in the species composition, shrub and herb layer, and tree recruitment are documented in three study areas of the Krivoklátsko Biosphere Reserve (Czech Rep.): an oak-hornbeam forest, a semi-thermophilous oak forest, and a herb-rich beech forest. Since 1993, both fenced plots and unfenced (control) plots have been monitored annually in the study areas. The shrub in the oak-hornbeam forest has strongly developed on a fenced plot while the cover and numbers of forbs have decreased. In the oak forest, there has been only a slight increase in the species number on the fenced plot, in contrast to the control plot. The total cover of the herb layer within the beech fenced plot has not significantly changed, while on the unfenced plot the cover has increased mainly due to the spread of aliens. The browsing of deer in the forests is responsible for frequent soil humus disturbances, migration, and ecesis of non-forest fringe and plant aliens. The deer keeps the oak-hornbeam forests open (which is important for the survival of some threatened species) and suppresses juvenile growth. Hence, the deer's behaviour may influence biodiversity in both positive and negative ways depending on the vegetation type, which is crucial for nature conservation.

### 538. HABITAT CHARACTERISTICS AND POPULATION STRUCTURE OF THE THREATENED CHEQUERED BLUE BUTTERFLY (SCOLITANTIDES ORION) IN FINLAND

**KOMONEN**, **ATTE**, University of Joensuu, Finland; **Tikkamäki**, **Tuuli**, University of Joensuu, Finland; **Mattila**, **Niina**, University of Jyväskylä, Finland; **Kotiaho**, **Janne**, University of Jyväskylä, Finland

The chequered blue butterfly Scolitantides orion is threatened throughout Europe. The northernmost European population of the species occurs in Linnansaari National Park in Finland. We studied the habitat characteristics and the population structure of the species in a network comprising eighty-six islands. These comprised 143 potential habitat patches, of which 101 were occupied by the species. All habitat patches were small with an average area of 666 m2 (range 4 – 15 000). The larval host plant Sedum telephium averaged 227 (range 10-1009) stems per patch (total 32 976). Overall, 135 adult butterflies and 2 308 eggs were recorded during June 2005. The average number of adults and eggs per occupied patch was 1.3 (range 1-14) and 23 (range 1-402), respectively. None of the habitat variables explained the incidence or abundance of the species, indicating that stochastic colonization-extinction dynamics are likely to prevail in population dynamics of the species. To guarantee a viable metapopulation of the species in Linnansaari, tourism needs to be controlled in the vicinity of the largest local populations.

### 539. ASSESSING EXTERNAL ENVIRONMENTAL COSTS AND BENEFITS OF FIELD ACTIVITIES

**KÖNCZEY, RÉKA**, Szt.István Universíty, Institute of Environmental Sciences, Hungary

Forecasting and measuring environmental side effects of field activities are limited to potential or recorded effects on valuable ecosystems, or on protected species at best. There is a growing internal (researchers, natural site managers) and external requirement for proving carefulness in planning, implementing and evaluating even field studies or management activities. I compared the usability of various environmental indicator and "audit" systems (ecological footprint, environmental audits, environmental assesment, sustainability reporting, SD indicators) and tested these systems on different activities (field research, field management). Only the ecological footprint method (calculated for a given time period or for the whole activity) was found to be comparable among different activities of different institutions. However, the most important environmental resource used as well as the most significant pollution caused by the transport needs in the cases where no chemicals were used and no land were occupied permanently.
Acknowledging the vital importance of normative possibilities (permissions, regulations, ethical codices) I argue that researchers and area managers can use the ecological footprint method as an indicator of their external environmental effects or can easily complete an ecological cost-benefit analysis based on materials and energy use, land occupation and number of stakeholders. (Handouts will be available at the Conference.)

### 540. CONSERVATIONAL STATUS OF DIOSZEGHYANA SCHMIDTII (DIOSZEGHY, 1935) IN NORTHEASTERN HUNGARY (LEPIDOPTERA, NOCTUIDAE)

**Korompai**, **Tamás**, University of Debrecen, Hungary; **TÓTH**, **JÁNOS PÁL**, University of Debrecen, Hungary; **Kozma**, **Péter**, Museum of Mátra, Hungary; **Kapusi**, **Felícia**, University of Debrecen, Hungary

Dioszeghyana schmidtii (described from the Banat, Romania) is one of the biogeographically typical, threatened species of the Pannonian region. Outside the Carpathian basin there are only a few populations in Bulgaria, Greece and Turkey (latter separate subspecies). We have started our researches in 2002 on revealing the distribution area of the species, examining its habitat preferences and potential factors of threat which have an effect on the species. As a result of intensive surveys we have found about 30 new habitats within four years. Most of the newly discovered sites can guerantee the long-term conservation of this species. It has appeared that the moth's habitat preferences are more varied that it was previously known. It occurs not only in nature-like lowland and colline xerothermic oak forests rich in tartar maple (Aceri tatarico-Quercetum) but also in other steppic woods with Quercus spp. and even in more or less degraded woods dominated by Turkey oak (Qercus cerris). Our experiences show that the conservation of Hungarian populations can be mostly secured by maintaining the nature-like mixed character and the fringes of the forests which are rich in maples (Acer tataricum and A. campestre).

### 541. CONTRASTING HABITAT-USE OF TWO SYMPATRIC MACULINEA SPECIES – SOME ASPECTS OF NICHE SEGREGATION

**Kőrösi**, **Ádám**, Hungarian Natural History Museum, Hungary; **Örvössy**, **Noémi**, Hungarian Natural History Museum, Hungary; **Vozár**, **Ágnes**, Hungarian Natural History Museum, Hungary; **Gergely**, **Viktória**, Corvinus University of Budapest, Hungary; **Peregovits**, **László**, Hungarian Natural History Museum, Hungary

Maculinea species are among the most endangered butterfly species in Europe. Moreover, their obligate myrmecophil life-cycle raises many interesting ecological and evolutionary questions. A sympatric population of M. nausithous and M. teleius has been studied for 3 years. Their flight periods overlap and both species use exclusively Sanguisorba officinalis as foodplant. Their host ant species are different and occupy different microhabitats so niche-segregation of butterflies is predicted. The sampling site was a wetland meadow surrounded by deciduous forest in a stream-valley. The site was divided into small units on two spatial scales according to field characteristics, where the two populations were studied by mark-release-recapture method. M. teleius preferred the open inner parts of the meadow, while M. nausithous occupied the shaded edges close to the forest. On the finer spatial scale the distribution of M. nausithous was more aggregated, while on larger scale the opposite pattern was observed. M. nausithous

was more likely to move between habitat parts, but it was influenced by the actual management of the site. In the given landscape structure the habitat is more fragmented for M. nausithous due to its expressed preference of forest edges, so it has to be more mobile to find the optimal microhabitat.

### 542. EFFECTS OF PATCH QUALITY AND LANDSCAPE STRUCTURE ON SAPROXYLIC SPECIES DWELLING IN SPRUCE MIRES

**KOSKELA**, **MERVI**, Kainuu Regional Environment Centre, Finland; **Peuhu**, **Elina**, University of Helsinki, Finland; **Siitonen**, **Juha**, Finnish Forest Research Institute, Finland; **Várkonyi**, **Gergely**, Kainuu Regional Environment Centre, Finland

Species associated with dead wood have been severely affected as the volume of coarse woody debris has declined due to intensive forest management by more than 90% in boreal forests in Finland. Besides this, loss and fragmentation of old growth forests has altered landscape structure. We studied the occurrence of selected beetle and wood-rotting fungi species in old growth spruce mires in eastern Finland and Russia at three different scales. We chose six species of both beetles and fungi occurring on spruce logs. Out of these, four species were threatened or old-growth forest indicator species and two species habitat generalists. At habitat patch scale we studied the effects of quality and continuity of dead wood. It was shown that the amount of spruce logs was important factor for the fungi. At local scale we used incidence function model to understand the effects spatio-temporal isolation of old-growth fragments. Historical record of the occurrence of the old-growth spruce forest has been constructed for the study sites for the period of 50 years. At the largest scale we compared two regions with different forest management history. For the focal beetle species this turned out to be the most important factor affecting species occurrence.

### 543. DISPERSIAL STRATEGY OF INDIVIDUALS LIVING IN METAPOPULATION

**KOSKO**, **KAROLINA**, Centre for Ecological Research PAN, Poland; **Uchmanski**, **Janusz**, Centre for Ecological Research PAN, Poland

We developed the model to analyse metapopulation dynamics. The model has four scenarios describing different dispersion strategies of individuals: 1) migration as a stochastic process – emigrants are selected randomly 2) individuals who emigrate do not obtain any resources as the result of intraspecific competition 3) individuals who emigrate obtain resources but not enough to produce progeny 4) emigration of best individuals when local population is endangered by extinction. Simulations of the scenarios give various results in each analysed variant. Metapopulation extinction time differs if candidates to migrate are selected randomly (scenario 1) or non-randomly (scenario:2, 3, 4). Laboratory experiments on isopoda species, Porcellio scaber, were conducted to test the model's assumptions. In three experiments of different duration, weight of dispersing and non-dispersing individuals was compared. The difference in dispersion ability between gravid and not gravid females was tested in other experiment. There was no significant differences in weight, length and condition of females (gravid or not) between dispersing and non-dispersing individual. The results of the experiment prove the first scenario of the model and confirm stochastic dispersal of Porcellio scaber.

### 544. HOW DOES INFLUENCE THE FERTILISER AND PESTICIDE USE THE BIRD AND PLANT RICHNESS AND ABUNDANCE IN HUNGARIAN ARABLE FIELDS?

**KOVÁCS**, **ANIKÓ**, Szent István University, Faculty of Veterinary, Institut for Zoology, Hungary; **Batáry**, **Péter**, Hungarian Natural History Museum, Hungary; **Báldi, András**, Hungarian Natural History Museum, Hungary

One of the largest threat to biological diversity is the intensification of agriculture. However, there are very few information about this in Central-European countries. The influence of agricultural intensification, i.e. fertiliser and pesticide use were studied on plants and birds. We made our investigations on winter cereal fields in and around the Kiskunsag National Park in 2005. Seven different intensity types were chosen (3 fields per intensity). Bird relative abundance was estimated by point counting method. Botanical survey was conducted in the edge and in the interior transects of the fields. From the observed 28 bird species, skylark (37 %), yellow wagtail (27 %) and quail (9 %) were the most abundant. There is a decreasing tendency in the total abundance of birds with increasing management intensity. According to the botanical survey we found significant higher species richness and weed cover in the edge than in the interior transects. There is significant negative correlation between the pesticide use and plant richness and cover in the interior transect. Our results show negative influence of cultivation intensity on birds and plants. Spiders, bees and beetles were also sampled by funnel traps and yellow water pans, the identification is in progress. Finally the ongoing GIS analysis could help to understand the effects of landscape heterogeneity as well.

### 545. FERIHEGY AIRFIELD: PERSPECTIVES FOR NATURE CONSERVATION AND THE FLIGHT SAFETY

**KOVÁCS**, **TIBOR**, MME-BirdLife Hungary, Hungary; **Lendvai**, **Csaba**, MM-BirdLife Hungary, Hungary; **Katona**, **Krisztián**, St. István University, Hungary; **Peregovits**, **László**, Hungarian Natural History Museum, Hungary; **Forgács**, **Zsuzsa**, Hungarian Natural History Museum, Hungary; **Soltész**, **Zoltán**, Hungarian Natural History Museum, Hungary; **Tóth**, **Tamás**, Budapest Zoo, Hungary; **Szövényi**, **Gergely**, Eötvös University of Sciences, Hungary; **Ferenc, Ferenc**, Budai Középiskola, Hungary; **Kovács, Orsolya**, MME-BirdLife Hungary, Hungary

Ferihegy Airport is one of the last dry, sandy grasslands in the vicinity of Hungary's capital. This habitat type is characteristic mainly in Asia and reaches the easternmost edge of its distribution in the Carpathian Basin. Once covered extended areas in Hungary but nowadays has been restricted in small patches in the middle of the country. Although the grass of the Ferihegy Aiport has been used for aviation goals for several decades, some features of the original grassland are still recognizable. Budapest Airport supports a long-term conservation project on the airfield of the Ferihegy Aiport. The main aim of the project is to compile an inventory of the wildlife living in the grass of Ferihegy and to work out a sustainable management, especially for the grass-mowing and bird alert. Eight taxa have been selected for survey in the first year (2005-2006) of the project: plants, orthopterans, carabid beetles, butterflies and moths, amphibians and reptiles, birds, mammals. Some of them have considerable influence on the flight safety. The results of the first year survey showed that the airfields grass has been degradated, mainly by intense mowing. However, several protected species were discovered, either vertebrates or invertebrates. This fact will be considered when new mowing methods, including the long grass policy, are intruduced on the airfield.

### 546. MODELLING THE POTENTIAL THREATS TO THE BEAVER CASTOR FIBER POPULATION VIABILITY IN THE VISTULA RIVER VALLEY

**KOWALCZYK**, **KAMILA**, Centre for Ecological Research PAN, Poland; **Romanowski**, **Jerzy**, Centre for Ecological Research PAN, Poland; **Kosko**, **Karolina**, Centre for Ecological Research PAN, Poland

After introduction in 1970s and natural dispersion beavers formed thriving populations in Central Poland. Though the numbers are not monitored, the data on species distribution are common. We propose to use Population Viability Model to assess current status and threats to the Beaver on the 120 km long section of Vistula Valley. The LARCH computer model was calibrated to fit local ecological situation and to evaluate five scenarios of the Vistula Valley future development, generated with the stakeholders input. The density of 1, 2, 4 and 8

reproductive units/ km2 of optimal habitats were used to simulate different numbers of expanding Beaver population. LARCH analysis indicates higher vulnerability of low density populations to the same environmental changes. At present large Minimum Viable Population exists, part of one sustainable network. Hypothetical construction of two dams and removal of riparian forests within dikes leads to 25% population reduction. The opposing scenario of river renaturalisation is beneficial by increasing Beaver numbers by 42%. The modelling illustrates that out of two Natura 2000 areas only one – Kampinos Forest SAC- provides efficient protection to the species. Beaver network sustainability in Middle Vistula SPA is effected by elements of three (regulation, renaturalisation, reforestation) scenarios analysed.

### 547. DOMESTIC CATS (FELIS CATUS ) PREDATION ON WILDLIFE FAUNA IN CENTRAL POLAND

**KRAUZE**, **DAGNY**, Warsaw Agricultural University, Poland; **Gryz**, **Jakub**, Warsaw Agricultural University, Poland

Domestic cats (Felis catus) are common pet animals in Poland. Many of them, especially living in the rural area, breed without control, leave settlements freely and are not properly fed. Studies began in spring 2004, carried out in field and forest mosaic of Central Poland, showed that cats are among the most numerous terrestrial predators in the area. Animals and their tracks have been found in all habitats, often far from human settlements. Taking into account cats abundance, it appeared necessary to asses their possible influence on native wildlife fauna. From the beginning of 2005 voluntary owners were asked to register prey their cats bring home. Throughout 12 months 7 to 18 cats were observed and altogether 549 prey items were collected. An average number of prey brought home by a cat differed between months and was the highest in September (9,8) and the lowest in February (0,5). The most frequent prey were mammals (70% of all prey items), then reptiles (11%), birds (9%) and invertebrates (7%). Mammals were the most frequent prey in autumn and winter (about 80% of all prey items) and the least in spring (46%). On contrary, reptiles had the biggest share in spring (32%) and birds in winter (20%).

### 548. GENETIC DIVERSITY OF ANTHYLLIS MONTANA L. SSP. JACQUINII (KERN.) HAYEK (FABACEAE) AT ITS NORTHERN DISTRIBUTION EDGE

**KROPF**, **MATTHIAS**, University of Natural Resources and Applied Life Sciences, Vienna, Austria

The mountain legume Anthyllis montana comprises two subspecies with the eastern European ssp. jacquinii characterised by a small number of populations at the northernmost distribution edge in Austria. These populations are highly isolated, patchy structured, individual-poor, and are considered to be endangered. For conservation management, an AFLP analysis of 164 individuals was performed by comparing genetic diversity of all Lower Austrian populations with southern (i.e. central) populations from Slovenia/Croatia. 503 AFLP fragments were generated of which 11 (2.2%) were monomorphic. The hierarchically structured approach revealed three groups representing each of the two northernmost Austrian populations apart from the third Lower Austrian population being more similar to Slovenian and Croatian populations, respectively. While populational AMOVA revealed 18.5% of the genetic variation distributed among populations, a hierarchical AMOVA showed 11.9% of the total variation among the three groups, and 75.7% within populations. Genetic diversity and population size were not correlated, and different diversity measures uncovered the Lower Austrian populations as genetically diverse. Thus, distributional stasis and long-standing isolation have generated unique, but not (yet) genetically depauperated Anthyllis montana ssp. jacquinii populations at its northern distribution edge.

### 549. LIFE STRATEGY OF RED ALGAE (RHODOPHYTA) IN RUNNING WATER BIOTOPS

**KUCERA**, **PAVEL**, Masaryk University Brno, Faculty of Science, Czech Rep.; **Komarek**, **Ondrej**, Academy of Sciences of the Czech Republic, Czech Rep.

Freshwater red algae (Rhodophyta) require generally clear water, they are sensitive to levels of pollution. Therefore some of them are good bioindicator species, their occurrence in Europe is rare. From ecological point of view, they represent one group of benthic algae tied to substrate and growing as macroscopic clumps of biomass together with filamentous green algae. Other groups of benthic algae are free living on the bottom surfaces (diatoms and cyanophytes). The distribution of red algae populations was studied during the whole season in view of different substrates, climatic conditions by fotogrammetry and image analysis. The results show that measured parameters influence the distribution of macro-algal communities. Seasonal changes are due to spatial distribution of red algae significant. Substrate size plays the most important role. They grow in stable substrate (boulders and cobbles). The other important factors limiting the development of red algae are flow and light intensity. They require turbulent flow (streams, riffles, weirs and cascades). Light intensity influences the seasonal changes of phytobenthic communities. The most suitable conditions for their development are in spring and autumn, in summer only due to increasing shadow of leaf cover.

### 550. DIVERSITY FOR AN URBAN AREA - THE CONCEPT OF THE PROTECTION OF BIODIVERSITY IN KRAKÓW, POLAND

**KUDLEK**, **JOANNA**, Jagiellonian University, Poland; **PEPKOWSKA**, **ALEKSANDRA**, Jagiellonian University, Poland; **Walasz**, **Kazimierz**, Jagiellonian University, Poland; **Weiner**, **January**, Jagiellonia University, Poland

Kraków, the second largest city in Poland, is still rich in biodiversity values. The aim of our study was to propose a comprehensive protection plan addressing problems of nature conservation in an urban agglomeration.
Based on the literature and expert knowledge on the distribution of important species, the list of the biodiversity hotspots within the urban area has been assembled, along with detailed descriptions and methodical suggestions for active protection. Apart from the list of selected sites designated for protection, a broader management conservation plan for the entire city has been proposed. To achieve this, the whole area was divided hierarchically into possibly uniform biodiversity management units with respect to the land use and the threat factors. Finally, a conception of creating ecological parks in Kraków is presented with an outline of the possible realizations.
Funded by EU Project EVK2-CT-2002-80009.

### 551. BIODIVERSITY POLICY INTEGRATION INTO SECTORAL POLICIES THROUGH STRATEGIC ENVIRONMENTAL ASSESSMENT IN ESTONIA

**KULDNA**, **PIRET**, Estonian Institute for Sustainable Development (SEI Tallinn), Estonia

The study aims at assessing the current status of biodiversity policy integration into sectoral policies through strategic environmental assessment (SEA) in Estonia. It identifies the key factors for an effective consideration of biodiversity issues in SEA and explores their applicability in cases of sectoral SEAs. The methods used are literature review, document analysis and interviews. There is not much research done yet on biodiversity in sectoral plan or programme SEAs, compared to spatial planning SEAs. The study seeks to establish a general framework of opportunities and difficulties for effective biodiversity policy integration through sectoral SEAs from the viewpoint of SEA biodiversity experts. Most attention is paid on biodiversity planning and its usage in SEA, analysis of biodiversity-related impacts, alternative proposals, mitigation and

monitoring. The findings indicate that the consideration of biodiversity issues in SEAs depends on the level of abstraction of the associated sectoral plan. The more concrete it is, the more detailed impacts can be predicted. Therefore regional-level SEAs play an important role in specifying the effects on biodiversity and should be developed for all relevant sectoral development plans.

### 552. ESTABLISHMENT OF THE LONG-TERM MONITORING PROGRAM AND THE FRAME FOR THE CONSERVATION OF ITALIAN AGILE FROG, RANA LATASTEI, IN CROATIA

**KULJERIC**, **MARIJA**, Croatian Herpetological Society - Hyla, Croatia

As a part of the EEC Habitats Directive implementation, Croatian Herpetological Society, in cooperation with The State Institute for Nature Protection, has launched a project for monitoring and conservation of Rana latastei in Croatia. It is one of the most endangered amphibian species in Europe. Area of distribution in Croatia is restricted to the central part of the Istrian peninsula. None of the localities with R. latastei populations are included in the protected areas. Although there is very little data, recent declines are suspected due to drainage and deforestation. Guidelines of the program are: determine the present status of the species and threats to the species and their habitat in the area, prepare the national Species action plan, create a frame for habitat protection and management, establish long-term population and conservation monitoring, conduct public awareness and educational campaigns. Preliminary field surveys showed that R. latastei is present at a wider area then previously recorded, some localities are 10 to 15 km away from the nearest old ones. On the longterm scale, data from monitoring program will be used to evaluate and adjust conservation actions in the area. Conservation efforts will be oriented both towards species and their habitat.

### 553. WHY OTTERS (*LUTRA LUTRA*) PREY ON EUROPEAN POND TURTLE (*EMYS ORBICULARIS*)? EXPERIENCES OF A CASE STUDY

**LANSZKI, JÓZSEF**, University of Kaposvár, Hungary; **Molnár, Marcell**, University of Kaposvár, Hungary; **Biró, Janka**, University of Kaposvár, Hungary; **Molnár, Tamás**, University of Kaposvár, Hungary

In this case study, the ecological background of an unusual hunting behaviour was investigated, when otters preyed upon European pond turtles in a Hungarian fish pond system during a 18 months period. Predation on turtle was found only during cold periods (established by spraint analysis and also by the collection of 182 turtle carcasses in 2003). The relationship was not close between fish availability and turtle consumption. The crude protein content of the turtle head and leg was higher than that of fish, frog and turtle body, while the energy content of the samples was similar. The mean body weight of the killed turtles (460 g) fell within the range of the optimal prey size of the otter. Turtles were used as cache foods by otters during extreme environmental conditions (as in the long winter), but occurred only rarely as buffer foods during moderate winter. In fish ponds, the conservation of the coexistent otter and turtle depends on the pond management. The maintenance of a higher fish availability in ponds during winter makes it possible to avoid the need to acquire a proper hunting technique on turtle, indicated by the scarcity of the primary fish food.

### 554. OPTIMAL CLUTCH SIZE OF THE GALL WASP DIPLOLEPIS ROSAE (HYMENOPTERA: CYNIPIDAE)

**LÁSZLÓ, ZOLTÁN**, Ecological Institute, University of Debrecen, Hungary; **Tóthmérész, Béla**, Ecological Institute, University of Debrecen, Hungary

Optimal clutch size of the gall wasp *Diplolepis rosae* (Hymenoptera: Cynipidae) was examined in galls on *Rosa spp.* collected through three years. The rate of escaping success of newly hatched gall wasp adults was 18% respective to the mean clutch size while escaped parasitoid adults constituted 37% of the mean clutch size. Almost 25% of the mean clutch size contained dead gall wasp and parasitoid adults failed to escape from galls. The remaining gall cells contained dead larvae. With increasing clutch size parasitism rate decreased, while the rate of emerged and dead gall wasps increased. Clutch sizes that occurred most frequently did not agree with that which showed the maximum survival rate from young larva to adult emergence of the gall wasp. This discrepancy was examined from the viewpoint of the impact of clutch size on the number of emerged gall inducers, dead individuals and parasitism rate. It is concluded that the failure to escape from larger galls could be taken as an explaining variable for this discrepancy while the emerging gall inducer rate and parasitism rate not.

### 555. TARGET SPECIES IN A VINE GROWING AREA - CAN THEY PREDICT SPECIES DIVERSITY?

**LAUBHANN, DANIEL**, University of Natural Resources and Applied Life Sciences, Vienna

To monitor the effect of different management types on slopes between vineyards in the region Traisental, Lower Austria, a target species concept has been developed. Currently, we investigated whether the selected pool of zoological and botanical target species is applicable to give information about the species diversity of the slopes. On 30 slopes, within three study areas we counted all previously defined target species as well as numbers of plant, snail, and grasshopper species as biodiversity measure.
The botanical target species exhibited significant positive correlations to the number of grasshopper and plant species (Spearman's $r_S$ = 0.657, $p < 0.001$; $r_S$ = 0.869, $p < 0.001$, respectively), but no correlation was found with the snail species diversity ($r_S$ = -0.216, $p > 0.26$). Occurrences of zoological target species were restricted to only two study areas with very low individual numbers, thus prohibiting statistical analysis. Concluding, while the selected zoological target species are not applicable to draw general conclusions about species diversity, the number of present botanical target species actually shows a high correlation with the grasshopper and plant species richness of slopes in the vine growing region Traisental.

### 556. SCHOOL OF CONSERVATION BIOLOGY: TOWARDS EDUCATION AND CAPACITY BUILDING IN SCIENTIFICALLY SOUND BIODIVERSITY CONSERVATION IN SOUTHERN EUROPE

**LAZAR**, **BOJAN**, Croatian Natural History Museum, Croatia; **Besendorfer**, **Visnja**, University of Zagreb, Faculty of Sciences, Croatia; **Hamer**, **Bojan**, Rudjer Boskovic Institute, Croatia; **Holcer**, **Drasko**, Croatian Natural History Museum, Croatia; **Heppell**, **Selina S.**, Oregon State University, United States; **Heppell**, **Scott, A.**, Oregon State University, United States

Southern Europe is among European hot-spot countries with high biodiversity. This biodiversity includes intraspecific, interspecific and ecosystem diversity and high endemism rate. There is also a high diversity of political and economical structure of individual states, particularly in its southeastern part, ranging from EU members to underdeveloped countries. Reconciliation of biodiversity conservation and modern development in southeastern transitional countries is a demanding task and requires trained specialists. However, very few university curricula in the region include specialized courses in conservation biology. In order to continually enhance education and capacity building in the field of scientifically sound biodiversity conservation, the Croatian Biological Society has started with organization of an international graduate School of Conservation Biology (SCB). Through an intensive short course, the School provides basics on conservation biology from population to ecosystem levels, including labs and field courses. Through interactive classes, students are provided with insight in the latest trends, state of the art knowledge and available

methodologies/tools for biodiversity conservation. The impact of SCB is analyzed based upon (i) student's evaluation, (ii) representation of students from different countries, and (iii) possibility to apply obtained knowledge.

### 557. EFFECTS OF THREE HERBICIDES ON ASSIMILATORY PIGMENT CONTENT OF CHLORELLA VULGARIS AND BOTRYOCOCCUS BRAUNII

**LAZAR**, **DANIELA ANCA**, Bucharest University, Biology Faculty, Romania

The study of the effects of herbicide applications on algae culture represents a basic step in modelling the dynamics of algal populations in aquatic ecosystems with high herbicide polution risks. The Chlorella vulgaris and Botryococcus braunii cultures were used for the testing of the effect of the different concentrations of simazine, metribuzin and isoproturon on the growth and the chlorophyll a, b and carotenoid pigments content after 7 and 14 days from the add of the herbicide in the medium culture. The concentrations which inhibited with 50% the growth of the cells number of Chlorella after 7 days from the adding of the herbicide were about 0.631 microM for simazine, 0.282 microM for metribuzin and 0.023?microM for isoproturon. For Botryococcus LD (lethal doses) 50% were about 0.131, 0.222 and 0.950 microM, respectively, for isoproturon. Concomitantly, there were recorded significantly variations in the assimilatory pigments content from the variants treated with herbicides. The analyse of the regressions between the cells number and the pigments content shown that variation of the assimilatory pigments content may be explained through an adaptation reaction to self-shadowing for simazine and isoproturon, but in case of metribuzin the results suggest a direct effect of the herbicide.

### 558. INVASIVE RATTUS NORVEGICUS ERADICATION IMPACT ON ISLAND BIRDS AND INVERTEBRATE COMMUNITIES

**LE VIOL**, **ISABELLE**, Museum National dHistoire Naturelle, France; **Kerbiriou**, **Christian**, Muséum National dHistoire Naturelle, France; **Flandrin**, **Jonathan**, Muséum National dHistoire Naturelle, France

The invasion of ecosystems by allien species is currently viewed as one of the most important sources of biodiversity loss. One particular case concerns rats on islands. In September 1996, eradication of Rattus norvegicus from two islands of the Iroise insular complex (France) was successfully achieved.
Impact of eradication was measured on bird populations and terrestrial invertebrate communities. Birds were annually monitored from 1996 before eradication to 2001 and in 2006. Populations of three main terrestrial species increased significantly, from + 70% to 700% in 2001. The direct and indirect impacts (certainly due to increase of three insectivorous bird species) on the invertebrate community were also evaluated by comparing pitfall trapping before and one and ten years after eradication, on 6 neighbouring islands: the two rat-eradicated islands, two without rat, and two occupied by rats. The invertebrate community structure showed modifications: a significant increase of large size invertebrates (potentially preys for rats), and a decrease of small invertebrate species (potentially bird preys).
The results of this experimentation that manipulated the presence of species in complex trophic webs, allow to better understand the functioning of communities. They help to assess the efficiency of eradication programs and their impact on biodiversity.

### 559. POPULATION GENETICS OF THE AMERICAN MINK (MUSTELA VISON): IMPLICATIONS FOR ITS MANAGEMENT AND THE CONSERVATION OF NATIVE SPECIES IN SPAIN

**LECIS**, **ROBERTA**, IRTA, Spain; **Ruiz Olmo**, **Jordi**, Generalitat de Catalunya, Spain; **Domingo Roura**, **Xavier**, IRTA, Spain

The American mink, Mustela vison, a semi-aquatic carnivore originating from North America, was imported into Europe from the beginning of the XX century for fur farming practices. Due to massive escapes, farm damages, deliberate releases and/or accidents, feral mink populations were established in the aquatic ecosystems of many European countries, including Spain. We genotyped 155 American mink originating from País Vasco, Catalunya, Castilla León, Aragón, Valencia and Galicia using 10 polymorphic microsatellite loci to highlight population genetic structure, distribution and dispersal. M.vison populations in Spain appear quite differentiated and not yet connected by gene flow. Bayesian clustering analyses and spatial analyses of molecular variance detected 4 inferred clusters, overall coinciding with the sampled geographical localities, and the population in Catalunya resulted affected by a recent bottleneck. All sampled feral mink populations, except the Castilla León one, show very large estimated effective population sizes. Molecular analyses result useful to support local management strategies and indirectly benefit the conservation of threatened species in Spain, such as the endangered European mink (M.lutreola), and the polecat (M.putorius), which share the habitat with the American mink.

### 560. HABITAT USE AND RANGE MANAGEMENT ON PRIORITY AREAS FOR HEN HARRIERS

**LECKIE**, **FIONA**, Centre for Ecology and Hydrology, United Kingdom; **Arroyo**, **Beatriz**, Centre for Ecology and Hydrology, United Kingdom; **Redpath**, **Steve**, Centre for Ecology and Hydrology, United Kingdom; **Amar**, **Arjun**, The Game Conservancy Trust, United Kingdom; **Riley**, **Helen**, Scottish Natural Heritage, United Kingdom

To mitigate further decline of the hen harrier (Circus cyaneus) in the UK due to loss and deterioration of habitat, considerable emphasis has been placed on the creation of special protection areas (SPAs) to safeguard and manage valuable habitat for this species. Yet, relatively little is known about harrier habitat preferences and home ranges in the UK. The aim of this four-year study was to evaluate aspects of habitat that explain harrier breeding and foraging in Scottish SPAs, and to test whether the habitat-related relationships are general across all sites. We used long-term data of harrier nest locations together with new foraging data. Habitat was assessed by training satellite images with field-obtained habitat data. We present results on home range sizes and overlap, habitat use for hunting and the relationship between habitat and harrier nest distribution. We discuss the management consequences of our results.

### 561. THE INVASION OF RED DEER (CERVUS ELAPHUS) IN CORRELATION OF AFFORESTATION IN LANDSCAPE LEVEL

**LEHOCZKI**, **ROBERT**, Szent István University, Hungary; **SZEMETHY**, **LÁSZLÓ**, Szent István University, Hungary; **Katona**, **Krisztián**, Szent István University, Hungary; **Mátrai**, **Katalin**, Szent István University, Hungary; **Orosz**, **Szilvia**, Szent István University, Hungary

The increase in population numbers and aggressive range expansion of large game species is experienced in Hungary and also in many other countries of Europe. Red deer expands rapidly into the Hungarian plain and cause conservation and wildlife management problem. Many authors propose intensive agriculture as the main cause of this process. Several others emphasize the inappropriate game management or the importance of increasing forest coverage. We investigated the role of forest habitats in this process. A long-term radio telemetry study carried out in three different biotops proved that the majority of red deer individuals use forests exclusively and only temporal use of agricultural areas was found. On the basis of diet analysis forests provides more and better quality food supply for deer than agricultural areas. The GIS analysis showed stronger correlation between deer population size and the forest cover or the dispersion of forest blocks, than the coverage of forest-agriculture complex habitats. These results highlight the importance of forests compared to agricultural lands. These findings should be considered in planning of new afforestation programs.

### 562. CONSERVATION GENETIC ANALYSIS OF CULTURED AND NATURAL-WATER POPULATIONS OF COMMON CARP (CYPRINUS CARPIO) IN HUNGARY

**Lehoczky**, **István**, University of Kaposvár, Hungary; **NAGY**, **ZOLTÁN TAMÁS**, Research Institute for Fisheries, Aquaculture and Irrigation, Hungary; **Magyary**, **István**, University of Kaposvár, Hungary; **Hancz**, **Csaba**, University of Kaposvár, Hungary; **Bakos**, **János**, Research Institute for Fisheries, Aquaculture and Irrigation, Hungary; **Jeney**, **Zsigmond**, Research Institute for Fisheries, Aquaculture and Irrigation, Hungary

The intraspecific variation, phylogenetic history, population and conservation genetics of diverse lines and landraces of the common carp (Cyprinus carpio L.) was evaluated using up to eight microsatellite markers. More than 600 samples have been collected from specimens kept in the live gene bank at the Research Institute for Fisheries, Aquaculture and Irrigation in Szarvas (Hungary), as well as from some natural-water populations from Hungary and abroad. A basal and distinct phylogenetic position of the Asian populations has been proved. Among European populations, „wild" (natural) lines – e.g. populations of the Danube and Tisza rivers – were clearly separated form cultured ones and from each other, too. In spite of their relatively recent separation event, natural populations could be well distinguished based on few (already 2-3) characteristic microsatellite markers. The cultured lines in Hungary showed close genetic relationship to each other according their known breeding history. Inbreeding effects at a certain extent could be observed as a result of the loss of heterozygosity. By natural/wild lines – even kept in live gene bank – the observed heterozygosity was constantly higher than by cultured lines. Our results show that live gene banks may singnificantly contribute to maintain valuable fish strains.

### 563. THE EFFECT OF FOREST SUCCESSION ON LIFE-HISTORY TRAITS OF PRIMULA VERIS

**LEHTILÄ**, **KARI**, Södertörn University College, Sweden; **Syrjänen**, **Kimmo**, Finnish Environment Institute, Finland; **Leimu**, **Roosa**, University of Turku, Finland; **Begoña Garcia**, **Maria**, Instituto Pirenaico de Ecología (CSIC), Spain; **Ehrlén**, **Johan**, Stockholm University, Sweden

Primula veris belongs to a group of species that thrive best in grassland habitats but are also able to survive in different stages of forest succession. We used demographic modelling to determine how population growth rate of the cowslip Primula veris and performance of individuals in different life history transitions are affected by habitat closure and forest succession. The field study was carried out in Sweden and Finland. Primula veris had a positive growth rate in all studied habitat types except in late stages of forest succession. Seedling recruitment, however, was sensitive to habitat closure already at early and middle phase of forest succession. Elasticity analysis showed that survival and growth of full-grown plants contributed most to population dynamics, especially at late successional stages. We conclude, however, that management for better seedling recruitment is necessary because survival of full-grown individuals is already high. Recruitment of many perennial plant species may suffer from habitat closure, but population response to deteriorated conditions may be slow because sensitivity of population growth rate to seedling recruitment is low.

### 564. SHORT-TERM RECOVERY OF THE EDAPHIC ARTHROPOD COMMUNITY AND OF SOIL FUNCTIONAL PARAMETERS AFTER A FOREST WILDFIRE

**LEITÃO DAS NEVES CURADO**, **NUNO FILIPE**, Universidade de Aveiro, Portugal; **Antunes**, **Sara**, Universidade de Aveiro, Portugal; **Gonçalves**, **Fernando**, Universidade de Aveiro, Portugal

Every year in Portugal a large number of forest fires takes place and there is a need to study the effects of these disturbances in forest ecosystems and, more importantly, the way their natural recovery takes place. This work intended to study the shortterm recovery of the edaphic arthropod community and of some soil functional parameters (physical and chemical data and soil enzymatic activities) in a burnt Pinetree area. Soil and arthropod sampling was carried out in the burnt area and in a neighbouring unburnt area, approximately three and eight months after the fire, coinciding with winter and spring. The differences in the arthropod community between the burnt and the unburnt areas were large during winter, but converged in spring. In the winter, the burnt area was dominated by opportunists (like Formicidae) and carrion feeders (Silphidae) that exploited the spoils of the fire, while in spring predators were dominantly present (Linyphiidae and Staphilinidae). In spring, significant differences between the burnt and the unburnt areas were still observable for the majority of the measured soil parameters. Globally, the results showed a potential recovery of the edaphic fauna and, to a lesser scale, of soil functional parameters.

### 565. COMPARATIVE ANALYSIS OF PHYSIOLOGICAL AND MORPHOLOGICAL CHARACTERISTICS OF WILD AND HATCHERY-REARED ATLANTIC SALMON (SALMO SALAR L.) JUVENILES

**LELIUNA**, **EGIDIJUS**, Institute of Ecology of Vilnius University, Lithuania; **Kazlauskiene**, **Nijole**, Institute of Ecology of Vilnius University, Lithuania; **Kesminas**, **Vytautas**, Institute of Ecology of Vilnius University, Lithuania

Releases of the hatchery-reared Atlantic salmon (Salmo salar L.) juveniles have become a common measure to restore and support vulnerable wild populations of the species. Qualitative features of the released fish are of crucial importance considering conservation issues. In our study we compared some morphological and physiological parameters of the hatchery-reared (Zeimena Hatchery) and wild salmon juveniles originating from the wild population of the Zeimena River (Svencionys district, Lithuania). The samples were collected and studied in 2001 – 2004. Maturation patterns and operculum malformations were used as the measures to evaluate differences between life history of the fishes in the natural and artificial conditions. The hatchery salmon parr were characterized by accelerated growth and maturation rate. Share of precocious parr males in the hatchery samples was significantly higher than in the samples of wild population. High percentage of unilateral or bilateral disorders of the operculum was detected in the hatchery juveniles. Constituents of the hatchery conditions – temperature regime, feed quality and feeding level were identified as the most important factors causing precocious maturation and morphological malformations of the hatchery juveniles.

### 566. FECUNDITY OF A NATIVE AND AN INVASIVE FISH SPECIES IN DIFFERENT ENVIRONMENTAL CONDITIONS

**LENGYEL**, **PÉTER**, Research Institute for Fisheries, Aquaculture and Irrigation, Hungary; **Józsa**, **Vilmos**, Research Institute for Fisheries, Aquaculture and Irrigation, Hungary; **Györe**, **Károly**, Research Institute for Fisheries, Aquaculture and Irrigation, Hungary

Increasing abundance of invasive species decisively affect the species composition of fish fauna. For restoring the species composition, it is indispensable to know the fecundity indices of the dominant fish species. Knowing these, it is possible to determine the interventions leading to biomass ratios approaching the original ones. During our studies on Lake Balaton and River Tisza, we studied the absolute fecundity of fish before the reproduction period. The objects of the study were in both cases the native white bream (Blicca bjoerkna) and the invasive goldfish (Carassius auratus gibelio). In both fish species, fecundity was significantly higher in river samples than in lake ones. In goldfish, fecundity of older age groups, starting from the 7th year, increased by an order of magnitude, from hundreds of thousands to millions. Intensive fishing of older age groups can slow down the further stock growth. In white bream, the age-group-specific fecundity of the Tisza samples was homogeneous independently from the habitat. In lake samples, there were significant differences in the fecundity indices

obtained in the four basins of the lake. Because of the relatively low fecundity, the necessary recruitment can be assured with limited fishing of older age groups.

### 567. INTEGRATING DYNAMIC ASPECTS OF HUMAN-WOLVES RELATIONSHIPS INTO CONSERVATION PRACTICES

**LESCUREUX**, **NICOLAS**, Museum National dHistoire Naturelle (Paris), France

Management and conservation of wolves populations are often linked to the modalities of human-wolf coexistence. Recent ecological researches confirm the important consequences of human activities on wolf behaviour. By comparison, studies on wolf influences on human behaviour are not numerous and often reduced to local people attitudes. Moreover, each agent of the relationship is studied independently. The ethnological investigations I led in Kyrgyzstan among shepherds and hunters during nine months showed that conflicts in this country were not based on irrational cultural perceptions. Knowledge, perceptions and practices were built in interaction with wolves through a common history. Since wolves adapted to new human practices, relationships were in constant evolution. These results led us to consider that human-wolves relationships must be studied in their dynamic dimension, by monitoring simultaneously wolf behaviours, human practices and their co-evolution. Management of wolves populations has to take into account many external factors due to human societies complexity. Since these external factors are not easily predictible, management is a long time process which has to be redefined all the way through experience.

### 568. AFFORESTATION IN MEDITERRANEAN ECOSYSTEMS: NATIVE PLANTS AND ARTHROPODS IN SEMI-NATURAL AFFORESTED HABITATS

**LEVANONY**, **TAL**, Tel-Aviv University, Israel; **Columbus**, **Ehud**, Tel-Aviv University, Israel; **Mandelik**, **Yael**, Tel-Aviv University, Israel; **Chikatunov**, **Vladimir**, Tel-Aviv University, Israel; **Zonstein**, **Sergei**, Tel-Aviv University, Israel; **Kravchenko**, **Vasiliy**, Tel-Aviv University, Israel; **Dayan**, **Tamar**, Tel-Aviv University, Israel

Afforested habitats are a major component of many Mediterranean ecosystems. In light of growing development pressure in Mediterranean ecosystems, afforested landscapes become an important component of the remaining open landscape. We compared abundance, species richness and community composition in natural maquis and pine plantations in the Judean foothills, 30 km south-west from Jerusalem. We established twenty-four 0.1 hectare plots in afforested habitats with dominance of Pinus halepensis in two density levels (240 and 490 trees per hectare), and in maquis habitats. We carried out a seasonal study of spiders, beetles moths, and vascular plants using pitfall and light traps and plant surveys. Abundance and species richness of beetles and spiders and plant species richness in pine plantations were lower then in natural maquis. Similarity indices showed significant differences in the species composition of beetles and spiders between the two habitats. Great differences were found between the dominant beetles' species of the two habitats. No significant difference was found between the two densities of afforested areas. Differences in the moths' community were inconsistent. We conclude that afforested habitats support a different fauna compared to the natural habitats they replace, and that this pattern obtains even with reduced pine densities.

### 569. DIVERSITY OF INTERSPECIFIC INTERACTIONS OF SMALL BALSAM (IMPATIENS PARVIFLORADC.) PROMOTES ITS INVASIVE SUCCESS IN MAZURIAN LAKELAND

**Lipinska**, **Agnieszka**, CENTRE FOR ECOLOGICAL RESEARCH PAN, Poland; **Uchmanski**, **Janusz**, Centre for Ecological Research PAN, Poland

Small balsam is an invasive plant species which has successfully colonized Europe and have a large impact on the environment. This quintessential invader arrived from the Himalayan region and has since spread rapidly throughout European countries. The current project aims are to investigate probable causes and effects of small balsam success in Poland. The investigation consisted of laboratory experiments and field observations. Experiments were designed from spring to autumn at adjacent experimental sites. Samples were taken three times a season. The arbuscular mycorrhizal status, diversity of nonmycorrhizal fungi coexisting with seeds and densities of soil meso- and macrofauna which influence roots and seeds of this plant were investigated. Plants number and seed productivity were calculated, too. Our results demonstrate that small balsam success may depend on the better ecological adaptation of this species (e.g. higher seed production) and lower susceptibility to pathogens. Small balsam exude chemicals from their roots and leaves that are detrimental to other plants growth. This species also accumulates less soil mesofauna, which have an influence on its roots. Arbuscular myccorhiza is typical of small balsam, but there are differences between the diversity of mycorrizal fungi in the roots of both species in experimental sities.

### 570. COMPARATIVE RADIOTRACKING SURVEY OF FEMALE TESTUDO HERMANNI TORTOISES IN BURNT AND INTACT HABITATS : CONSEQUENCES ON MANAGEMENT AND CONSERVATION PRACTISES

**LIVOREIL**, **BARBARA**, SOPTOM, France

The 2003 summer fires in southern France killed 64% adult and 99% immature tortoises of one of the few remaining population of this species. Some animals were spared because they probably moved away to humid areas during an unusual springtime drought. These tortoises recolonized the whole site very quickly thanks to the rapid regrowth of the vegetation. Nevertheless, the population is fragile and may require conservation management. The problem is to choose what to do in order to have a parsimonious yet efficient impact on survival and reproduction on this site. To promote natural recovery (rather than a captive breeding program), we studied habitat use and compared surviving tortoises to congeners living in two intact sites differing by their vegetation structure. Results show differences in home range sizes but similar habitat preferences. The burnt area seems more favorable for foraging but predation on eggs is high. Tortoises describe looping patterns in their environment within about 3 weeks, slightly modifying their direction between two successive loops, until they move to a new zone for summer. This behavioral pattern has important consequence on future management programs as well as capture-recapture studies.

### 571. GIS-BASED PREDICTIVE MODELS ON NESTING SELECTION OF AN ENDANGERED RAPTOR APPLIED TO IMPORTANT BIRD AREAS DESIGN

**LÓPEZ-LÓPEZ**, **PASCUAL**, University of Alicante, Estación Biológica Terra Natura/Cibio Centro Iberoamericano de la Biodiversidad, Spain; **García-Ripollés**, **Clara**, Spain; **Urios Moliner**, **Vicente**, University of Alicante, Estación Biológica Terra Natura/Cibio Centro Iberoamericano de la Biodiversidad, Spain

To identify potential habitat for endangered species is a major concern in Conservation Biology in relation to protected areas design. For this purpose, predictive models on breeding habitat preferences of Bonelli´s eagle Hieraaetus fasciatus have been performed at four different spatial scales in a Mediterranean area. The Iberian Peninsula holds approximately 80% of the European breeding pairs and it is considered as Endangered according to the recently published Red Book of the Birds of Spain. Topographic, disturbance, climatic and land use factors were measured on a Geographic Information System at occupied and unoccupied U.T.M. squares in order to develop predictive models. By our results, we consider that there is a hierarchical framework on habitat selection procedure. Probability of species occurrence increases with slope in craggy areas at lower altitudes. Also, the species seems to prefer

disperse forests, scrubland and agricultural areas. Predictive models obtained will be used to efficient monitoring this scarce species, predict range expansions or identify suitable locations for reintroductions and also to design protected areas such as Important Bird Areas (IBAs) to help on wildlife management. A prediction map of the species´ potential habitat is presented, highlighting suitability areas for Bonelli´s eagle to include them in the future NATURA 2000 network.

**572. PULSED RESOURCES IN A MEDITERRANEAN LANDSCAPE AND THEIR IMPORTANCE TO EURASIAN BADGERS CONSERVATION**

**LOUREIRO**, **FILIPA**, University of Lisbon, Portugal; **Bissonette**, **John A.**, Utah State University, United States; **Macdonald**, **David W.**, Oxford University, United Kingdom; **Santos-Reis**, **Margarida**, Centro de Biologia Animal, Faculdade de Ciências

The Mediterranean landscape of Serra de Grândola (Portugal) is one of the many habitats inhabited by Eurasian badgers (Meles meles) where the unpredictable and ephemeral availability of food may be characterized as a pulsed phenomenon. We evaluated fruit and arthropod availability throughout four years, and analysed 165 faecal samples of badgers to reveal their diet over one of these years. The badgers' primary foods were insects (Coleoptera and Orthoptera) and fruits (e.g., olives, acorns and pears), and in general terms they showed year-to-year fluctuations. Despite this, an annual pattern was clear to orthoptera, olives and acorns, confirming the pulsed characteristic of these resources. Some of the yearly variations in food availability were strongly associated with climate variables. Badgers tracked the annual pulses of the availability of coleoptera, olives and pears. The tracking of pulsed resources may have implications for the population dynamics, behaviour, and social organization of the badgers and can be interpreted as an adaptation to the unpredictability characteristic of Mediterranean habitats. The conservation of Eurasian badger in these habitats is therefore closely connected with the preservation of these landscapes and the heterogeneity of patches of different biotopes.

**573. CONSERVATION OF DWARF BROWN TROUT' (*SALMO TRUTTA M. FARIO* L.) POPULATION**

**LUKIN, ANATOLY**, Russian Academy of Science, Northern Water Problems Institute, Russia; **Sharova, Julia**, Russian Academy of Science, Northern Water Problems Institute, Russia

Biodiversity of northern oligothrophic water bodies not depends on species number. It depends on number of ecological forms that differ in morphology and ecology. The aim of the investigation is initiate a long-term conservation program for the Brown trout (*Salmo trutta* L.) and continue research on the distribution, dynamics and long-term effects of anthropogenic impact and poaching on the Brown trout populations in Russian Rivers. *Salmo trutta m. fario* (L.) is one of the forms of brown trout (*Salmo trutta* L.). This species is at present included in the Red Data Books of Russia as an endangered species. *Salmo trutta m. fario* (L.) is genetically important for conservation of biodiversity of north ecosystems and increase in the number of the Brown trout' populations. The rivers and streams of Baltic Sea are spawning places of this species. Water ecosystems are intensively exploited and the Brown trout is in critical situation due to the dramatically decreasing suitable spawning places. Poaching and technogenic pressure is also high despite the restrictions due to low fisherman and local people awareness. This highlights the urgency of protecting and recovery the spawning places, improvement of legislation, aquaculture, poaching control vital to the Brown trout' long-term survival.

**574. HABITAT DIVERSITY, FRAGMENTATION AND CONNECTIVITY IN THE ENVIRONMENT AROUND HUELVA (SW, SPAIN)**

**LUQUE PALOMO**, **CARLOS JAVIER**, Universidad de Huelva, Spain; **Muñoz Gonzalez**, **Jerónimo**, Universidad de Sevilla, Spain; **Álvarez López**, **Antonio Agustín**, Universidad de Sevilla, Spain; **Redondo Gómez**, **Susana**, Universidad de Sevilla, Spain; **Mateos Naranjo**, **Enrique**, Universidad de Sevilla, Spain; **Castellanos Verdugo**, **Eloy Manuel**, Universidad de Huelva, Spain; **Vecino Bueno**, **Inmaculada**, Universidad de Sevilla, Spain; **Figueroa Clemente**, **Manuel Enrique**, Universidad de Sevilla, Spain; **Fernandez Muñoz, Francisco,** Universidad de Sevilla, Spain

The environment around Huelva (146 961 ha) is interesting for its richness of habitats and diversity of uses. These include coastal sand dunes, salt marsh, urban centres, mediterranean forest and various crops. In addition, the study area is bordered by the Natural Park of Doñana, within which is the National Park, refuge habitats for many species. In this project, landscape diversity and habitat fragmentation were measured for different groups of animals, using type species. A GIS-based model was developed to analyse connectivity, using maps of landuse and soil and vegetation cover of Andalucia as the base layers. This study found that the landscape consists of a mosaic of different habitats with relatively high diversity. There are three areas with good internal connectivity but poorly connected with each other. The model identified ecological corridors, primarily associated with the network of water courses and ten potential bottlenecks that should be taken into account by environmental managers concerned with the biological conservation of the area.

**575. EFFECTS OF HABITAT FRAGMENTATION ON BIG AND MEDIUM-SIZED MAMMALS COMMUNITY IN SAO PAULO STATE (BRAZIL)**

**Lyra-Jorge**, **Maria Carolina**, University of Sao paulo, Brazil; **Ciocheti**, **Giordano**, University of Sao paulo, ;Brazil; **Pivello**, **Vania Regina**, University of Sao paulo, Brazil

Sao Paulo State is the most densely populated in Brazil, and consequently, a few patches of the native vegetation remain. However, big and medium-sized mammals are still present, including endangered species like Puma concolor, Chrysocyon brachyurus, Myrmecophaga tridactyla, and others. The area of this study considered 7 fragments of savanna and semideciduous forest and their surroundings, composed essentially by sugar-cane and eucalyptus monocultures. To understand how the process of habitat fragmentation influenced the occurrence of big and medium-sized mammals, 23 camera traps were installed in the study area, remaining there for 17 months. From the 15 species registered, Puma concolor,Chrysocyon brachyurus and Tayassu tajacu explored the landscape most intensely, with a relative frequency index (RFI) of 12; LeoparduspardalisandHerpailurus yagouaroundi, in contrast, registered RFI of . Chrysocyon brachyurus showed the highest relative abundance index (RAI = 0,00485), followed by Puma concolor and Tayassu tajacu (RAI = 0,00416). MANOVA tests suggested the distribution of these mammals in the landscape is more influenced by the habitat quality in the patches and matrix than by the vegetation type. Therefore, keeping the quality of the fragments is vital to save one of the last mammal refuges in the region.

### 576. GENETIC CHARACTERIZATION OF IBERIAN BROWN TROUT (*SALMO TRUTTA*) POPULATIONS AT MICROGEOGRAPHICAL LEVEL USING MICROSATELLITES DNA ANALYSIS

**MADEIRA M.J.**, Universidad del País Vasco. Facultad de Farmacia. Departamento de Zoología y Biología Celular Animal. Spain; **Machordom, A**., Museo Nacional de Ciencias Naturales (CSIC). Departamento de Biodiversidad y Biología Evolutiva, Spain; **Gómez-Moliner, B.J.,** Universidad del País Vasco, Facultad de Farmacia. Departamento de Zoología y Biología Celular Animal. Spain**; Guyomard, R**., Institut National de la Recherche Agronomique-France (INRA). Département de Génétique des Poissons, France

Biodiversity conservation has become a priority for the people involved in the management of natural resources. However, this principle is more difficult to be applied to those species under exploitation due mainly to economic interests. In this work we assessed structural gene variation of several brown trout populations located in several streams from the north of Iberian Peninsula, including populations of brown trout from different drainages: Cantabrian-Atlantic, Mediterranean and Duero basins. We have analysed allele frequency variation and distribution at 9 microsatellites loci with the aim to analyse the Iberian population's structure at microgeographical scale which is important for conservation and management of the ESUs (Evolutionary Significant Units) identified. Moreover, we also examined extent of introgression by alien genomes due to the stocking activities employing non-indigenous hatchery specimens. The results obtained showed a microdivergence within major brown trout lineages mainly in the Cantabrian-Atlantic basin due to genetic differentiation and local adaptation. Besides, microsatellites markers provided us a good tool for the measure of genetic introgression. Using Bayesian methods we detected a higher index of hybridization than previously found by other methods. The presence of hybrid specimens was higher in the Mediterranean basin than in the Cantabrian-Atlantic basin.

### 577. GENETIC COMPARISONS OF ENDANGERED POPULATIONS OF VIPERA URSINII MOLDAVICA AND VIPERA URSINII RAKOSIENSIS

**MAJOR**, **ÁGNES**, Hungarian Natural History Museum, Hungary; **Halpern**, **Bálint**, MME Bird Life Hungary, Hungary; **Péchy**, **Tamás**, MME Bird Life Hungary, Hungary; **Kiss**, **Botond**, Danube Delta National Institute for Research and Development, Romania

We examined 49 meadow vipers (Vipera ursinii moldavica) from two isolated populations in the Romanian Danube-Delta and 17 samples (Vipera ursinii rakosiensis) from the area of Kiskunság National Park in Hungary. We recorded morphometric data and collected blood-samples: 18 from Sfântu-Gheorge, 31 from Periteasca, and 17 from Kiskunság National Park. We included 29 morphological characters, 68 polymorphic loci found with 14 decamer RAPD primers and 39 alleles found at 4 microsatellite loci for characterisation of the relationships. According to AMOVA analyses, 17% of the genetic variability of the microsatellite loci was divided among the subspecies, 14% among populations, and 69% between the individuals of populations (P = 0.001). As for RAPD fragment diversity, AMOVA showed 19% variability between subspecies, 6% among populations of species, and 74% for individuals within populations. Principal coordinates analyses based both on the RAPD band presence/absence Huff-distances and microsatellite genotypic distances of the individuals, clearly differentiated the samples according to their origin. However, in the PCA plots constructed by 29 morphological characters, the members of the Vipera ursinii moldavica populations are mixed, but females and males are slightly separated. The separation of the subspecies proved to be smaller than for the molecular markers.

### 578. CRYOPRESERVATION OF POST-MORTAL EPIDIDYMAL SEMEN IN MOSCOW ZOO

**MAKSUDOV**, **GEORGE**, Moscow Zoo, Scientific Department, Russia

Post-mortem spermatozoa recovery is an important technique in obtaining germplasm after animal death. According to Moscow zoo program, the testes were excised from dead males and stored different time at 4°C. Then spermatozoa were recovered from the cauda epididymis, accessed and frozen in liquid nitrogen. In 2005 year we got 19 specimens from 10 species: kiang *Equus kiang*; goat *Capra hircus*›; giraffe *Giraffa camelopardalis*; markhor *Capra falconeri*; white-tailed gnu *Connochaetes gnou*; polecat *Mustela putorius*; european mink *Mustela lutreola*; american mink *Mustela vison*; hunting dog *Lycaon pictus*; manned wolf *Chrysocyon brachyurus*. The sperm quality of 6 specimens was found to be unsuitable for freezing. Other samples were frozen. Pellet and straw methods and different extenders were used. The glycerol in concentrations from 4 to 10% was the cryoprotectant. Motile spermatozoa were recovered and successfully frozen even after storage for 9 (goat) and 7 days (gnu). Initial spermatozoa motility was 32 and 55%; post-thaw ones were 7 and 9% accordingly. Therefore, if animals die unexpectedly and cryopreservation is not possible immediately, temporal storage of testes at 4°C followed by spermatozoa cryopreservation may help to preserve their genomes. This might be useful to save genetic material from rare species.

### 579. EFFECTS OF FARMING IN UNDERSTORY ON SPECIES COMPOSITION OF FOREST (CASE STUDY WEST FORESTS OF IRAN

**Maleknia**, **Rahim**, Tehran University, Islamic Rep. of Iran**; Feghi**, **Jahangir**, Tehran University, Islamic Rep. of Iran; **Namiranian**, **Manochehr**, Tehran University, Islamic Rep. of Iran; **Namiranian**, **Manochehr**, Tehran University, Islamic Rep. of Iran

Zagros forest in the west of Iran with an area of 5 million ha accounts for almost 40% of countrys forests. Non_ irrigated farming in understory of these forests is common. In order to study the effects of this farming manner on species composition , two forest regions were selected in which understory of one region is used as farmland and another is not. For this end in each region 30 plots were established. data were converted to exsell and spss spred sheets. Results indicated: in forest with farmed undestory only Quercus persica occurs but in forest without farmed understory in addition to this specie Acer monspessulanum, Amygdalus sp. , ficus sp. , PIstacia mutica , P. khinjuk ,Ddaphnia sp. And Cratagus sp. occur. In forest with farmed understory 28% and 72% of trees have seed origin and coppice origin respectively but in non farmed understory forest 60% and 34% of trees have seed and coppice origin respectively and 6% are shrubs. Statistics analyzes show farming in understory significantly reduces regeneration of forest, canopy cover and abundance of undergrowth plants

### 580. GENETIC ANALYSIS OF THE POPULATIONS OF CENTAUREA HORRIDA BADARÒ (ASTERACEAE)

**MAMELI**, **GIULIA**, Università degli Studi di Sassari, Italy; **Meloni**, **Marilena**, Università degli Studi dellInsubria, Italy; **Binelli**, **Giorgio**, Università degli Studi dellInsubria, Italy; **Filigheddu**, **Rossella**, Università degli Studi di Sassari, Italy

Centaurea horrida B. (Asteraceae) is an endemic species whose habitat is restricted to the North-West of Sardinia, with the exception of an isolated population in the North-East, its ecological range being restricted to rocky cliffs presenting the species with harsh conditions especially related to drought. The species is protected under the Habitat 92/43 CEE Directive and it is in the IUCN Red List. We have undertaken a conservation project that has started with the estimate of the amount and of

the distribution of the genetic variability of the species. To this purpose, we have tested the cross-amplification of 10 SSRs specific for Centaurea corymbosa, four of which have yielded single-locus, polymorphic markers. We have sampled and geo-referentiated 172 plants of the Alghero, Stintino and Asinara populations; the plants have been genotyped by means of the four markers. The amount of genetic variation, as estimated by He, was between 0.6 (Alghero) and 0.91 (Stintino) while genetic differentiation, as estimated by FST, was 0.146 averaged over all loci. AMOVA demonstrated a significant amount (14% between regions, 12% among pops/within region) of genetic variation between the populations studied. The genotyping of the progeny from single plants will allow us to estimate the amount of gene flow in this species.

### 581. POLYMORPHISM OF THE MHC CLASS II DQA GENE IN BROWN HARES (LEPUS EUROPAEUS) FROM EUROPE, TURKEY AND ISRAEL

**MAMURIS**, **ZISSIS**, University of Thessaly, Greece; **Stamatis**, **Costas**, University of Thessaly, Greece; **Suchentrunk**, **Franz**, Vienna Veterinary University, Austria; **Moutou**, **Katerina A.**, University of Thessaly, Greece

Class II major histocompatibility complex (MHC) molecules involved in the initiation of the immune response. Species or populations with low MHC polymorphism may be particularly vulnerable to infection, and consequently may face a higher risk of extinction. Whether limited MHC diversity affects population survival remains controversial. We studied the polymorphism of DQA gene in 558 brown hares (Lepus europaeus) from Greece, other European countries, Turkey and Israel, using the SSCP method in combination with nucleotide sequence analysis. A total of 67 SSCP profiles were detected (45 heterozygotic and 22 homozygotic), resulting from 33 different alleles. DQA polymorphism was at higher levels from those reported for other mammalian species. No common alleles or profiles were found between Europe and Turkey-Israel. Levels of polymorphism and heterozygosity were significantly higher in Turkey and Israel than in Europe, showing congruence with mitochondrial DNA and allozyme data analyses already conducted in the same samples. This might be the result of a combination of Anatolia's biogeographic position with the chance of multiple gene flow from neighboring regions, and the likelihood of long-term presence of hares during the last ice age, when large parts of more northern latitudes did not provide suitable habitats.

### 582. THE APPEARANCE AND CHARACTER OF STAND STRUCTURE OF AN UNMANAGED, NATURAL-LIKE BEECH-SILVER LIME FOREST (ROPOLY FOREST RESERVE, HUNGARY)

**MÁNYOKI**, **GERGELY**, Univ. of Pécs, Hungary; **Horváth**, **Ferenc**, Hungarian Academy of Sciences, Hungary; **Borhidi**, **Attila**, Univ. of Pécs, Hungary; **Sárfi**, **Nikoletta**, Univ. of Pécs, Hungary; **Révész**, **András**, Hungarian Academy of Sciences, Hungary

The structure of the tree stand is a momentary state of the dynamically changing forest stand which is also determined by human disturbance. This type of researches have an important conservational role if it is done in unmanaged forest. The aim of these researches is to explore the structural elements, habitats and recognise the natural forest dinamics to serve the "reform-sylviculture". The conditions of these studies is ensured by the status of Forest Reserve core area. The goal of this study was to explore and characterize the tree stand structure of a 120 years old Vicio oroboidi-Fagetum forest in 0,5 hectare quadrat. We marked and mapped the trees which had bigger diameter at breast height than 6 cm, and we assigned 22 primer variable to each tree. The investigated area's 38-48 meter high overdominated trees have poorly overhand splayed crown form, while the largest crown-wide of the overtopped and intermediate trees are lokated at the half or at the lower part of their crown-length. Our results contrast with some literatures because this two storeyed crown-structure of natural-like Vicio oroboidi-Fagetum shapes as follows: the beech take place in the upper-, but the silver lime is in the lower crown layer.

### 583. ORNTIHOLOGICAL ANALYSIS AS PLANNING AND MANAGEMENT TOOL IN THE URBAN PARK OF NAPLES HILLS

**MARIA FILOMENA**, **CALIENDO**, University Federico II Napoli, Italy; **Lucilla**, **Fusco**, Istituto di gestione della fauna, Italy

The urban fast growth and consequent degrade of natural ecosystems show the importance of urban areas, as peculiar ecosystem to defend. It's necessary a further planning for the recovery of degraded areas, particularly difficult in Neapolitan areas having radically modified territories. The 2004 june 16 the metropolitan Park of Naples hills was founded. It promotes a sustainable model of the Naples town. From this it's necessary some opportune elaborations of biological datas, as environmental indicators and urban endurability, to be utilized by local managers. Analizing the various ecotopes of the Park we noted the lack of revised zoological data and specificity of these for the various zones constituting the park. For that it's interesting to propose a research identifying : a) the various ecotopes b) to describe animal communities, utilizing the birds as study model. They are a good bioindicator, as for their abundance and censusing, as for their sensibility to minimal environmental transformations (Morrison, 1986). With the use of mathematical models this taxon gives many important informations on the community status and on the whole ecological system. Furthermore various thematic maps can be produced by overlay of the environmental and faunistic data, by means of GIS techniques. With this analysis is possible to evaluate the natural environmental quality and to identify the recovery enterprises and the environmental vocation actions.

### 584. EVALUATION OF THE CONSERVATION STATUS OF NARCISSUS SEROTINUS IN THE IBERIAN PENINSULA

**MARQUES**, **ISABEL**, Museu Nacional História Natural, Portugal; **Draper**, **David**, Museu Nacional História Natural, Portugal

Conservation programmes are usually connected with scarce, threatened or rare species. Plants traditionally considered as common are often neglected in terms of conservation plans. N. serotinus is a xenogamous species widespread through the Mediterranean coast. It is not included in protected lists although populations are often fragmented and occur in degraded habitats. Thus, a field survey was promoted to evaluate the present status of N. serotinus in the Iberian Peninsula. Several populations along this area were visited and main threats were analysed. The results show that SW populations are generally well conserved in contrary to SE populations that are fragmented in isolated patches and threaten by habitat loss and degradation. The reproductive success of this species also declines along the Iberian Peninsula being correlated with the size of the population and the habitat conservation. Floral visitors are very low in some populations revealing a disrupt in plant-pollinator interactions. In some populations, hybridization with a co-generic species also affects the conservation of this species. Due to these results, conservation categories for administrative region were evaluated considering neighbouring populations and main gene flow distances.

### 585. MONITORING WILDLIFE USE OF CROSSING STRUCTURES ON MOTORWAYS: SHOULD WE USE FOOTPRINTS OR PHOTOGRAPHIC SYSTEMS?

**MATA**, **CRISTINA**, Universidad Autonoma de Madrid, Spain; **Hervas**, **Israel**, Universidad Autonoma de Madrid, Spain; **Herranz**, **Jesus**, Universidad Autonoma de Madrid, Spain; **Suarez**, **Francisco**, Universidad Autonoma de Madrid, Spain; **Malo**, **Juan E.**, Universidad Autonoma de Madrid, Spain

We analyse the effectiveness of two different monitoring procedures (tracks left in marble dust vs. photographic systems) used to control vertebrate crossing of motorways through wildlife and nonwildlife engineered passages. Both systems were used

simultaneously in 94 crossing structures to estimate detection likelihood for 1) each method: footprint registration (p) and photographic control (q), 2) among the three camera types used and 3) among species. After 1,246 passmonitoring days, 1,521 detections were obtained corresponding to 22 different species or species groups. The effectiveness of both monitoring systems was significantly different regardless of camera type (Wilcoxon test, p0.8), whereas photographic detection showed lower values in most cases (mainly q 1.0 seconds for the quickest devices). However, it is necessary to highlight the key role of photographic systems when weather conditions preclude correct track registration and whenever specific (or even individual) identification through pictures is needed.

### 586. DIVERSITY PATTERNS IN THE SALT MARSHES IN THE GUADIANA ESTUARY (SW SPAIN). CHANGES IN DIVERSITY

**Mateos Naranjo**, **Enrique**, Universidad de Sevilla, Spain; **REDONDO GÓMEZ**, **SUSANA**, Universidad de Sevilla, Spain; **Luque Palomo**, **Carlos Javier**, Universidad de Huelva, Spain; **Álvarez López**, **Antonio Agustín**, Universidad de Sevilla, Spain; **Rubio Casal**, **Alfredo Emilio**, Universidad de Sevilla, Spain; **Castellanos Verdugo**, **Eloy Manuel**, Universidad de Huelva, Spain; **Luque Palomo**, **Maria Teresa**, Universidad de Sevilla, Spain; **Figueroa Clemente**, **Manuel Enrique**, Universidad de Sevilla, Spain

In this study the diversity patterns were analysed in the marshes of La Nao and La Sardina and in Isla de San Bruno (estuary of the river Guadiana). By means of photointerpretation and country samples, the plant communities of each space were differentiated and the species present and their relative coverages registered. Shannon-Weaver index was calculated, as well as the number of species and the area of each community, the topography was recorded and a detailed cartography of each community created. In La Nao 31 communities, occupying 1034974 m2, were differentiated, in La Sardina 15 (1279656 m2), and in Isla de San Bruno 23 (2410288 m2). La Nao was the spot with the highest number of communities per area and the highest specific diversity (H=0.9), as opposed to La Sardina (H=0.79), very anthropised, and Isla de San Bruno (H=0.73), which suffers the invasion of the grass Spartina densiflora. In the three spots, in areas of low marshes the lowest values of diversity (c. 0.2) were registered, in middle marsh the diversity increased up to c. 1.2 and in high marsh decreased again to c. 0.8. This common pattern could be due to the evolution of environmental factors, less stressing in areas of middle marsh. There is a tendency to present a higher diversity in middle marsh, which is the niche of the invasive Spartina densiflora, which is very competitive.

### 587. ANALYSIS OF THE INVASION OF SPARTINA DENSIFLORA IN THE ODIEL RIVER ESTUARY (HUELVA, SW SPAIN). IMPLICATIONS FOR DIVERSITY.

**MATEOS NARANJO**, **ENRIQUE**, Universidad de Sevilla, Spain; **Redondo Gómez**, **Susana**, Universidad de Sevilla, Spain; **Luque Palomo**, **Carlos Javier**, Universidad de Huelva, Spain; **Castellanos Verdugo**, **Eloy Manuel**, Universidad de Huelva, Spain; **Wharmby**, **Clare**, Universidad de Sevilla, Spain; **Muñoz González**, **Jerónimo**, Universidad de Sevilla, Spain; **Luque Palomo**, **Maria Teresa**, Universidad de Sevilla, Spain; **Figueroa Clemente**, **Manuel Enrique**, Universidad de Sevilla, Spain

Spartina densiflora is a South American grass that has appeared in the salt marshes of the Gulf of Cadiz. This study investigated the extent to which this species has invaded the biosphere reserve known as the 'Marismas del Odiel' and identified the areas most affected by S. densiflora and resulting impact on plant diversity.
The relative species cover of distinct plant comunities was estimated using photo-interpretation and field surveys. This data was used to calculate the Shannon-Weaver index and species richness of the invaded communities. Spartina densiflora was present in 12 of the 17 communities described. 18% of the salt marsh area consisted of monospecific communities dominated by this species (cover > 75%). These communities were located in middle and upper zones, and around the edges of tidal channels. Richness and diversity decreased with increasing coverage of S. densiflora to values close to zero (Pearson index P Spartina densiflora is a highly invasive species which can occupy many habitats, reducing diversity and presenting a serious problem for the conservation of these ecosystems.

### 588. FOREST+N+E+T – MONITORING NETWORK OF FOREST STAND DYNAMICS AND ECOLOGY

**MÁZSA**, **KATALIN**, Institute of Ecology and Botany of Hungarian Academy of Sciences, Hungary; **Horváth**, **Ferenc**, Institute of Ecology and Botany of Hungarian Academy of Sciences, Hungary; **Aszalós**, **Réka**, Institute of Ecology and Botany of Hungarian Academy of Sciences, Hungary; **Czájlik**, **Péter**, Vásárhelyi István Nature Conservation Group, Hungary; **Gergely**, **Zoltán**, State Forest Service Hungary, Hungary; **Bidló**, **András**, Faculty of Forestry, University of West Hungary, Hungary; **Kovács**, **Gábor**, Faculty of Forestry, University of West Hungary, Hungary; **Király**, **Géza**, Faculty of Forestry, University of West Hungary, Hungary

In Hungary 63 Forest Reserves were designated in the 1990's in order to ensure strict protection of representative forest stands and to carry on long term research of these ecosystems left for free development. A new methodological approach was developed to monitor and investigate patterns and dynamics of the near natural forest stands in the long run. The methodology, infrastructure and service is called: "FOREST+n+e+t" – monitoring network of forest stand dynamics and ecology. It is a grid system of permanently marked field sampling points, which supports producing standard datasets of spatially and thematically linked modules such as stand structure, soil and vegetation. Spatial extent can vary at a wide scale from the smallest functional stand unit to small catchment or landscape scale. Results of additional research areas can be coupled with the established datasets and data evaluation can be improved by use of GIS. The methods for the inventory of forest stand structure and of soil mapping at sampling points were developed and tested. In the core areas of four forest reserves about 200 hectares were surveyed in 2004-2005 and the databases of stand structure and soil mapping were set up.

### 589. MAPPING AN IMPORTANT TOOL FOR NATURA 2000 MANAGEMENT AND CONSERVATION : A CASE STUDY OF SANTA BÁRBARA VOLCANO (AZORES)

**MELO, CECÍLIA**, Universidade dos Açores, Departamento Ciências Agrárias, GEVA. Portugal; **Dias, Eduardo**, Universidade dos Açores, Departamento Ciências Agrárias, GEVA. Portugal;

With the objective to discuss the importance of vegetation mapping for nature conservation and to ensure the long-term future of NATURA 2000 sites, a case study in Terceira island (Azores) is presented in which the importance of the natural vegetation of Santa Bárbara volcano (Natura 2000 site) is evaluated thorough the elaboration of its vegetation map. By means of phytosociological classification and ordination the plant communities and abiotic factors governing the variance in vegetation are discussed. The ordination results suggest the following factors to be of major effect on the variance in vegetation: wind exposure and soil humidity.
Eighteen different natural vegetation types were identified: grasslands (2), peat communities (4), scrubs (7), forest (3) and vegetation of rocky slopes (2). All communities are protected under the Habitat and Species Directive (EC/92/43) and most of them are endemic to Azores Islands. Vegetation mapping is an important tool for the highlighting areas of importance for conservation, allowing there characterization, and evaluation. It gathers an important set of information about the distribution an abundance of natural vegetation types and flora species. This information is indispensable for the elaboration of management plans of Special Zones for Conservation of the Nature 2000 network.

**590. CARNIVORE-LIVESTOCK CONFLICTS AND THEIR MANAGEMENT – A COMPARISON ACROSS FIVE MEDITERRANEAN COUNTRIES**

**MERTENS**, **ANNETTE**, Istituto di Ecologia Applicata, Italy; **Angelucci**, **Simone**, Parco Nazionale della Majella, Italy; **Cortes**, **Yolanda**, Fundacion Oso Pardo, Spain; **Di Nicola**, **Umberto**, Parco Nazionale del Gran Sasso e Monti della Laga, Italy; **Huber**, **Djuro**, Veterinary Faculty, University of Zagreb, Croatia; **Latini**, **Roberta**, Parco Nazionale dAbruzzo, Lazio e Molise, Italy; **Ribeiro**, **Silvia**, Grupo Lobo, Portugal; **Convito**, **Luca**, Provincia di Perugia, Italy

The LIFE COEX Project aims to monitor the conflict between large carnivores and agricultural activities in five Mediterranean countries and to implement adequate management strategies. Data collection was done with a standardized survey methodology. In 2005 most of the damage caused by bears in Italy was on livestock (69%) whereas in Croatia it was on material goods (33%). Contrarily, the parameters of wolf damage were similar in the three analyzed areas (Portugal, Spain and Italy): in these countries 0,51% of the livestock was damaged by wolves in 429 attacks on 254 holdings. The species most affected was sheep (73,9%) although the proportion was lower in Portugal (59,3%) than in Italy (77%) and in Spain (91%). Among the three countries there were no significant differences in the number of attacks in each holding and the number of damaged animals per attack. Regional variations can be explained by differences in the husbandry and damage prevention techniques. This points out the need for the improvement and monitoring of damage prevention techniques, wherefore in the target areas guard dogs and electric fences for livestock protection are donated to farmers. The use of such methods will be the focus of the review of the existing compensation systems in the project areas: the common approach will be to link the compensation payments to the use of damage prevention systems.

**591. THE NATURA 2000 ESTABLISHMENT PROCESS IN ROMANIA**

**MIHAILESCU, SIMONA**, Institute of Biology, Romanian Academy, Romania; **Maxim**, **Iurie,** Ministry of Environment and Water Management, Romania; **Grigoras**, **Ion,** Danube Delta National Institute for Research and Development, Romania, **Biris**, **Adrian-Iovu,** Forest Research and Management Institute, Romania

In the last few years Romania has achieved great progress in conservation of important areas from the biodiversity point of view. The different scenarios developed in the last years estimate that the Natura 2000 network will cover 7.5% to 15% of the Romanian territory. As a result of legislation act, the process of the extent of national network of protected areas has been launched. Although part of the protected areas are including habitats and species of community importance. Implementation of the Habitats and Birds Directives will bring new territories in the protected area network.
This implies that the status of new protected areas has to be based on a scientific documentation, with a detailed map of the area (in GIS format) containing also the situation of land owners.
For the development of Natura 2000 in Romania, the consortium was established and the proposals were submitted from different institutions as: research institutions, museums of natural sciences, local environment protection agencies, NGOs, etc.
A very important step was in developing of a particular soft for Natura 2000 using the internet interface and it involve the institutions contribution.
Related to the Natura 2000 network in Romania, priorities identified for the time period before EU accession were established.
In the last few years Romania has achieved great progress in conservation of important areas from the biodiversity point of view. The different scenarios developed in the last years estimate that the Natura 2000 network will cover 7.5% to 15%, if not more of the Romanian territory. As a result of legislation act, the process of the extent of national network of protected areas has been launched. In this regard, the surface area of the natural protected areas is continuously increasing reaching by 2005 - 7% of the total land surface of Romania.
Although part of the protected areas are including habitats and species of community importance. Implementation of the Habitats and Birds Directives will bring new territories in the protected area network and thus will increase the need for resources and for efficient management.
This implies that the status of new protected areas has to be based on a scientific documentation, with a detailed map of the area (in GIS format) containing also the situation of land owners.
For the development of Natura 2000 in Romania, the consortium was established and the proposals were submitted from different institutions as: research institutions, museums of natural sciences, local environment protection agencies, NGOs, etc.
A very important step was in developing of a particular soft for Natura 2000 using the internet interface and it involve the institutions contribution.
Related to the Natura 2000 network in Romania, priorities identified for the time period before EU accession were established.

**592. ACTIVE PROTECTION OF ANIMALS - EFFECTIVE METHOD OR EXPERIMENT? EXAMPLE OF THE EUROPEAN POND TURTLE EMYS ORBICULARIS**

**MITRUS**, **SLAWOMIR**, University of Opole, Poland

Active protection programs frequently using raising young animals in captivity and then releasing them into a natural habitat. Many times such programs are used without scientific monitoring of their effects, however, they originally were established on an experimental. Populations of the European pond turtle, Emys orbicularis, are considered endangered in many parts of its range. Several countries have initiated headstarting programs for this species (= raising turtle hatchlings in captivity and then releasing them into a natural habitat). My recent research in central Poland has showed that the technique would be effective only if a large proportion of hatchlings are taken to artificial rearing and when decreasing of adults survivorship is stopped. The real efficiency of such programs, however, also depends on e.g. differences in the age of maturity and the long-term survival rates of wild and headstarted individuals - factors that are currently not known. On the basis of analysis of efficiency of headstarting program of the turtle in Poland, I think that active protection programs should still be considered experimental, and I recommend initiation such activities only when population of any animal is in the real danger and there is no other possibilities to protect the population.

**593. GENETIC ANALYSIS OF TWO EUROPEAN POND TURTLE (EMYS ORBICULARIS L.) POPULATION LOCATED IN SOUTH HUNGARY**

**MOLNÁR**, **TAMÁS**, University of Kaposvár, Hungary; **Schindler**, **Mária**, University of Vienna, Austria; **Molnár**, **Marcell**, University of Kaposvár, Hungary; **Lanszki**, **József**, University of Kaposvár, Hungary; **Bíró**, **Janka**, University of Kaposvár, Hungary; **Magyary**, **István**, University of Kaposvár, Hungary; **Lehoczky**, **István**, University of Kaposvár, Hungary

The genetic diversity of two European pond turtle populations (located in Dávodpuszta and Mike) were investigated. Full genomic DNA was isolated from muscle tissue of turtle bodies predated by otter in Dávodpuszta (n=36) and from blood samples of live individuals in Mike (n=25). Thirteen microsatellite primers developed for Emydoidea blandingii were tested in the Emys orbicularis. Five of the microsatellites showed polymorphism and further three were monomorphic; the size of the products varied between 86 and 198 bp. In case of the polymorphic loci the number of alleles varied between 5 and 20. The genetic distance between the two populations was 0.235 (Nei Da distance). An assignment test showed that 93.44 % of the individuals could be classified correctly into their original population. Both populations showed individual alleles at each loci. The Hardy Weinberg test showed significant heterozygote

deficit at all loci of the Dávodpuszta population and at three loci of Mike population. The mean observed heterozigozity (0.433 0.21 and 0.56 0.10; in the Dávodpuszta population and Mike population, respectively) was lower than the mean expected heterozigozity (0.77 0.08 and 0.77 0.08) in both populations. This suggests that especially the Dávodpuszta population is isolated, which can result the decreasing of the genetic diversity.

### 594. LAND USE CHANGES IN THE NORTH WEST OF MADRID (SPAIN). EFFECTS ON THE LANDSCAPE

**MONTSERRAT, MORA LUCAS**, Universidad Complutense de Madrid, Spain; **Nogales Ruiz, Isabel,** Independent researcher (PhD-Forestry Student) Spain.

Socio-economical changes that have taken place in Spain during XXth century have affected the landscape structure, and therefore, its composition and configuration.
The study has focused on the changes that have come about in an area of the north west of the Community of Madrid. Using Geographical Information Systems (GIS), we have analysed several aerial photographs covering the zone, to study these transformations from both spatial and temporal point of view. To do so, we created GIS coverages corresponding to each year of study, and then we classified the result patches according to their environmentally homogeneous characteristics.
Results obtained show an abandonment process of agriculture land-use that had been predominant during 1950's decade, until last part of XXth century, when urbanization becomes stronger. These processes have caused fragmentation of natural areas. This loss of connectivity can be considered as a threat to the conservation of ecosystems.
We conclude that the present scenario of a Regional Park declaration of the zone, would contribute to avoid the extinction of last patches of natural habitats, and would also set up the basis for recovering the zone and facing up human disturbances.

### 595. VEGETATION CHANGES OF THE LAKE BALÁTA

**MORSCHHAUSER**, **TAMÁS**, University of Pécs, Hungary; **Kovács**, **Gábor**, University of West Hungary, Hungary; **Csete**, **Sándor**, University of Pécs, Hungary; **Csiky**, **János**, University of Pécs, Hungary; **Gerely**, **László**, University of Pécs, Hungary; **Bátori**, **Zoltán**, University of Pécs, Hungary; **Borhidi**, **Attila**, University of Pécs, Hungary

The Baláta is a 174 hectare bog-lake located in southwestern part of Hungary formed sandy area in hornbeam-oak zone. The main botanical values are diverse and sensitive vegetation mosaic with rare plants such as Aldrovanda vesiculosa and Caldesia parnassifolia. The first vegetation map with phytocoenological releves was made by A. Borhidi and M. Járai Komlódi (1959). This protected area is developed by natural succession. Moderate forestry management is only in buffer zone. Our aims are repeat of the vegetation map and phytocoenological releves, collect of soil data and analysis of the changed vegetation using aerial photograph and GIS methods. The repeated vegetation map in 1:10000 scale was made in 1997. In the last 40 years vegetation of the southern part of he lake turned more mosaic. The territorial distribution, extension and quality of the quickly variable treeless bog associations were changed. The territory of the open waters decreased significantly. The appearing and proliferating of the sphagnum is conspicouos change on the northern and eastern side of the lake, which caused appearing new associations. Genetic soil type connected with vegetation map the best among studied soils properties. The upper layer of soil turned more acidic on the northern plots.

### 596. DISTRIBUTION OF SHREWS IN A FRAGMENTED LANDSCAPE IN CENTRAL ITALY: AN ECOLOGICAL NETWORK PLANNING PERSPECTIVE

**MORTELLITI**, **ALESSIO**, University of Rome La Sapienza, Italy; **Boitani**, **Luigi**, University of Rome La Sapienza, Italy

Considerable amount of literature exists on the effects of habitat loss and fragmentation on biodiversity, however few studies have investigated the distribution of shrews (Insectivora Soricidae) in fragmented landscapes, despite their important role in ecosystem functioning as predators. We studied the distribution of shrews in 25 patches varying in size (range: 0,5 – 80 hectares), isolation and shape in central Italy. 200 pitfall traps were set for 1 year, we caught a total of 5 species. Crocidura leucodon was caught in 56 % of the patches, Sorex minutus and Crocidura suaveolens in 40 % of the patches, Sorex samniticus and Suncus etruscus in 20 % of the patches. We found no correlation between species richness and fragment size and isolation variables: even 0,5 hectares relatively isolated patches supported up to 3 species. Logistic regression analysis parameterized on presence/absence data showed how patch variables (size and isolation) did not explain the observed distribution while patch structure variables were significant predictors. We discuss these results from an ecological network planning perspective, arguing that even small patches with suitable characteristics should be considered in landscape management, since they support small populations and may play an important role as stepping stones or in metapopulation dynamics.

### 597. RECENT ACHIEVEMENTS IN THE FIELD OF THE PROTECTION OF HABITATS AND BIODIVERSITY IN ROMANIA (2000-2005)

**MUNTEANU, DAN,** Romanian Academy, Commission of Nature Monuments, Romania

In the last few years several important laws and regulations have been adopted by the Romanian Government or by the Romanian Parliament in the field of environment and biodiversity protection. The results of these legislation acts are the following :

- a basic law concerning the regime of the protected areas, the conservation of habitats and biodiversity (2000, 2001);
- a complete and official list of the protected areas of the country (2000), including their surface (they cover 5% from the national territory)
- delimitation and internal structure of the national and natural parks (2003); rules concerning their administration;
- 114 new protected areas (2% of the national territory), including 27 SPAs (for the first time promoted by Romania), 2004:
- a new version of the protected species and habitats, according to the CE directives (Habitat Directive, Birds Directive) (2005):
- a new law of the protection of environment (2005);
- 6 new protected areas, including a national park (1,78 %), 2005.

  By including new areas in the national network of such areas it has been achieved a growth of surface of protected natural areas up to 9%, so not far from other candidate countries in EU.

### 598. THE EFFECT OF CLIMATE CHANGES ON THE BREEDING ACTIVITY OF COMMON TOAD (BUFO BUFO)

**MURAKÖZY**, **ANNA**, Szent István University, Gödöllő, Hngary; **Kiss**, **István**, Szent István University, Gödöllő, Hungary

Common toad is one of the most widespread, protected amphibian species in Hungary. The aim of the study was to reveal the relationship between the climatic factors and the breeding characteristics, the number of breeding individuals and their body size parameters, and to show which are the major influencing factors, based on a long term research. The investigations were carried out at Babat-valley (near Gödöllo, Hungary) between 1989-2002. The periods between two breeding seasons were divided into intervals, which corresponded to the lifecycle of toads. Based on our results, soil temperature proved to have the most significant effect on breeding activity. Close correlation was seen between the average and the standard deviation of climatic factors and the

number of adult toads. The average value of climatic factors between two breeding seasons had the greatest effect on the beginning of reproduction. While cummulated air temperature showed the strongest corellation with the beginning of the breeding period, the amount and frequence of rainfall only had an influence together with the air and soil temperature values. As the climatic factors strongly affect the characteristics of the breeding activity of the common toad, the collected data on alteration trends can serve as an important information for the timing of conservation management.

**599. CONSERVATION GENETICS OF AN ENDANGERED GROUNDNESTING BEE COLLETES FLORALIS**

**MURRAY**, **TOMÁS**, Queens University Belfast, United Kingdom; **Paxton**, **Robert**, Queens University Belfast, United Kingdom; **Fitzpatrick**, **Úna**, University of Dublin Trinity College, Ireland; **Brown**, **Mark**, University of Dublin Trinity College, Ireland

Both wild and managed bees provide the essential ecosystem service of pollination which is of great ecological and economical importance. Ample evidence now exists that European bee species are in peril due to habitat degradation and loss as well as pesticide exposure. Yet relatively little is known about their distribution, abundance and conservation status, as true in Ireland as elsewhere across Europe. The ground-nesting bee Colletes floralis is currently recognized as endangered, or in decline, throughout much of Europe and has been designated as a Biodiversity Action Plan (BAP) species in the UK, awarding it special conservation status. The island of Ireland is thought to hold 90 percent of C. floralis populations in the Atlantic Zone, where it nests primarily on coastal dunes. Thus Ireland may be an important refuge for the species within Europe. C. floralis was sampled at EU priority coastal habitats within Ireland and Scotland and analysed at 10 microsatellite loci developed for the species to examine the degree of genetic isolation between populations. Diploid male production, an indication of inbreeding in Hymenoptera, was also examined as it represents a potentially important genetic load on isolated populations.

**600. INDICATORS FOR NATURE FRIENDLY DITCH MANAGEMENT BY FARMERS**

**MUSTERS**, **C.J.M.**, Institute of Environmental Sciences (CML), Leiden University, Netherlands; **Vos**, **P.**, Institute of Environmental Sciences (CML), Leiden University, Netherlands; **Ter Keurs**, **W.J.**, Institute of Environmental Sciences (CML), Leiden University, Netherlands

Ditches are important and characteristic landscape elements in the western and northern parts of the Netherlands. Although they are needed to drain agricultural areas, they have no direct productive value, and therefore, they may offer an opportunity for nature conservation within agricultural areas. From previous studies on dairy farms it is known that ditch management of farmers has a direct influence on vegetation and macro-fauna. Yet, no Environmental-Agricultural Schemes (EAS) are available for the conservation or enhancing of biodiversity in these aquatic systems. To enable the evaluation of future EAS for ditches, a simple and reliable measurement of biodiversity is needed. Such a measurement could also be used in direct payment schemes. We studied a set of 16 plant species as an indicator system for weighted plant species richness of ditches in peat areas. We found that the number of species of this set with a threshold value of four is a sensitive and specific indicator for above average species richness. However, when studying this indicator over time, we found that it is not sensitive to changes in species richness. These seemingly contradicting results suggest that dichotomy indicators may not be fit for indicating changes of biodiversity. Possible solutions will be discussed.

**601. CONSERVATION AND BIODIVERSITY OF WILD PLANTS IN GEORGIA**

**NADIRADZE**, **KAKHA**, Association for Farmers Rights Defense, AFRD, Georgia

Georgia is biologically very diverse. It may very well have been the first place where grapes and wheat were domesticated. A great number of native varieties of plants and animals are observed here representing the best selection material due to their particular genetic features. Orchids are enormously beautiful and sophisticate plants. Family Orchidaceae is one of the largest diverse plant families. There are up to 725 orchid genera and about 20 000-25 000 species. Among them, 25 % of all orchid species are terrestrials (grow in the soil), 70 % are epiphytic (grow on trees), the 5 % grow on different subtracts. Some orchids, such as Rhizanthella gardener, spend their entire life underground, even flowering proceeds in the soil and only apices of inflorescence bracts show aboveground. The Orchidacae is a cosmopolitan family found almost in all climatic zones. They occur very near the limit of vegetation from arctic to the most extreme desert environments. Epiphytes are limited to tropical and subtropical environments, while terrestrial orchids occur in all climatic zones. In temperate zone, where Georgia is located species are terrestrial. Mostly, these are geophytes with ephemeroidal life cycle.

**602. A COMPARISON OF THREE SAMPLING METHODS FREQUENTLY USED IN ORTHOPTEROLOGICAL STUDIES: EFFECTIVENESS, SELECTIVITY AND VEGETATION STRUCTURE**

**NAGY**, **ANTAL**, Hungarian Academy of Sciences - University of Debrecen, Hungary; **Sólymos**, **Péter**, Faculty of Veterinary Science, Szent István University, Hungary; **Rácz**, **István**, University of Debrecen, Hungary

The study of species' distributions and community composition are essential elements in biodiversity assessment, monitoring and adaptive management, in which Orthopteras are commonly used indicators. In order to get unbiased data on both species richness and relative abundances the selectivity, effectiveness and accuracy of methods in different conditions should be known. To develop sampling strategies we compared the effectiveness and selectivity of sweep-netting, direct search and dish trap methods, due to habitat structure. The most work effective method was sweep-netting, while the highest number of rare species were sampled by direct search. Dish traps were most selective to ground dwelling species. Sweep-netting and direct search were sensitive to grass dwelling species. Our results underlines that neither method is universal, and combination of sweep-netting and direct search provides the most advantages: it can be used in wide range of habitats, needs lower sampling effort in both field and labour, volunteers can be drawn into, provides the most complete checklist, it is cost effective and disturbs habitats and insect communities less than other combination of methods.

**603. SPREADING OF THE INVASIVE GARDEN ANT *LASIUS NEGLECTUS* (HYMENOPTERA: FORMICIDAE) IN HUNGARY: LOCAL EXPANSION RATE AND NEW COLONIES**

**NAGY, CSABA**, Department of Systematic Zoology and Ecology. Eötvös Loránd University, Faculty of Sciences, Hungary; **Tartally, András**, Department of Evolutionary Zoology and Human Biology. University of Debrecen, Faculty of Sciences, Hungary; **Espadaler, Xavier**, Ecology Unit and CREAF. Universitat Autònoma de Barcelona, Spain

The spreading of invasive species is an actual conservation biological problem. *Lasius neglectus* is a polygynous ant which often forms huge supercolonies (e.g. the recent size of the type colony is estimated at about six square kilometres). This ant is an introduced species to Hungary and was described from Budapest. The native ant species usually disappear from the

supercolony centres and the structure of the native soil fauna also changes there. It seems that the *L. neglectus* queens do not disperse by mating flights but the human introduction is an accepted way of establishment of this species (viz. introducing of colony buds with some queens e.g. by potted plants). The spreading of *L. neglectus* within Hungary was examined in two scales: (1) local expansion of three supercolonies was measured during years; (2) each newly discovered colony was noted with the year of detection. The local expansion ranged between few meters to 134 m in a year and the number of known colonies extended from three to 19 between 1988 and 2005. Most of the colonies are still small which suggests their recent introduction. Some supercolonies are near protected areas. The prevention of further introduction is essential.

### 604. COMPARATIVE STUDY OF TWO DIFFERENT SIZED POPULATIONS OF *LIBELLULA FULVA* (ODONATA: LIBELLULIDAE)

**NAGY, H. BEÁTA**, Department of Hydrobiology, University of Debrecen, Hungary; **Dévai, György**, Department of Hydrobiology, University of Debrecen, Hungary

Since studying the behaviour of a threatened dragonfly species of lowland creeks could reveal important issues for the conservation of these biotop's biodiversity we analysed mating behaviour and morphometrical parameters of males of two closed *Libellula fulva* (Müller, 1764) populations through different dragonfly densities. Studies were carried out with mark-recapture method during two seasons (2003, 2005) along two small canalised creeks in Eastern Hungary. In the first year were marked 185 males and 40 females, while in the second 324 males and 61 females. The study was carried out along a 350 meter long section of the Kutas creek (near Ártánd locality) and a 385 meter long section of the Kis-Körös creek (near Bojt locality). The population along Kis-Körös creek was larger than the one along Kutas creek. The males of the larger population had significantly greater body sizes while females showed no differences. As far as in the smaller population most of males showed a relative strong site fidelity, the other population showed no such behaviour, but we observed more intensive satellite behaviour. If population densities have an impact through body sizes on mating behaviour it suggests attentive observing of background factors which influence the alteration of population sizes.

### 605. INDEX OF NATURALNESS VARIATION ACROSS TIME IN SIC TABURNO (SOUTH ITALY)

**NAPOLITANO**, **FRANCESCO**, Università degli Sutdi del Sannio, Italy; **Guarino**, **Carmine**, Università degli Sutdi del Sannio, Italy

Taburno (Communitarian Interest Site), in South Italy, extends on 53 Km2 and includes numerous communitarian habitats (forests and grasslands). The aim of this paper is to determine how landscape in natural site has changed through time and how the extention of land cover varied by physiographic unit. Historical aerial photographs were used to analyze land cover change from 1954 to 1998. To evaluate naturalness in the area, it has been used ILC (Index of Landscape Conservation) by Pizzolotto R. and Brandmayr (1996) which consider the criterion of the approaching vegetation to its mature phase (Climax). So, two land cover map were classified in 14 classes of naturalness starting from class 0 (no vegetation) to class 14 (Climax vegetation). This index is ruled by this equation: ILC = 1 – (A/Amax) where A is the grade of artificialness. The value of the index equal to 1 represents maximum of naturalness, the value of the index equal to 0 represents the minimum naturalness. In 1954 ILC was equal to 0,69 wile in the 1998 it was equal to 0,73. Over this period, class 13 (Deciduos Woods), class 9 (Castanea sativa Woods) and class 7 (Artificial Coniferous Woods) increased by 26,4%, 54,1% and 100% respectively, while class 10 (Natural Perennial Grassland), class 11 (Woods-Scrubs transition) and class 12 (Sclerophyllous Stable Woods) decreased by 47,7%, 9,34% and 78,9% respectively.

### 606. GENETIC STRUCTURE AND DEMOGRAPHY OF ENDANGERED POPULATIONS OF IBEROLACERTA MONTICOLA IN THE NORTHWEST OF THE IBERIAN PENINSULA

**Naveira**, **Horacio**, Universidad de A Coruña, Spain; **GALÁN**, **PEDRO**, Universidad de A Coruña, Spain; **REMÓN**, **NURIA**, Universidad de A Coruña, Spain

Iberolacerta monticola is an endemic species living in the northwest of the Iberian Peninsula, mostly at middle-high altitude. However, a few populations have been found at low altitude sites, associated to Atlantic forests growing at river-sides, or rocky elevations near the sea-side. Apparently, this present day distribution is the result of the contraction of the species range that began after the Holocene Atlantic period (7,500-4,500 years BP), and extended up to probably 300-400 years ago. In the last few years, the alteration of natural habitats by human intervention has further increased the pressure on low altitude populations, bringing some of them to the brink of extinction. Both by demographic and genetic methods, our research team are trying to identify the major factors affecting the probability of survival of these populations, so that appropriate management policies for their conservation can be developed. As a first step, we have collected data from several sites, including physical characteristics of the habitats, estimations of population size, morphological attributes of adult specimens, reproductive traits and several genetic properties of the populations by the analysis of microsatellite loci. These neutral genetic markers strongly suggest that some kind of overdominant selection may be involved in the maintenance of polymorphism in this species.

### 607. VARIATION IN MITOCHONDRIAL DNA REVEALS MULTIPLE DISTANT GLACIAL REFUGIA OF SCOTS PINE (*PINUS SYLVESTRIS* L.) IN EURASIA: CONSERVATION STRATEGY

**NAYDENOV, K.** University of Quebec at Abitibi-Trmiscamingue, Department Forestry**,** Canada; **Senneville, S**., **Beaulieu, J**., **Tremblay, F**., **Bousquet, J**., **Kumar, M**.

Scots pine (*Pinus sylvestris* L.) is an evergreen conifer, with wide natural area of distribution in Eurasia. The population genetics, biogeographical history, and postglacial colonisation of this species was studied using polymorphism of two mitochondrial genes (*nad1* intron B/C and *nad7* intron 1) in 54 natural populations from Europe and Asia. Among 991 trees analysed, 4 distinct mitotypes were detected based on two size variants of *nad1* and four of *nad7*. Each of them corresponded to different repeat number of minisatellite-like motif. The presence of haplotype is highly structured geographically. The average haplotype per population was 1.540, and mean haplotype diversity (*H*) was 0.150. The identified haplotype exhibited the highest genetic differentiation among populations ($G_{ST}$ = 0.643; $p$ < 0.001). The presence of one rare haplotype with limited distribution suggests a very recent mutation, perhaps even from the Holocene. Spatial analysis identified 4 homogenous groups of populations that conceived the genetically different glacial populations. The results suggest an existence of Scots pine refugia in the Iberian Peninsula; the Balkan Peninsula; Small Asia; far south-eastern Europe; and north-eastern China.

### 608. CYTOGENETICS OF HUNGARIAN MOLE-RATS (NANNOSPALAX LEUCODON)

**NÉMETH**, **ATTILA**, Eotvos Lorand University, Hungary; **Csorba**, **Gábor**, Hungarian Natural Histrory Museum, Hungary; **Farkas**, **János**, Eotvos Lorand University, Hungary

Hungary is the northwestern limit of the blind mole-rat (Nannospalax leucodon) distribution area. The populations of this typical steppe species are decreasing and now probably

less than 800 animals live in Hungary. Based on Israeli scientific researches it has been proven that active speciation process is under way on the populations of mole-rats. They are characterised by different chromosomal numbers and could not breed with each other. We have hardly any information about Hungarian mole-rats and until very recently we knew nothing about the chromosomal types we have. Since the species is strictly protected in Hungary we have to solve the problem of catching animals alive, work out a non-invasive sampling method and find the proper laboratory process. After a year of extensive field work and laboratory experiments we are able to catch live specimens and found the way how to determine karyotype from 0.5 ml of blood. According to the first results one population is characterised by 2n=50 chromosome number which differs from other population studied near our borders. The evolutionary background and taxonomic significance of this chromosome polymorphism still need to be investigated but in the light of this finding it is clear that the different and isolated populations of mole-rats should be treated as separate units in the management plans.

### 609. SURVEYING AN ISOLATED POPULATION OF PELOBATES FUSCUS IN THE URBAN AREA OF IASI TOWN (ROMANIA)

**NICOARA**, **ANDREEA**, Al. I. Cuza University, Romania; **Nicoara**, **Mircea**, Al. I. Cuza University, Romania

We studied the ecology of Pelobates fuscus population surviving in a restrictive space from an urban area of Iasi town. Individuals were measured, weighted, photographed and then released. Stomach contents were collected by stomachal flushing method. Relative small sized adults, less competitive, were captured, suggesting that population is in decline. Coleopterans were dominant (30%) in the preys consumed, suited by arachnids (17%) and collemboles (16%). The destruction of breeding and feeding habitat was caused by fragmentation of the entire ecosystem due to river canalisation and street construction, waste storage, week end tourism and housing in the area.

### 610. ROLE OF MACROINVERTEBRATES AS FOOD BASE FOR FISH POPULATION CONSERVATION IN RIVER TROTUS (ROMANIA)

**NICOARA**, **MIRCEA**, Al. I. Cuza University of Iasi, Romania; **Ureche**, **Dorel**, University of Bacau, Romania

Assesing macroinvertebrates role in fish feeding and conservation was the aim of the present study. Research viewed fish living in River Trotus and its tributaries. The diet of fish fauna from River Trotus has never been investigated before. Fish biological material was seasonally sampled during the years 1998-2000. 92 sampling sites for fishing were fixed. 11588 specimens (81485.9 grammes) belonging to 13 species were captured. Macroinvertebrates were identified at the lowest taxa possible while their relative abundances expressed as percentages. Frequency of occurrence of preys (FO%) also was calculated. In order to check fish species way of feeding (opportunistic or selective), macroinvertebrates indices of diversity - Shannon-Wiener H (S) and equitability - Pielou (J) were calculated. The breadth of the food niche of the fish species was assessed using the Levins measure (B) (1968) and Hurlberts measure (BA) (1978). With regard to macroinvertebrates presence in fish digestive content, a very strong dominance of the Class Insecta (above 90%) was observed in all fish species. Diptera were most numerous in samples, both as individual numbers and taxa. On the second place came larvae-nymphs of Trichoptera and Ephemeroptera with comparable values.

### 611. THE RISK OF INTROGRESSION OF FOREIGN GENES IN POPULUS SPEC. – MODELLING INTROGRESSIVE GENE FLOW IN THE LANDSCAPE -

**NIGGEMANN**, **MARC**, University of Marburg, Department of Conservation Biology, Germany; **Jakoby**, **Oliver**, Germany; **Rathmacher**, **Georg**, University of Marburg, Germany; **Budde**, **Katharina**, University of Marburg, Germany; **Ziegenhagen**, **Birgit**, University of Marburg, Germany; **Bialozyt**, **Ronald**, University of Marburg, Germany

Introgressive gene flow may be a problem if it affects the pure species status of endangered taxa. An example of such a risk is the endangered riparian tree Black Poplar (P. nigra). Short rotation and high-yield plantations of its cultivated hybrid P. x canadensis are scattered throughout the landscape in Central Europe. The hybrid populations are known to produce fertile pollen and egg cells with a high potential of outcrossing in P. nigra. A computer model is being developed which analysis introgressive gene flow via pollen and seeds in a real landscape in Central Germany. For the first time the landscape gene flow model is validated through gene flow studies with microsatellite DNA markers. The model will be provided to policy and decision-making since it can be immediately carry over to vertical gene transfer in putative GM poplar plantations. First theoretical studies will be presented.

### 612. BIOGEOGRAPHYCAL AND ECOLOGICAL STUDIES OF 2 LEGUM GENERA IN IRAN

**NOORI**, **MITRA**, University of Arak, Iran, Islamic Rep. Of.

Iran is a very large country with many contrasting habitats and extreme variations in climate. Species of Ammothamnus and Ammodendron genera are native to Iran. Populations of each species were sampled and populations mean for the different characters calculated. The climate, altitude and soil pH at each sampled site has been recorded. Distribution maps of each one of the species were prepared based on Rechinger, my observations and my herbarium work. A vegetation survey was carried out at each site. Plants were identified using references. Data were encoded and analyzed using SPSS. Principal Component Analysis was carried out on the whole data set. Results showed members of both genera are in the Irano-Touranian region. In addition Ammodendron conollyi is mainly concentrated in Khalidjio-Omanian region and all of samples were in 5.5-6.5 range soil pH. The presence of Ammodendron conollyi shows a strong correlation with high temperature, low precipitation and acidic soil pH. Ammothamnus lehmanii is associated with vegetation identified by low altitude, dry habitat vegetation, with deep firm desert sands and also with Peganum harmala, Lycium barbarus, Dendrostellera lessertii, Salsola soda, Tamarix articulate, Capparis spinosa and Aerva tomentosa.

### 613. DEFORESTATION INFLUENCES THE ASSOCIATION OF SOME SOIL BIOLOGICAL PROPERTIES

**NOURBAKHSH, FARSHID**, College of Agriculture, Isfahan University of Technology, Iran

There is a growing interest in developing soil quality indicators that can be used as early indicators of changes in soil biological quality. A study was conducted to investigate the effects of oak (*Quercus brantii* Lindl) deforestation on soil organic C (SOC), soil basal respiration (SBR), potentially mineralizable N (PMN) and soil L-asparaginase activity (LAS). The association of the bio-indicators was also studied. Soil samples were collected from natural forest and deforested counterparts of 4 adjacent sites in Lordegan region, west central Iran. Results indicated that SOC, SBR, PMN and LAS were decreased significantly in deforested counterparts compared to the natural forest condition. The degree of association between the bio-indicators was significantly decreased by deforestation. It can be concluded that deforestation not only influenced the bio-indicators, but also decreased the degree of correlation among them. Besides, the measured attributes showed to be sensitive

to reflect the effects of the anthropogenic effects on soil biological quality.

### 614. THE HEMEROBY OF THE HABITATS WITH SOZOPHYTE OCCURRENCE – THE "GLOBAL GARDEN" CONSERVATION CONCEPT

**NOWAK**, **ARKADIUSZ**, University of Opole, Poland

The term hemeroby was introduced to botanical terminology approx. 25 years ago and it has appeared in several scientific writings as a complementary term for naturalness. The aim of the presented study was to measure the hemeroby level of the habitats were sozophytes (red-listed plant species) occur in the region of Opole Silesia, SW Poland. For the chosen 532 species 1516 relevés were sampled using Braun-Blanquet method and the hemeroby level was assigned. As a result we find that almost 9% of the sozophyte populations occur in polyhemerobic conditions, 40% in euhemerobic, 39 in mesohemerobic and only 12 in oligohemerobic. We conclude, that sozophytes quite often occur in transformed and strongly influenced by man habitats, especially in areas with long human settlement tradition. If we consider the relatively high floristic diversity in non-natural habitats as valuable for conservation (e.g. quarries, pits, road verges) we have to include such places in biodiversity protection strategies. This could lead to „Global Garden" conservation concept, when we do not conserve the natural diversity anymore, but „man-made".

### 615. MICROSATELLITE POLYMORPHISM OF THE TWO LINES OF EUROPEAN BISON BISON BONASUS

**NOWAK**, **ZUZANNA**, Warsaw Agricultural University, Poland; **BUKOWCZYK**, **IZABELA**, Warsaw Agricultural University, Poland; **Bukowczyk**, **Izabela**, Warsaw Agricultural University, Poland; **Olech**, **Wanda**, Warsaw Agricultural University, Poland

The contemporary population of European bison (Bison bonasus) is divided into two genetic lines (LB and LC), which arrived from different number of founders and representative of different subspecies. Nowadays two European bison populations are being kept separately. For the goal of genetic diversity comparison between these populations and the level of inbreeding and relatedness among the animals determination within lines; DNA of 132 individuals of the LB line and of 103 individuals of the LC line has been analyzed at 20 microsatellite loci. Markers were selected for the study based on high heterozygosity, many alleles per locus and similar hybridization temperature. Microsatellites were chosen from bovine database recommended by International Society for Animal Genetics (ISAG). These markers were optimized to allow evaluation in a few multiplex PCR reactions. Data were summarized by marker and line for a number of parameters. Allele and genotypes frequencies, observed heterozygosity and fixation index (FIS) were calculated. Expected heterozygosity was estimated from allele frequencies assuming Hardy–Weinberg equilibrium.

### 616. DOES DISPERSAL OR HABITAT QUALITY LEAD TO NEGATIVE DENSITY-AREA RELATIONSHIP IN MACULINEA BUTTERFLIES?

**NOWICKI**, **PIOTR**, Jagiellonian University, Institute of Environmental Sciences, Poland; **Settele**, **Josef**, UFZ Centre for Environmental Research, Germany; **Woyciechowski**, **Michal**, Poland

Most studies suggest negative relationship between habitat patch area and butterfly population density, which is usually explained by asymmetric dispersal between large and small patches, whereas little attention is paid to differences in habitat quality. We investigated spatial abundance patterns of Maculinea teleius and M. nausithous in southern Poland using GIS. Low dispersal and lack of spatial autocorrelation implied that densities of both species were shaped by local factors rather than by dispersal. They proved to be affected by area (strongly negatively) and internal fragmentation (positively) of Sanguisorba officinalis foodplant patches, while none of foodplant characteristics played any role. We hypothesise that the pattern stems from differences in availability of the other vital resource for myrmecophilous Maculinea butterflies, i.e. Myrmica ant nests. Since ants are under strong parasitic pressure of Maculinea within their foodplant patches, and spread mainly through colony budding from surrounding refuge areas, their abundance should be higher on small and fragmented patches. This underlines the importance of foodplant patch surroundings for preserving Maculinea butterflies, which in recent years have become flagships of biodiversity conservation. The study was funded by EC within its projects MacMan and EuMon.

### 617. PHENOTYPIC CHANGES IN ALPINE COREGONIDS REVEALED FROM MONITORING SURVEYS THAT COVER UP TO 60 YEARS

**NUSSLE**, **SEBASTIEN**, University of Lausanne, Switzerland; **Kueng**, **Christoph**, Fischereiinspektorat, Switzerland; **Von Wattenwil**, **Kuno**, University of Lausanne, Switzerland; **Wedekind**, **Claus**, University of Lausanne, Switzerland

Natural population are likely to evolve in response to selection pressures that are linked to human activities. We are analysing data from various monitoring programs, that cover up to 60 years of exploitation and population management, of different whitefish populations (Coregonus sp.) in the canton Bern (Switzerland). Several parameters such as the number of females and males, the number of eggs, and fish weight have been measured every year during spawning season. We describe the phenotypic changes in these populations and link them to factors that varied between populations (e.g. the catch regulations). We observe strong changes especially in fish size and in reproductive parameters like the average number of eggs, average eggs sizes, and the operational sex ratios. Our findings suggest that the study populations evolve in response to human-linked selection pressures. We discuss our results in the light of various population management strategies.

### 618. POPULATION VIABILITY ANALYSIS OF THE MEDITERRANEAN MONK SEAL (*Monachus monachus* HERMANN, 1779) INHABITING IN THE NORTHEASTERN MEDITERRANEAN

**OK, MELTEM** Middle East Technical University Institute of Marine Sciences, Turkey; **Gucu, Ali Cemal**, Middle East Technical University Institute of Marine Sciences, Turkey; **Akçakaya, Reşit**, Applied Biomathematics, United States

Northeastern Mediterranean coasts of Turkey host critically endangered Mediterranean monk seal. In this study, the vital parameters of the monk seal colony which have been obtained since 1994 were evaluated by using population viability analysis to evaluate the risk of extinction of the species in the eastern Mediterranean, and their expected chances for recovery. This study also aims to compare the effect of Marine Protected Area established in 1999 on the conservation of the species. Annual survival rate of the colony was estimated as 0.926 and annual fecundity of the colony was estimated as 0.182 pups per adults. With these parameters, risk of extinction of the colony was estimated as 0.5% for next 20 years. Besides, scenarios like "what if the MPA has not been established" and "to what extent MPA has contributed to the conservation of the species" was tested using model parameters estimated for the period before the establishment of MPA (1994-1999) and the following period (2000-2005). With pre-MPA parameter estimates (1994-1999) probability of falling below 2 individuals at least once during the next 20 years is 27.8%. Whereas after MPA the probability is reduced to 0.17% supporting significantly positive effect of the protection.

### 619. ATTITUDE OF VARIOUS INTEREST GROUPS TOWARDS WOLVES AND EURASIAN LYNX IN POLAND

**OLSZANSKA**, **AGNIESZKA**, Institute of Nature Conservation Pas, Poland; **Okarma**, **Henryk**, Institute of Nature Conservation Pas, Poland; **Bath**, **Alistair J.**, Memorial University of Newfoundland, Canada

A survey on attitudes toward wolf (Canis lupus) and lynx (Lynx lynx) was conducted in Poland in 1999/2000, on representative sample of the society (2628 persons). People's attitudes were studied after the radical change of carnivores management policy – after being seasonally protected game species, lynx was declared strictly protected in 1995, wolf in 1998. Such radical change of conservation measures was strongly criticised by hunters and game managers. Five interest groups were asked for their opinions and attitudes: 580 hunters, 363 foresters (non-hunters), 356 farmers and livestock owners, 1290 general public, 39 NGO members. Studies were carried out in three areas: SE Poland (bear, wolf, lynx present), NE Poland (wolf and lynx present), central and W Poland (no large carnivores present, sporadic observation of migrating wolves). Questionnaire consisted of four blocks of questions, people were asked about their emotional attitude toward the species, level of knowledge on species biology, attitude towards various management tools, personal feelings on various features of the species and wildlife. Contrary to the expectations, attitudes towards carnivores were rather positive in all regions, among most of respondent groups, negative among farmers. Knowledge about carnivores ecology was significantly higher among hunters and foresters than among other groups.

### 620. RAMET AGE-CLASSES AND GROWTH STRATEGIES OF ENDEMIC *DIANTHUS CALLIZONUS* AND *DIANTHUS GELIDUS* FROM ROMANIAN CARPATHIANS: PHYTOGEOGRAPHY, EVOLUTIONARY THEORY AND IMPLICATIONS FOR CONSERVATION

**ONETE, MARILENA**, Institute of Biology, Ecology, Taxonomy and Nature Conservation Centre, Romania

*Dianthus callizonus* (narrow endemic in Piatra Craiului Massif) and *D. gelidus* (*D. glacialis* ssp. *gelidus)* (endemic in Romanian Carpathians) grow as small patches on limestone substrate within alpine and sub-alpine areas. The fact that these species are diploid and that their propagation is clonal with different growth strategies according to habitat and the plant communities within which they survive, leads to the conclusion that the alpine areas of the Romanian Carpathians have acted as glacial refugia for these species and even for the characteristic plant communities that hold them. We used the ramet age-classes of the two species to establish how they affect population dynamics, as a model for testing plant viability, and hence their potential for continued survival under numerous threats. These threats include direct destruction of individual plants and consequent impacts on population dynamics.

### 621. MULTI-CRITERION EVALUATION AND FUTURE PROJECTION OF FOREST ECOSYSTEM SERVICE IN YODO RIVER BASIN USING A STAND BASED BIOMASS MODEL

**OOBA**, **MAKOTO**, Osaka University, Japan; **Machimura**, **Takashi**, Osaka University, Japan; **Oda**, **Tomohiro**, Osaka University, Japan; **Fuji**, **Tsuyoshi**, Osaka University, Japan; **Masumoto**, **Ai**, Osaka University, Japan; **Inoue**, **Yoshio**, Osaka University, Japan; **Kondo**, **Akira**, Osaka University, Japan; **Kaga**, **Akikazu**, Osaka University, Japan

Yodo River basin in central Japan has an area of 8240 km2 and contains highly developed urban area, cropland and mountainous forest area. Aiming to propose a forest management policy to promote ecosystem service in terms of economy and environmental conservation in this area, several forest treatment strategies were evaluated multi-criterionally and the future changes of ecosystem service by them were predicted using a newly developed forest mass growth model. The model calculates biomass growth, yield and carbon accumulation of the pure stands based on yield tables and is capable to consider the effects of site class and thinning. Biodiversity, atmospheric carbon sequestration and economic budget of forestry over 80 years from present were predicted using simulation results of the model. The biodiversity strategy improved the monotonous mosaic of tree species and age and extended the potential habitat of several critical animal species. The strategy that promotes the reforestation of rapid-grow species maximized carbon sequestration but had disadvantage to the biodiversity. The large economic budget deficit in all strategy suggested the necessity of a public subsidy to forest treatment as expenses for the environmental protection.

### 622. CONSERVATION CONTRA UTILIZATION PERSPECTIVES OF TRUFFLES IN CARPATHIAN REGION

**ORCZÁN**, **ÁKOS KUND**, Eötvös Loránd University, Hungary; **Pintér**, **Zsuzsanna**, Eötvös Loránd University, Hungary; **Halász**, **Krisztián**, Corvinus University of Budapest, Hungary; **Bratek**, **Zoltán**, Eötvös Loránd University, Hungary

Biodiversity of hypogeous fungi in Carpathian region were studied in detail by HOLLÓS (1859-1940) and SZEMERE (1884-1974). The truffling widely spreaded in last decade and so the number of herbarial materials was risen notably. Comparison of herbaria may reflect the changing tendencies of distribution of underground species under the last 200 years. 113 hypogeous species reported from the region up to now. Certain species became more frequent: Tuber brumale, Stephensia bombycina, Hymenogaster bulliardii or spreading slowly (Tuber magnatum); others seems to be ancient, relict species (Mattirolomyces terfezioides, Elaphomyces virgatosporus); some are very rare all over Europe: E. leveillei E. persooni Leucogaster nudus; some living on introduced host plants: Picoa carthusiana, Rhizopogon villosus, Sepultaria summeriana. After all only the 6 black Elaphomyces species became legally protected last year in Hungary. Tuber indicum upwardly imported from China as an agressive mycorrhiza-forming fungi my be danger to the European endemic truffle species. Tuber aestivum has the biggest economical value in the region and so several of its natural habitats are vandalized. For conservation of hypogeous fungi futher research on their distribution and ecological tolerance is needed. The results may support the regulation of truffling and habitat protection in the countries of the region.

### 623. GENETIC DIVERSITY IN THE DYSPLOID AND THREATENED MEDITERRANEAN LARKSPUR DELPHINIUM STAPHISAGRIA L. (RANUNCULACEAE)

**ORELLANA**, **MARIA RENÉE**, GReB, Spain; **Rovira**, **Anna**, GReB, Spain; **López-Pujol**, **Jordi**, GReB, Spain; **Blanché**, **Cèsar**, GReB, Spain; **Bosch**, **Maria**, GReB, Spain

Delphinium staphisagria L. is an annual herb, widespread in the Mediterranean basin but locally rare, especially in the western area. Although it is considered endangered in France, no conservation status is reported for the whole area. In the past it was used as a medicinal and ornamental plant; this fact probably promoted its present distribution, often in disturbed habitats. It is a peculiar species within the genus due to its flower and seed morphology, and its dysploid karyotype (2n=18). For assessing the conservation status of D. staphisagria, the genetic diversity of 31 populations was studied using allozyme electrophoresis. A total of 17 loci were interpreted and 28 alleles were identified. Low levels of genetic diversity were found (P=20%, A=1.3, He=0.06) and few differentiation between populations was detected. A positive correlation between population size and allozyme variability was found. The majority of loci were monomorphic. The most diverse locus was Pgm-2 with 4 alleles. The depauperate genetic variability of this plant could be attributable to its reproductive system that allows high rates of spontaneous self-pollination. The results suggest that this species is endangered and populations are vulnerable to stochastic events, thus we propose that some conservation measures should be taken.

### 624. DECONSTRUCTING MYTHS ON LARGE GULLS AND THEIR IMPACT ON THREATENED SPECIES

**ORO**, **DANIEL**, IMEDEA (CSIC-UIB), Spain; **Martinez-Abrain**, **Alejandro**, IMEDEA (CSIC-UIB), Spain

Owing to their increasing populations and facultative predatory habits large gulls have been made held for the alteration of many ecological communities, and have in turn been intensively culled during recent decades. We used 177 long-term population trends of the yellow-legged gull and 10 sympatric species in the Mediterranean to study their population dynamics. Gulls actually affected survival, fecundity, foraging ecology and nesting habitat availability of many species. However, population growth rate of most sympatric waterbirds showed positive values, even at sites where culling has yet to be and local large gull populations are large and increasing. Results suggest clearly that population increase has been not exclusive of yellow-legged gulls, especially at regional level. Strikingly, population extinction rate was similar between large gulls and sympatric species. Conservation agencies should heed basic principles of population and community ecology, e.g. yellow-legged gulls have bred historically with other bird species (which most likely have developed defensive mechanisms against this predator), and populations of gulls are also regulated by density-dependence. Incoming environmental European policies on fishing discards and rubbish management should control more naturally and efficiently gull density and the long-term composition of seabird communities

### 625. INTRODUCED NON-NATIVE FISHES IN INLAND WATERS OF SARDINIA (ITALY)

**ORRÙ**, **FLAVIO**, Universitá di Cagliari, Dipartimento di Biologia Animale ed Ecologia, Italy; **Cau, Angelo,** Universitá di Cagliari, Dipartimento di Biologia Animale ed Ecologia, Italy

In the early 1990s, the general status of the ichthyofauna in Sardinian inland water was investigated by rigorous field surveys (154 study sites). After ten years, the status of fish populations has been directly checked to better understand distributions, community structure, and general ecology of both native and non-indigenous species. Native fish communities have undergone adverse and significant changes, many of them generally tending toward a lesser diversity, reduced distribution and increased numbers of rare species. The kinds and numbers of non-indigenous fishes have been changing. New non-native fishes have been introduced, either deliberately or accidentally, to the regions waters and already-established invasive species have been expanding their ranges. Our empirical data indicate that 66.7% of freshwater species living in Sardinia are non-native. Based on our current results, we will provide an overview of the ecological role of introduced and invasive fishes in Sardinian freshwater, identifying what we believe to be the major risks associated with their establishment. We will also discuss the prospects for future environmental impact and identify critical information and analyses to be contemplated by future research.

### 626. EFFECTS OF VEGETATION TYPE ON HOSTPLANT PATCH USE OF SOUTHERN FESTOON

**Örvössy**, **Noémi**, Hungarian Natural History Museum, **KŐRÖSI**, **ÁDÁM**, Hungarian Natural History Museum, Hungary; **Batáry**, **Péter**, Hungarian Natural History Museum, Hungary; **Vozár**, **Ágnes**, Hungarian Natural History Museum, Hungary; **Peregovits**, **László**, Hungarian Natural History Museum, Hungary

The Southern Festoon (Zerynthia polyxena) is a vulnerable species, reaches its north-western distribution in Hungary, where it can be locally abundant. In Central Europe larvae are monophagous on Aristolochia clematitis. The aim of our study was to gather information on host plant use by the adults and on the distribution pattern of eggs and larvae among different host plant patches. The studied population inhabited a poplar plantation near Csévharaszt on the Great Hungarian Plain. Host plant patches were mapped on a 300×1000 m area and 23 patches were chosen for transect sampling. Each transect represented a separate host plant patch in different types of microhabitat (poplar- and black locust plantation, clearings and small disturbed hummocks). The number of imagoes was counted daily during the flight period. The number of eggs and larvae were counted twice, and a vegetation survey was also carried out in quadrates. The four types of microhabitats differed in the number of imagoes, eggs and larvae as well, due to different habitat quality. Host plant density and appearance affected the imago abundance, host plant number affected the number of eggs; host plant size and the percent of bare ground influenced the quantity of larvae. Our results show that the quality of the microhabitat patch has got an effect on butterfly abundance.

### 627. MITOCHONDRIAL DNA PHYLOGENY OF ANDROCTONUS SPECIES OF TUNISIAN SCORPIONS: SPECIATION AND PHYLOGEOGRAPHY IN RELATION TO VENOM TOXICITY

**OTHMEN, ABDELWAHEB BEN**, Institut Supérieur de Biotechnologie de Monastir (ISBM), Tunisie; **Said, Khaled**, Institut Supérieur de Biotechnologie de Monastir (ISBM), Tunisie; **Testa, Johann M**., Natural History Museum, Department of Entomology, UK.; **Chatti, Noureddine**, Institut Supérieur de Biotechnologie de Monastir (ISBM), Tunisie; **Mahamdallie, Shazia S**., Natural History Museum, Department of Entomology, UK.; **Ali, Zohra Ben**, Institut Supérieur de Biotechnologie de Monastir (ISBM), Tunisie; **Ready, Paul D**., Natural History Museum, Department of Entomology, UK.

The phylogeny of the Androctonus Ehrenberg, 1828 species in Tunisia was inferred by comparative sequences of a fragment of mitochondrial DNA (16S rRNA). The NJ tree using uncorrected p distances as an input matrix, revealed three well supported main cluster within Androctonus genus: A. amoreuxi clade, A. aeneas clade and A. australis clade. Moreover, the study revealed a clear divergent phylogeny within the most dangerous and widely distributed A. australis in Tunisia: Two distinct monophyletic clades exist which are geographically separated by the chott el Jerid. Morphology analysis of the number of pectinal teeths showed that males and females from the northern clade had respectively, significantly higher number than male and female from the southern clade .We propose that the derived lineages arose from both tectonic and climatic change events which occurred in the Villafranchian period in which the Chott constitute a real barrier to gene flow between northern and southern populations. The contact zone where the two mitochondrial lineages coexist is located around chott el Jerid haplotypes. In addition unidirectional introgressions of mtDNA from A. australis toward A. amoreuxi was detected and discussed in the present survey. The two morphological subspecies A. a. hector and A. a. garzonii did not showed monophyletic groups and then were synonymized.

### 628. NATURA 2000 NETWORK IN ESTONIA

**OTSUS, MERIT**, Estonian University of Life Sciences, Estonia

The national proposal of the sites according to the Birds and Habitats Directive in Estonia was completed in May 2004 when the country joined EU. Sites for Natura 2000 network resulted from the extensive selection process which was based on the data of numerous inventories of habitats and species and was conducted using GIS tools. The establishment of proper protection and management has been dealt with at the same time with site selection and is an ongoing process until today. Altogether 509 pSCIs are proposed for conservation of 60 Annex I habitats (incl. 17 priority habitats) and for 51 Annex II species (incl. 3 priority species). The marine territory takes nearly a half of the total area of proposed Natura network. More than 30% of the area of Natura sites was not protected before. Designation of the Natura network increased the protected territory in Estonia

from 10% to 16%. On the country level the Natura 2000 network significantly increased the protected area of semi-natural grasslands, natural lakes, rivers, forests. On the European scale habitats have preserved rather natural conditions and spatial coherence in Estonia, e.g. certain preserved coastal and wooded meadows might be among the biggest ones in Europe.

### 629. WOLF POPULATION RESPONSES TO THE INTENSIVE CONTROL BY HUNTING IN LATVIA

**OZOLINS**, **JANIS**, The State Forest Service, Latvia; **Pupila**, **Alda**, Teici Nature Reserve, Latvia; **Andersone-Lilley**, **Zanete**, Latvian Forestry Research Institute Silava, Latvia; **Zunna**, **Agrita**, Latvian Forestry Research Institute Silava, Latvia; **Bagrade**, **Guna**, Natural History Museum of Latvia, Latvia; **Ornicans**, **Aivars**, Latvian Forestry Research Institute Silava, Latvia

Control of the wolf population by hunters in Latvia is considered a significant task of game management. Since the EU accession in 2004 control is restricted by requirements for wolf protection. Targeted searching and extirpation of packs or single wolves are mostly conducted only if hunting for the main game species (elk, red deer, roe deer, wild boar, beaver) is limited by their low numbers, restricted permit numbers or closed season. Otherwise, killing the wolves happens by chance while hunting for the above-mentioned game species. It is suspected that the hunting bag of wolves represents a random sample, which can be used to monitor their population status. In the period from 1998 to 2005, a total of 1,164 wolves were shot. Surveying this bag, 331 wolves were collected for ageing and determination of reproductive status. The obtained pattern of the sex-age structure resembles that of a growing population. However, according to the distribution data, the wolf population has declined within the given period of time and remained stable only during the last three years. Fertility of the female wolves at the age of 2+ years (n=32) was quite high according to the number of placental scars – 6.4 (min 4; max 10; SD=1.5) and 72.6% of the shot females over two years old exposed fresh signs of reproduction. The data are used to substantiate the annual decision on the hunting quota.

### 630. ECOLOGY OF AN ENDEMIC CENTAUREA PHYROHOBLEPHARA FROM EAST ANATOLIA-TURKIYE

**OZTURK**, **MUNIR**, Ege University, Turkey; **Celik**, **Sezgin**, Canakkale Onsekiz Mart University, Turkey; **Yucel**, **Ersin**, Anadolu University, Turkey

Centaurea phyrohoblephara DC. is an endemic taxon with restricted distribution in the East Anatolian region of Turkiye mainly the states of Erzincan, Elazigi, Sivas and Bayburt. It prefers calcareous habitats but is under heavy grazing pressure. Morphological features like root length/thickness, plant height, width of basal leaves; length/breadth of terminal leaves, involucrum, achen; length of capitulum, length of outer/inner whorls of pappus were studied in detail. The soils from different depths (0-10; 10-20; 20-30 cm.) from 14 localities were collected and subjected to an analysis of texture, pH, organic matter content, percentage of CaCO3, N, NaCl, Na+,K+,Ca+, Mg++, P2O5 , Fe++, Mn++, Zn++ and Cu++. Interrelations between the altitudinal differences was also investigated. The results revealed that soil characteristics at different depths like Mn (10-20 cm), Fe (10-20 cm), %P2O5 (20-30 cm), %N (0-10 cm) and %N (20-30 cm) are effective on the morphological features. The most significant effective variable was Mn++ (10-20 cm) and Fe++ (10-20 cm). Former proved effective on 5 morphological features (length/thickness of root, length/breadth of involucrum, length of outer whorl of pappus) and latter on 4 morphological features (length of capitulum, length/breadth of involucrum, and length of achen) of C. phyrohoplephara. All these reults were verified statistically. The aim of this study is to enlighten the features suitable for its propogation and conservation.

### 631. ROAD FRAGMENTATION IN FOREST AND CULTURAL LANDSCAPES OF LOMBARDY (NORTH ITALY)

**PADOA-SCHIOPPA**, **EMILIO**, University of Milano-Bicocca, Italy; **Poggesi**, **Maria Cristina**, University of Milano-Bicocca, Italy; **Bottoni**, **Luciana**, University of Milano-Bicocca, Italy

Road fragmentation causes biodiversity loss at landscape level. Many fragmentation metrics have been proposed by landscape ecologists. We chose to work on three metrics (division, splitting index, effective mesh size and the corresponding auxiliary quantities, coherence, splitting density, net product) based on the probability that two animals placed in different areas somewhere in the region of investigation might find each other. In Lombardy (23852 km2) the road network extends for 12246 Km. We divided the region, by means of a Geographic Information System, in 68 ecological units using catchment basins and altitude belts. For each ecological unit we evaluated these fragmentation metrics in forest and agricultural landscapes with and without roads. Then we elaborated a ratio between non-road and road data sets in order to give a quantitative evaluation of the role of road network in landscape fragmentation process. Results show that roads may be the first cause of fragmentation in many areas: in some ecological units forests of south and west Lombardy or cultural landscapes in east Lombardy the mesh size changes of 95 percent when we add the road network. This approach allows us to identify the main areas where road construction should be avoided.

### 632. LONG-TERM MONITORING OF THE CHANGES IN BRYOPHYTE VEGETATION LIVING ON THE STONE-DAMS OF THE DANUBE IN A SECTION AFFECTED BY THE DIVERSION OF THE RIVER

**PAPP**, **BEÁTA**, Hungarian Natural History Museum, Hungary; **Rajczy**, **Miklós**, Hungarian Natural History Museum, Hungary

In 1992 a 120 km long section of the Danube river at Szigetköz region, part of the borderline between Hungary and Slovakia, was diverted into a new riverbed to put into operation the Gabcikovo Hydropower Plant. After the diversion the water level in the former Danube riverbed has dropped by approximately 4 m. From 1994 transects were sampled by applying the classic Braun-Blanquet method on the stone-dams at Szigetköz region to trace the changes of saxicolous bryophyte vegetation. Investigation of similar transect was initiated at Medve village (downstream) as a reference location. According to the results the suitable habitats for the saxicolous, aquatic bryophyte vegetation of the stone-dams of the Danube at Szigetköz region have decreased considerably, the species composition is not stable at all. Since the water level is almost constant only a very limited niche remained for the saxicolous, aquatic bryophyte vegetation, which lives in the water fluctuation zone. In the reference transect at Medve, regardless of the weather conditions, floods or low water levels, the species composition of the bryophyte assemblage living on the stone-dams of the Danube is constant.

### 633. ECOLOGICAL AND SOCIOLOGICAL DIVERSITY OF PRIVATELY-OWNED CONSERVATION LAND: IMPLICATIONS FOR CONSERVATION POLICY DEVELOPMENT

**PASQUINI**, **LORENA**, University of Sheffield, United Kingdom

Private lands managed for conservation can play a crucial role in meeting national and international conservation objectives, but their diversity needs be systematically examined and characterised. Ecological and sociological characteristics of private conservation areas (PCAs) in the Little Karoo, South Africa, were assessed through a multi-level analysis integrating questionnaire surveys, in-depth interviews and GIS analyses. The PCA network captures a greater proportion of the land area than do statutory protected areas, as well as a greater and more diverse representation of vegetation types. The growth of PCAs is a recent phenomenon driven by strong conservation motivations, in half of cases unconnected to economic considerations. PCAs are highly individual in their requirements,

and closely dependent on the variable personal attitudes and circumstances of their owners. Results show that careful assessment of the attitudes and preferences of private landowners, as well as of the ecological value of their lands, is necessary for the development of effective incentive measures and regional conservation plans. Lessons of universal relevance in (a) the application of interdisciplinary methods to the study of conservation, and (b) the development of conservation policies that consider both the ecological and sociological characteristics of private lands, were thus gained from the study.

### 634. A SPATIALLY-EXPLICIT MODEL OF CONFLICT ZONES BETWEEN ALPINE BLACK GROUSE WINTERING HABITATS AND SNOW SPORT ACTIVITIES TO DELINEATE WINTER REFUGE AREAS

**PATTHEY**, **PATRICK**, University of Bern, Zoological Institute, Switzerland; **Wirthner**, **Sven**, University of Bern, Zoological Institute, Switzerland; **Signorell**, **Natalina**, University of Bern, Zoological Institute, Switzerland; **Arlettaz**, **Raphaël**, University of Bern, Zoological Institute, Switzerland

Human disturbance upon wildlife through continuously developing outdoor recreational activities is of growing conservation concern. We previously (see Arlettaz' oral presentation) showed that free-riding snow sports disturbance lead to stress and represent a new threat for Black grouse, a declining emblematic species of Alpine ecosystems. Here, we developed an occupancy suitability map to highlight the regions where major potential conflict may occur between human-use of the Alpine ecosystems and grouse favourite wintering habitats. We used Poisson regression to 1) determine relations between winter grouse distribution and habitat features, 2) construct a predictive occupancy model. Black grouse abundance was estimated by winter censuses. GIS variables expressing habitat characteristics (from habitat type to human pressure including snow sports and hunting) were extracted from satellite imagery, geographic databases and aerial photographs. The model classified human-disturbance (e.g. skilift density) and habitat type as the main variables affecting Black grouse abundance. A final «pre-interactive» occupancy suitability map, i.e. an optimal distribution map in the absence of human disturbance was generated. A map of human-pressure intensity was then overlaid so as to detect potential zones of major conflicts and spatially-explicitly delineate priority wintering reserves.

### 635. CONSERVATION OF ENDANGERED ENDEMIC SPECIES ALYSSUM BORZAEANUM NYÁR., USING MICROPROPAGATION TECHNIQUES

**PAUNESCU**, **ANCA**, Institute of Biology, Romanian Academy, Romania

The loss of plant genetic resources has made necessary the development of new ex situ conservation techniques to guarantee their preservation. Alyssum borzaeanum Nyár., is an endangered endemic from Romanian Flora.Techniques for efficient clonal multiplication and establishment of a gene bank of A. borzaeanum were developed. Embryogenic and organogenic responses were obtained from 4 days old seedling fragments, within 30 days of culture, on Murashige and Skoog (MS) medium, supplemented with growth regulators, as follows: 1 mg/l 2,4 D (2,4 – dichlorophenoxyacetic acid) and 0.2 mg/l Kinetin (6-furfurylaminopurine) – direct embryogenesis ; 0.1 mg/l NOA (2-naphtyloxyacetic acid) or 0.1 mg/l IAA (Indole-3-acetic acid) or 0.1 mg/l IBA (Indole-3-butyric acid) in combination with 1mg/l BAP (6-benzylaminopurine) or 0.1mg/l IAA combined with 1mg/l Kinetin – indirect embryogenesis; 0.1 mg/l NOA and 1mg/l Kinetin – direct organogenesis. Complete plant regeneration was achieved on MS medium without growth regulators. Rooted plantlets were transferred to soil for acclimatization in greenhouse. The survival rate was close to 80% and, regenerated plants were phenotypically uniform. The described protocols offer a valuable alternative ex situ conservation method for this endangered endemic and may offer the potential of being applied to other endangered Alyssum species.

### 636. HOW MANY EVOLUTIONARY SIGNIFICANT UNITS ARE IN THE MACULINEA GENUS IN HUNGARY

**PECSENYE**, **KATALIN**, University of Debrecen, Hungary; **Bereczki**, **Judit**, University of Debrecen, Hungary; **Tóth**, **Andrea**, University of Debrecen, Hungary; **Peregovits**, **László**, Hungarion Natural History Museum, Hungary; **Varga**, **Zoltán**, University of Debrecen, Hungary

Maculinea imagos were collected from 23 localities in eastern Central Europe. Enzyme polymorphism was analysed using polyacrylamide gel electrophoresis. 14 enzyme loci were studied in all samples. In the analysis of the data, F-statistics was computed and the total genetic variation was partitioned into within and between population or species components. Nei's genetic distances were calculated and UPGMA dendrogram was constructed on the basis of the distance matrix. AMOVA was computed to study the pattern of genetic differentiation among the samples. PCA analysis was also carried out using the allele frequency data of the samples. Our results indicated that Large Blues are less polymorphic than other European lycaenid butterflies studied. Strong genetic differentiation of four Maculinea species (M. alcon, M. teleius, M. nausithous and M. arion) was confirmed. No clear genetic differentiation was observed between Maculinea alcon and M. rebeli populations. Thus conclusion was drawn that there are four significant evolutionary units within the Maculinea genus.

### 637. LARGE DAMS POLICY IN PORTUGAL: IMPLICATIONS FOR CONSERVATION

**PEDROSO**, **NUNO**, Universidade de Lisboa, Faculdade de Ciências, Portugal; **Vasconcelos**, **Lia**, Faculdade de Ciências e Tecnologia , Universidade Nova de Lisboa, Portugal; **Santos-Reis**, **Margarida**, Universidade de Lisboa, Faculdade de Ciências, .Portugal

Large dams have been proposed as a solution to address energy and water needs. A model of development based on large dams dominated policy making, especially during the 50/60s, in many European countries and some still implement it (e.g. Portugal). The huge investments and impacts generated by large dams is nowadays cause of conflicts concerning the location and consequences of these constructions. Currently this is one of the more controversial questions in sustainable development and conservation, especially in Portugal were 157 large dams already exist and the construction of more 15 is foreseen in the near future. We discuss briefly Portugal's water and energy management policies along with the needs of the population, the Water Framework Directive, Portugal's responsibilities in the EU commitment on clean energies and impact on species. We conclude, after considerations based on some controversial dams build in Portugal and respective impact studies on threatened species that, despite representing an important and significant contribution to the development, and with well-known benefits, large dams have extreme ecological cost in some cases. It is advisable to look for alternative water and energy management policies that do not imply, to start with, the implementation of more large dams in Portugal.

### 638. DISTURBANCE EFFECTS ON THE GALICIAN SUBTIDAL MAËRL BEDS (NW SPAIN) BY MUSSEL AQUACULTURE *

**PEÑA**, **VIVIANA**, Seaweeds Laboratory, Spain; **Bárbara**, **Ignacio**, Seaweeds Laboratory, Spain; **Díaz-Tapia**, **Pilar**, Seaweeds Laboratory, Spain

Maërl is a subtidal community formed by the accumulation of loose-lying and non-geniculate coralline red algae. It is one of the more important marine habitats because of their high species diversity. Maërl is included in Natura 2000 sites and the most abundant maërl-forming species (Lithothamnion corallioides and Phymatolithon calcareum) are listed in the European Community Habitats Directive 1992. Anthropic activities affect seriously the structure and specific richness of

maërl. Studies focused on maërl ecology and physiology highlight the burial and sedimentation as the most negative environmental factors. In Galicia, main populations are located along the central channel of the rías where the extensive mussel aquaculture is widely spread. In order to know the effect of the detritus derived from mussel aquaculture on the Galician maërl beds, several radial transects (SCUBA diving) from natural maërl population to impacted bed in the southern rías of Galicia were carried out. The present work reveals the degradation of maërl bed in impacted sites: the increase in the dead maërl ratio (up to 85%), the decrease in thickness of the alive maërl layer (only 1 cm depth), the reduction in the structural heterogeneity and complexity of maërl and the reduction in the abundance and diversity of algal associated epiflora. *Contribution to PGIDIT03PXIB10301PR project (Xunta de Galicia)

### 639. BIOCORE – CENTRE FOR BIODIVERSITY AND ECOSYSTEM RESEARCH

**PENEVA, VLADA**, Central Laboratory of General Ecology, Bulgarian Academy of Sciences, Bulgaria; **Lazarova, Stela**, Central Laboratory of General Ecology, Bulgarian Academy of Sciences, Bulgaria; **Vasileva, Gergana**, Central Laboratory of General Ecology, Bulgarian Academy of Sciences, Bulgaria; **Fikova, Radka**, Central Laboratory of General Ecology, Bulgarian Academy of Sciences, Bulgaria; **Chipev, Nesho**, Central Laboratory of General Ecology, Bulgarian Academy of Sciences, Bulgaria

The increasing complexity of biodiversity conservation and research issues require further capacity building among the European research institutions. BioCORE project funded by the Ministry of Education and Science of Bulgaria is presented. The principal objective of the project is to enhance the research capacity of the Central Laboratory of General Ecology under the thematic sub-priority 6.3 “Global Change and Ecosystems”. This will lead to the development of a unique scientific entity in the country - Centre for Biodiversity and Ecosystem Research and its integration within ERA. The project consists of four work-packages: Reinforcement of research capacity; Strengthening of the scientific competence; Dissemination and outreach activities; Coordination and management. The main directions of work are outlined: basic research, aimed at better understanding of biodiversity and ecosystem functioning, including inventory, status and trends in biodiversity, structure, function and dynamics of ecosystems, and applied research, aimed at understanding the mechanisms of biodiversity changes, assessing and minimising the negative impacts of human activities on ecosystems, and ensuring integrated environmental management in relation to the conservation of natural resources. The research activities cover large-scale of natural and man-made ecosystems and habitats, as well as a wide range of target groups.

### 640. A FRAGMENT OF ITS FORMER SELF: THE ECOLOGY AND GENETIC DIVERSITY OF THE SMOOTH SNAKE (*CORONELLA AUSTRIACA*) IN A FRAGMENTED HEATH LANDSCAPE

**PERNETTA, ANGELO P**., Centre for Ecology and Hydrology, U.K.; **Reading, Chris J**., Centre for Ecology and Hydrology, U.K.; **Allen, John A**., University of Southampton, School of Biological Sciences, U.K.

The lowland heaths of southern Britain have significantly reduced in range following afforestation, agricultural intensification and urban development. As a result many heathland species are restricted to fragments of a formerly continuous habitat. The smooth snake is thought to be limited to remnant patches of heathland within its distribution in Southern Britain. This long-term study examines the effects of heathland patch size and isolation on the ecology and genetic diversity of the smooth snake. Sampling of snakes is being undertaken using 31 arrays of artificial refugia situated on heathland fragments throughout Dorset and Hampshire. Animals captured are marked with PIT tags to enable abundance estimates to be obtained and blood samples are taken. Preliminary results of variation in smooth snake relative abundance in relation to fragment characteristics will be presented and future genetic work will be outlined.

### 641. THE MAIN DRIVING FACTORS AFFECTING THE SPATIAL STRUCTURE OF THE TERRICOLOUS BRYOPHYTE LAYER IN FOREST COMMUNITIES

**PÉNZES-KÓNYA, ERIKA**, Department of Botany, Eszterházy Károly College, Hungary

The bryophyte community and habitat variables (forest floor thickness, stand density, litter cover, canopy opennes, exposition, soil pH, disturbance e.g. the distance from tourist roads) were analysed in different oak forest stands in the area of the Bükk mountains in Hungary. The characteristic factors were examined at each site where the bryophyte species were investigated in dependent sample quadrats. The bryophyte species groups were analysed with multivariate ordination methods (PCA) and the correlation between habitat characteristics and bryophyte occurance were analysed using canonical correspondance analysis (CCA).
The results show the strong effect of the exposition and canopy openness for the forest floor structure and as a consequence, the growing light intensity and the thinner litter layer for the bryophyte community living on the soil. These forest communities are sensitive for disturbance effects which have influence for the conditions of the dominant species within the terricolous bryophyte community because of the different regeneration mechanisms of them.

### 642. COEXISTENCE OF SYMPATRIC SIBLING WOOD ANTS THROUGH SPATIAL NICHE PARTITIONING: A RECIPROCAL HABITAT ANALYSIS

**Persico**, **Pietro**, University of Lausanne, Switzerland; **MAEDER**, **ARNAUD**, University of Lausanne, Switzerland; **Guisan**, **Antoine**, University of Lausanne, Switzerland; **Freitag**, **Anne**, Museum of Zoology, Switzerland; **Cherix**, **Daniel**, Museum of zoology, Switzerland

Formica lugubris and F. paralugubris are two sympatric sibling wood ant species that seem to occupy the same ecological niche in alpine forest ecosystems. In order to quantify the niche of each species, to test for niche differentiation, occurrence data (i.e. nest) were collected in the Swiss Jura Mountains using a random-stratified sampling design. Used factors were elevation, location relative to the forest, slope aspect and slope angle. Three habitat distribution models were fitted - for F. lugubris, for F. paralugubris and for the occurrences of the two species aggregated into a single dependent variable - using GLMs and a set of GIS predictors (climate, topography and vegetation). Two other models were calibrated through an original reciprocal habitat analysis consisting in applying each species set of predictive variables to the other species data set. Although the two species share very similar habitats they nevertheless exhibit distinct distribution patterns. F. lugubris and F. paralugubris occur respectively more frequently at woodland borders and in forest interiors. These results corroborate hypotheses on species reproductive strategies (opportunist alate disperser vs space-perennial specialist) and clarify the observed coexistence of studied species. These results have great implications in the conservation biology of these near-threatened ant species in Europe.

### 643. OCCURRENCE AND CONSERVATION OF CETACEANS

**PICANÇO**, **CRISTINA**, Projecto Delfim/Universidade de Évora, Portugal; **Brito**, **Cristina**, Projecto Delfim/Universidade Nova de Lisboa, Portugal; **Carvalho**, **Inês**, Projecto Delfim/Universidade do Algarve/Centre for Biodiversity and Conservation - American Museum o, Portugal

S. Tomé and Príncipe is an archipelago located in the Gulf of Guinea. This archipelago seems to be an important area for cetaceans, probably due to large concentrations of prey, as well

as the existence of several small bays and shallow water that constitute preferred rest areas. In comparison to other areas of the world, little is know about cetacean communities in this archipelago. A biological research to study cetacean's occurrence was conducted between 2002 and 2005. Sightings of humpback whales (Megaptera novaengliae), bottlenose dolphins (Tursiops truncatus), pantropical spotted dolphins (Stenella attenuata), orcas (Orcinus orca), sperm whale (Physeter macrocephalus) and pilot whales (Globicephala spp) were recorded. Historically, this archipelago has been reported as a possible breeding ground of humpback whales in the Gulf of Guinea region since the whaling period. S. Tomé and Príncipe don't have any legislation regarding marine mammals or the marine environment. It is also important to refer that a significant nature tourism and whale watching industry is presently beginning in the archipelago. Our research allowed obtaining new data on these cetacean's populations and efforts are being made to create a legal background to regulate human activities that may affect directly or indirectly whales and dolphins populations.

### 644. EVALUATION OF THE RESTORATION OF CALCAREOUS GRASSLANDS IN BELGIUM IN TERMS OF ECOLOGICAL STRUCTURE AND BOTANICAL DIVERSITY

**PIQUERAY**, **JULIEN**, FUSAGx, Belgium

This work is a first assessment of the acts of restoration of calcareous grasslands carried out in "Lesse and Lhomme" and "Viroin" areas (Belgium) during the last 15 years. The assessment in term of spatial structure has shown that the extent of grassland in these areas has more than doubled. This resulted mainly from an increase of the mean area of previously existing grasslands. The IFM index of connectivity between the grasslands has also increased. Then, the evolution of flora through the restoration has been studied. On oldest restored parcels, the vegetation became more nitrophobous, more heliophilous and contained proportionally more typical grasslands species, but the conditions of the ancient grasslands, that were also more species rich than restored grassland, has not been reached. The influence of the type of forest stand present before the restoration on the evolution of the flora is quite important at the beginning but after 10-15 years there were no more differences. The research of indicative species has shown that recent restorations were characterized especially by ruderal and forest species when the older restorations and the control grasslands were characterized by grassland species. A set of species typical of calcareous grasslands have not reappeared on restored grasslands.

### 645. THE WORLD HERITAGE ENVIRONS OF PANNONHALMA AS ONE OF THE MOST DOMINATIVE LANDMARK OF TRANSDANUBIA

**POTTYONDY, ÁKOS**, Szent István University, Inst. of Environmental and Landscape Management, Dep. of Landscape Ecology, Hungary

In Western Hungary an outstanding asset dominates the landscape, fitting neatly into its environment: the 1000 years old Benedictine Abbey in Pannonhalma. The monastery – together with its harmonious natural environment – was put on the World Heritage List in 1996. The monastery hill is highly emerging from the region, it can be seen from hundreds of kilometers. The Abbey together with its wider ambience (farmsteads, fields, villages, etc.) recalls a time when the monks were self–sufficient. The cultural and architectural values are strongly connected with their environs, a 7052 hectare Landscape Protection Area surrounds the monastery, a not yet fully transformed remain of the calcareous sand plains of the Little Hungarian Plain.
To sustain the world heritage area, planning and management must be done in quite a prudent and complex (agrarian, urban, archeological, natural etc.) system. Our goal is to create the World Heritage Area's land use structure, based on the natural and cultural values of the region.

### 646. PLANT SPECIES RICHNESS OF LOESS GRASSLANDS AT THE BARANYA-HILLS REGION (SOUTHERN HUNGARY)

**PURGER**, **DRAGICA**, BioRes Unlimited Partnership, Hungary; **Bartha**, **Sándor**, Institute of Ecology and Botany of the HAS, Hungary; **Csiky**, **János**, University of Pécs, Faculty of Sciences, Institute of Biology, Hungary

With growing emphasis on protecting biodiversity, there is an increasing need for models, which can predict the size of species pools of different habitats. Twenty-five semi natural loess grassland patches scattered in an agricultural landscape were investigated. For determining community species pool (the set of species present in a target community) 25 subplots - coenological relevés (4 m²) were recorded. Local species pool was determined as the set of species occurring in the landscape 1 km around the subplots. To filter a regional flora (1060 native plant species) - for determining the regional species pool - we used information from phytocoenological surveys. One third of the regional flora was identified as steppe, forest steppe and forest species potentially able to grow in a loess grasslands. Filtering by the mean value of ecological indicators (T, W, R, N) has been proved inappropriate because it excludes a 20-30 % of species from the regional pool which we found to occur in loess grassland stands. The weak relationship found between patch area and local species richness and the great dissimilarity between subplots suggests that the size of the community pool depends mainly on local processes, especially on local management history.

### 647. SUCCESSIONAL CHANGES OF ORTHOPTERAN ASSEMBLAGES, AND THEIR DISPERSAL PATTERNS IN A MOSAIC OF SANDY OLDFIELD AND GRASSLAND HABITATS

**PUSKÁS**, **GELLÉRT**, ELTE, Hungary; **Szövényi**, **Gergely**, ELTE, Hungary; **Nagy**, **Barnabás**, Plant Protection Institute of Hungarian Academy of Sciences, Hungary

We studied the changes of Orthopteran assemblages in the course of secondary succession in sandy oldfields in Kiskunsag National Park, Central-Hungary. Data of grasshoppers collected in oldfields of different ages and nearly semi-natural grassland patches were analysed by multivariate statistics. In the course of the secondary succession grasshopper species richness and abundance decreased and the rate of psammophilous species increased. The adjacent alkaline grasslands serve as important species pools for oldfields. Characteristic changes were detected in the mean flight potential of the assemblages, which may be interpreted by structural differences in the vegetation. We found significant correlations between distance of oldfields and similarity of the grasshopper assemblages. One of the reasons of the high spatial autocorrelation may be the restricted mobility of grasshoppers. We examined this with some dominant species by individual mark-recaptures. Most of the specimens were philopatric, however, some of them covered great distances. Their dispersal potential were comparable with the distances between oldfields. Some differences in movement could be detected among species and some mobility parameters correlated with temperature and wing length of specimens. In two years of investigations dispersal found to be different, probably due to changes in disturbance (grazing).

### 648. GIS AS A TOOL FOR THE INTEGRATED CONSERVATION OF NATURAL VALUES OF NP TARA (MT. TARA, SERBIA): ONE OF THE PRIME BUTTERFLY AREAS IN EUROPE

**RADOVIC**, **DEJAN**, University of Belgrade, Yugoslavia; **Jaksic**, **Predrag**, University of Pristina, Yugoslavia; **Radovic**, **Ivica**, University of Belgrade, Yugoslavia

There are 576 butterfly species in Europe and many of them are highly threatened. The Prime Butterfly Areas (PBAs) in Europe is a Project which aims is to identity a priority sites for their urgent

conservation ( 431 PBAs within 37 countries). On the territory of Serbia and Montenegro there are 207 butterfly species (nineteen of them threatened in Europe) and 17 PBAs. One of PBAs on territory of S&M is Mt. Tara (YU-14), covering 19200 ha (territory of National Park Tara) with three target species: Euphydryas maturna, Maculinea arion and Parnassius apolo. The Mt. Tara is among the most important centers of Balkan Peninsula and European ecosystem and species biodiversity. Except the PBAs the territory of Tara Mt. is on the list of Important Bird Areas of Europe (IBA). Diverse geographical data: landscape, geology, geochemistry, soil, hydrology, ecosystems, flora, fauna, vegetation, infrastructure, park facilities and DEM was collected and used in GIS for integrated valorization and conservation of natural values of NP Tara. We used geoprocesing (Geostatistical Analyst, ArcGIS Spatial Analyst and 3D Analyst extension) to create models to define usage of collected data for study of the habitat status and support to conservation efforts for three butterfly species.

### 649. ANNUAL CHARACTERIZATION OF SEA AMBIENT NOISE IN THE LOSINJ-CRES ARCHIPELAGO (CROATIA) AND ITS IMPACT ON BOTTLENOSE DOLPHIN DISTRIBUTION

**RAKO**, **NIKOLINA**, Blue world Institute for Marine Protection and Conservation, Croatia; **Fortuna**, **Caterina Maria**, Blue World Institute for Marine Protection and Conservation, Croatia; **Picciulin**, **Marta**, Natural Marine Reserve of Miramare-WWF, Italy; **Holcer**, **Drasko**, Blue World Institute for Marine Protection and Conservation, Croatia; **Mackelworth**, **Peter**, Blue World Institute for Marine Protection and Conservation, Croatia

In order to assess the extent of anthropogenic pressure, in terms of type and intensity of noise and presence of vessels, on the bottlenose dolphin distribution the Sea Ambient Noise (S.A.N.) was measured between November 2004 and October 2005. Recordings from 10 acoustic stations within Losinj-Cres archipelago (Croatia) allowed acoustical characterization of the area. The S.A.N. resulted to be a good indicator of presence of the anthropogenic noise. Boats and ships are responsible for most of the man-made noise and, in the areas with strong nautical tourism, they increase the S.A.N. in the low frequency bands mostly. Recordings of noise and data on vessel presence were compared to data on spatial distribution of bottlenose dolphins' groups. A clear correlation between the area with high anthropogenic pressure and a strong dolphin avoidance of the same area was found, mostly during the summer months. The avoidance of this specific area can be attributed to a seasonal significant increase of the total number of boats, particularly of very fast and noisy vessels such as speed boats and motor yachts, usually with inboard or outboard engines with power of more then 100 HP.

### 650. CONSERVATION STATUS OF THE SALAMANDRID, SALAMANDRA IFRAIMMACULATA SEMENOVI (CAUDATA: SALAMNADRAIDAE) IN THE ZAGROS MOUNTAINS WESTERN IRAN

**RASTEGAR-POUYANI**, **NASRULLAH**, Razi University, Iran, Islamic Rep. Of.

The family Salamandridae encompasses three genera in Iran: Neurergus Cope, 1862 (with three species); Triturus Rafinesque, 1815 (with a single species) and Salamandra Laurenti, 1768 (with a single species). Of these, the single species of Salamandra, S. ifraimmaculata semenovi, occurs in northern regions of the Zagros, Kurdistan Province, western Iran. This subspecies is, more or less, endemic to the areas of distribution, though it is also represented in some areas in northeastern Iraq as well as southeastern Turkey. Based on extensive study and research in almost all parts of the Zagros Mountains, distribution and conservation status of the Zagros Mountains salamandrid, S. i. semenovi, are discussed. The re-discovery of this taxa in some remote areas, around brooks and streams, in highlands of the Zagros is noted. The effects of severe draught of recent years as well as man-made habitat destruction and pollution on population decline of this vulnerable species are determined and it is concluded that if an urgent conservation plan, for population stabilization of this taxon, does not taking into effect, in the near future it will undergo drastic population decline.

### 651. NATURA 2000 IN GERMANY

**RATHS, ULRIKE**, Bundesamt für Naturschutz (BfN, I.2.2), Germany; **Ssymank, Axel**, Bundesamt für Naturschutz (BfN, I.2.2), Germany

In 2006 Germany finished its site proposals according to the Habitats Directive (92/43/EEC) after a number of subsequent additions to the list of proposed Sites of Community Importance (pSCI). The German contribution to the European Network of protected sites known as Natura 2000 meanwhile is covering 13,5 % of the terrestrial surface including over 4600 pSCI and 539 sites for the Birds Directive (SPA). This event given it is appropriate to analyse these proposals statistically. The poster gives an overview of the situation within the different spatial units of Germany, relating to the specific administrative and natural situation in Germany with three biogeographical regions (continental, atlantic and alpine) and to landuse. It analyses the configuration of the predominant habitats of Annex I or species of Annex II of the Habitats Directive. Further more the relationships between sites of the Natura 2000 Network and other nationally protected nature conservation sites are shown. Future tasks for Germany to fully implement Natura 2000 in pratice in order to achieve and to maintain favourable conservation status of the habitats and species of Community Interest are discussed.

### 652. SPATIAL MODELLING: A NEW USEFUL TOOL IN THE MANAGEMENT AND CONSERVATION OF THE RED-LEGGED PARTRIDGE (ALECTORIS RUFA)

**REAL**, **RAIMUNDO**, University of Malaga, Spain; **Farfán**, **Miguel Ángel**, University of Malaga, Spain; **Guerrero**, **José Carlos**, University of Malaga, Spain; **Barbosa**, **A. Márcia**, University of Malaga, Spain; **Muñoz**, **A. Román**, University of Malaga, Spain; **Estrada**, **Alba**, University of Malaga, Spain; **Vargas**, **J. Mario**, University of Malaga, Spain

In Andalusia (S Spain) the red-legged partridge undergoes a large decline due to habitat changes induced by human activity and to the excessive hunting pressure. Annual Hunting Reports (AHRs), a mandatory form in Andalusia for all game estates, report the number of individuals of each species hunted during each season. We analysed 32,134 AHRs dating since 1993/94 to 2001/02 from 6,049 game estates to estimate the average hunting yield (HY) of red-legged partridge in each of the 771 Andalusian municipalities. We characterised the municipalities with good yields with respect to those with poor yields using stepwise logistic regression on a set of climatic, topographical, land use, and vegetation variables. The probabilities of obtaining good HY were corrected to show, for each municipality, the favourability for obtaining good HY for the species, and we downscaled the model to represent these favourability values in 1x1 km squares in Andalusia. These results are shown in maps. The variables introduced in the final predictive model were grouped in orographical, climatic and vegetation factors. Using a variation partitioning procedure we specified how much of the variation of the favourability model was explained by the pure effect of each factor and by their interaction. Vegetation was the most important factor explaining the favourability for obtaining good HY.

### 653. MONITORING AND MORPHOMETRIC IDENTIFICATION OF SMALL MAMMALS

**REGŐS**, **ÁGNES**, Department of Systematic Zoology & Ecology, Eötvös Loránd University, Budapest; **Akác**, **Andrea**, Department of Systematic Zoology & Ecology, Eötvös Loránd University, Budapest; **Farkas**, **János**, Department of Systematic Zoology & Ecology, Eötvös Loránd University, Budapest; **Cserkész**, **Tamás**, Department of Systematic Zoology & Ecology, Eötvös Loránd University, Budapest

Our team investigated small mammals in some Hungarian places, at Mikla and Mezőnagymihály. The presence of small mammals, were proven by analyzing owl pellets. We determined the food preference of the given owl and the relative frequency and rough scale distribution of its prey species. The aim of our investigation was to determine the reliability of measurable and observable skull traits in the differentiation of Mus species (M. musculus and M. spicilegus), using zygomatic coefficient methods.
The attendance of the southern birch mouse Sicista subtilis trizona were also verified, it is one of the most endangered species in Europe, occurs in Hungary. There was only one successfully method for detecting the presence of this small mammal till now…

**654. UNRAVELING WINTERING SITES OF MIGRATORY BIRDS USING STABLE ISOTOPES: FIRST STEP TOWARDS AN INTEGRATED POPULATION DYNAMICS MODEL FOR THE HOOPOE**

**REICHLIN**, **THOMAS**, Zoological Institute, University of Berne, Switzerland; **Hobson**, **Keith A.**, Canadian Wildlife Service, Canada; **Schaub**, **Michael**, Swiss Ornithological Institute, Switzerland; **Jenni**, **Lukas**, Swiss Ornithological Institute, Switzerland; **Arlettaz**, **Raphaël**, Zoological Institute, University of Berne, Switzerland

Populations of migratory animals may be regulated by environmental or density-dependent factors operating in any of the areas that they visit during their annual cycle. Conservation guidelines could be optimized if the relative contribution of the different environments to vital rates would be known. However, for many migratory species even basic information on spatio-temporal movements is not available. Recently developed, the analysis of stable isotopes contained in feathers has proven to be a valuable tool to identify wintering grounds. We extracted hydrogen, carbon, and nitrogen isotopes (dD, d13C, d15N, respectively) from feathers of hoopoes (Upupa epops) breeding in Valais (Switzerland). Possible wintering grounds are in the Mediterranean area as well as in Sub-Saharan Africa. We found high values of dD in >95% of hoopoe feathers (n = 137), suggesting that they over-winter in African savannahs north of the equator. Patterns of seasonal survival will be reconstructed by capture-recapture models to see how environmental conditions, prevailing either in the breeding area or on the wintering grounds affect population dynamics. It will then be possible to decide where conservation actions should be prioritized.

**655. CONSERVATION OF WET MEADOWS AND FEN VEGETATION IN AGRICULTURAL AREA OF DANUBE LOWLAND, SLOVAKIA**

**REJLKOVÁ**, **MARKÉTA**, Comenius University, Faculty of Natural Sciences, Slovakia

This paper evaluates the recent wet meadows and fen vegetation on Žitný ostrov (SW Slovakia) compared to the past, identificating the factors leading to vegetation change including the human impact. Žitný ostrov is the largest Danube island. Its plant communities were adapted to high ground water level and frequent flooding. 150 years ago, the construction of dikes begun . This led to signifcant change of ground water level. The soil was drained by a number of channels and turned into arable land. 50 years ago, the island was covered mostly by agricultural land. But the fen vegetation still made an important part of it´s plant cover, representing mostly alliances Caricion davallianae and Molinion caeruleae. Rarely were reported communities of alliance Cnidium venosi. Nowadays, meadows are still present but only as fragments. Their water regime is changed and so is their vegetation, belonging often to order Arrhenatheretalia. The original fen vegetation is preserved on few places, representing mainly alliance Molinion caeruleae. Caricion davallianae is no longer present. Even if the recent fen communities are mostly degraded, we can still find the vegetation representing the history of this region, and thus worth conservation.

**656. DEVELOPMENT OF A MINISEQUENCING MICROARRAY WITH FORENSIC APPLICATIONS TO IDENTIFY PRIMATE SPECIES**

**Rönn**, **Ann-Charlotte**, Uppsala University, Sweden, Sweden; **Andrés**, **Olga**, Institut de Recerca i Tecnologia Agroalimentàries, Spain; **López-Giráldez**, **Francesc**, Institut de Recerca i Tecnologia Agroalimentàries, Spain; **Verschoor**, **Ernst**, Biomedical Primate Research Centre, Netherlands; **Domingo-Roura**, **Xavier**, Institut de Recerca i Tecnologia Agroalimentàries, Spain; **Syvänen**, **Ann-Christine**, Uppsala Universitet, Sweden; **BOSCH**, **MONTSERRAT**, Institut de Recerca i Tecnologia Agroalimentàries, Spain

Molecular techniques are pertinent for the identification of animals and their by-products in the context of conservation, wildlife management and law enforcement, especially when morphological recognition is difficult and/or confusing. Single Nucleotide Polymorphisms (SNPs) have been widely used in human genetic studies due to their high frequency, random genomic distribution and the possibility of being incorporated in high throughput technologies, such as minisequencing microarrays. However, the promising use of SNPs in wild species is still widely unexplored. In spite of being highly protected (e.g. by CITES), primates continue to be traded for food, for their use in biomedical research, for exhibition, and as pets. The aim of our study is to develop a minisequencing microarray to identify primate species. To do that, we have identified diagnostic positions in nuclear genes, such as epsilon globin, apolipoprotein B and NGFB, and in mitochondrial regions, such as 12S rRNA and cytochrome b using a computer program called DIAPOS. We have identified 176 diagnostic positions to distinguish among primate genus or species. All these positions had been implemented in a minisequencing microarray which will contribute to the DNA-based taxonomic identification of endangered primates and their products and thereby support law enforcement.

**657. SEXUAL DIFFERENCES IN THE DIET OF AN INVASIVE CARNIVORE IN SOUTHWESTERN EUROPE: IMPLICATIONS FOR CONSERVATION PLANNING**

**ROSALINO**, **MIGUEL**, Centre of Environmental Biology, Portugal; **Santos**, **Maria**, Centre of Environmental Biology, Portugal; **Pereira**, **Iris**, Centre of Environmental Biology, Portugal; **Santos-Reis**, **Margarida**, Centre of Environmental Biology, Portugal

Invasive species are usually believed to be more efficient competitors in their introduced range compared to their native distribution, being one of the major drivers of extinction and ecosystem change. The Egyptian mongoose is an African mesocarnivore that has invaded Europe, thus being a good case study to evaluate the impact of an invasive carnivore in indigenous prey populations. Gut contents of mongooses, from its northern distribution range (Portugal), were collected and analysed since 2003 until nowadays. Females consume mainly Galliformes (chickens and ducks, usually kept in poultry-yards) and fruits. These items are easily captured/collected, with lower energetic cost-benefit , implying a lower search/handling time. With this strategy females seem to trade-off lower search/handling time food by gain in time for nursing their young. Inversely, males seem to focus in lagomorphs, whose capture involves higher energy demands. Our results confirmed the overall higher predation upon lagomorphs, and suggest sex-specific feeding strategies. The impact of this still expanding invasive predator, particularly males, towards a key prey (rabbit) to most of Western Mediterranean predators (e.g. Iberian lynx, wildcat, polecat) should be considered when implemeting managementactions whose goals are to promote the conservation of threatened predators and game species.

**658. REHABILITATION OF RED FOXES (VULPES VULPES) AND THEIR IMPACT ON THE ENVIRONMENT IN ITALY**

**ROSCIONI**, **FEDERICA**, coop monitoraggio risorse naturali, Italy; **Boitani**, **Luigi**, University of Rome La Sapienza, Italy; **Riga**, **Francesco**, Istituto Nazionale per la Fauna Selvatica (INFS), Italy

In Italy there are few data on the effectiveness of rehabilitation programmes in rescue centres, specially for mammals. A study was performed to analyse the effect of rehabilitation of red foxes, considering that this species is not endangered. From 2000 to 2002, 7 individuals had been followed with radiotelemetry to obtain information on their survival, spatial behaviour and damages provoked to the agricultural environment after release. Soft and hard release had been used to evaluate if there were any differences in relation to the impact on the environment. We evaluated the activity of the animals in relation to the different times of the day, and the survival with the Kaplan-Meyer method. We considered variables such as time spent in the wild, time spent in rescue centres, type of pathology that lead to captivity and type of release, to relate them to home ranges (MCP and Kernel estimator) and to movements of the animals after release (CLF). The animals seemed to be unaffected by the period spent in captivity. This result in contrast with those obtained by other authors who concluded that in England captive rearing is a problematic process for red foxes, demonstrates the site-specificity of these kind of studies.

**659. COMPARATIVE ANALISYS OF MACROFUNGI COMMUNITIES**

**RUDOLF**, **KINGA**, University of Pécs, Hungary; **Morschhauser**, **Tamás**, University of Pécs, Hungary; **Pál-FáM**, **Ferenc**, University of Kaposvár, Hungary

The investigated area, the Cserehát-hills is situated in North-East Hungary . Occurence data of 460 macrofungi species have been recorded for eight caracteristic forest associations between august 1995 and november 2005. Comparison of macrofungi communities of sampling plots were made by reason of presence-absence data and fruiting bodies within 25 X 25 m. Phytocoenological releves were made each samplig plots with ZM quadrat methods. Soil samples was also collected and analysed main soil parameters. Multivariable analysis of the mycological data were processed with SYNTAX program (Podani 2000). Classification and PCoA methods were used. Comparison of fungal communities of sampling areas were carried out by classification process based on the species sets. Macrofungi communities formed a group according to plant assiciations. Species set of more humid habitat separated from dryer one. On the basis of PCoA the fungal releves were gave separated groups according to humidity and acidity.

**660. PRESENT STATE AND CONSERVATION OF THREATENED SEASHORE PLANTS SAL-SOLA KALI AND POLYGONUM OXYSPERMUM IN THE EASTERN ARCHIPELAGO OF GULF OF FINLAND**

**RYTTÄRI**, **TERHI**, Finnish Environment Institute, Finland; **Kanerva**, **Tiina**, Metsähallitus, Finland; **Rintanen**, **Tapio**, , Finland; **Tainio**, **Esko**, Metsähallitus, Finland; **Teeriaho**, **Jari**, Finnish Environment Institute, Finland

Salsola kali L. and Polygonum oxyspermum C. A. Mey. & Bunge have strongly declined in Finland during past decades. They inhabit open, sandy seashores along Gulf of Finland. The main reasons for their decline have been suggested to be trampling, collection and chemical disturbance (eutrofi-cation) which has led to overgrowth of vegetation on previously open sandy shores. The aim of our study was to analyze the present state and actual reasons for decline of these species in the eastern archipelago of Gulf of Finland, in order to give recommendations for conservation and management of them. In summer 2005 we examined about 12 kilometers of sandy seashores on 12 different is-lands covering most of the previously documented growing sites (19 for Salsola and 7 for Poly-gonum) of these species. The results were discouraging: Salsola has only one site left and Poly-gonum has most probably disappeared from this area. Only minor part of the shores were in natural condition. Many sandy seashores are overgrowing by strong competitors which benefit from the eutrofication of the sea. On the other hand many sandy shores are lacking their typical vegetation due to recreation pressures. An outstanding threat is also the invasion of alien Rosa rugosa which is rapidly spreading on seashores.

**661. SPATIO-TEMPORAL DEMOGRAPHIC VARIATION AND REPRODUCTIVE STRATEGY IN RARE ENDEMIC ONCOCYCLUS IRISES (IRIDACEAE) OF LEBANON**

**SAAD**, **LAYLA**, FUSAGx, Belgium; **Mahy**, **Grégory**, FUSAGx, Belgium

The development of recovery programs for rare and endangered species requires knowledge of breeding system and demography. We investigated mating system, population structure, reproductive success and seed bank in wild populations of rare Lebanese endemic taxa. The studied taxa were found to be strictly self-incompatible. Based on a 2-years monitoring, mean ramets density per year was highly variable within and between populations; a similar increase in density from one year to the other and a stable stage structure were observed. No significant effect of population or year was found on seed set but significant differences were found in its individual components (N ovules, fertilization rate, abortion rate). Seed set was also not influenced by flowering density. Environmental stochasticity affected the small studied population through a high herbivory. The density of viable seeds in the soil was lower to similar to the estimated annual seed rain density, suggesting no seeds accumulation in the soil over years. Seed predation by ants may be a major factor explaining this low accumulation. Our results suggest that the species distribution is not limited by a general failure of reproductive success or regeneration but population size plays a role in the long term survival of populations.

**662. ASSESSMENT OF POTENTIAL THREATS TO BIODIVERSITY IN SEGRE RIVER VALLEY, CATALUNYA, SPAIN**

**SAAVEDRA, DELI**, Fundació Territori i Paisatge, Spain; **Kowalczyk, Kamila**, Polish Academy of Sciences, Centre for Ecological Research, Poland; **Romanowski, Jerzy**, Polish Academy of Sciences, Centre for Ecological Research, Poland

The study assesses the effects of prospective landscape changes on viability of key species and biodiversity in Segre River Valley, NE Spain. Two opposing scenarios of Conservation and Abandonment were constructed based on the spatial explicit elements like land use changes (e.g. loss of irrigation channels and conversion of land for cereal crops), urbanization and infrastructure. The scenarios were analyzed using the LARCH (Landscape ecological Rules for the Configuration of Habitat) computer model filled with local ecological data for 9 mammalian, bird, reptile, amphibian and insect species that represent main ecosystems: riparian, grassland and woodland. Traditional land use maintained in the Conservation scenario retains the viability of *Microtus agrestis* and other grassland species. The anticipated conversion of river banks into riparian forest, according to the new regulations of Catalan Water Agency, results in significant increase in numbers of the *Dendrocopus minor*, *Oriolus oriolus* and *Triturus helveticus*. The main effect of the scenario of abandonment of the traditional land use is serious decrease in the numbers of *D. minor* dependant on tree rows, and *Motacilla flava* and other grassland species.

**663. NEW ADDITIONS TO IN SITU CONSERVATION OF PRIMULA FARINOSA SUBSP. ALPIGENA AS AN ENDANGERED SPECIES IN HUNGARY***

**SALAMON-ALBERT, ÉVA**, Department of Systematic Botany and Ecological Botany, University of Pécs, Hungary; **Csete, Sándor**, Department of Systematic Botany and Ecological Botany, University of Pécs, Hungary; **Stranczinger, Szilvia**, Department of Systematic Botany and Ecological Botany, University of Pécs, Hungary; **Farkas, Ágnes**, Department of Pharmacognosy, University of Pécs, Hungary

Two native populations were studied living in wet grasslands at low altitude. Habitat features were analysed previously, but had no sufficient information about individuals and populations. Our investigation focused on population dynamics in time and space, genetic diversity between and within populations, floral biology and pollen vitality for the success of reproduction and survival. There were great differences in number of individuals between habitats and sub-habitats as well. Within two of sub-habitats were no differences of measured conditional and reproductive features in time. Microclimatic parameters supported differentiation between subpopulations. Genetic variability was analysed with RAPD analysis using 6 primers. Cluster analysis by binomial matrix revealed that genetic variability was different between habitat types. By the pairwise dissimilarity indexes and spatial position asexual reproduction could be presumed at <10% of individuals. Floral biology and pollination was examined by ratio of morphological types, and determined pollen vitality with Alexander's method. Floral types were not balanced inside the habitats and sub-habitats as well. High percents of pollen vitality increasing sexual success in both of the habitats. Our investigation showed similarity in genetic diversity, ratio of sexual/asexual reproduction, and pollen vitality, dissimilarity in number of individuals, conditional-reproductive features and floral types between two populations.

*Supported by Balaton Uplands National Park (www.bfnpi.hu)

**664. LOSS OF DIVERSITY IN BIRD COMMUNITIES AFTER REGULATION OF RIVERINE MEANDERS: HOW STRONG IS THE COMPENSATORY EFFECT OF MATURE OAK GROWTHS ON FISHPOND DAMS?**

**ŠÁLEK**, **MIROSLAV**, Czech Agriculture University, Czech Republic; **SVOBODODOVÁ**, **JANA**, Czech Agriculture University, Czech Republic; **ZASADIL**, **PETR**, Czech Agriculture University, Czech Republic

Alterations to riverine ecosystems have been accompanied by degradation of biodiversity, which has also affected birds inhabiting riparian stands. However, the establishment of new man-made habitats is sometimes followed by the formation of new specific communities. This study examines differences between bird communities inhabiting relict growths of river meanders and those inhabiting secondary tree stands along two rivers in the Czech Republic. In addition, the study analyses whether well-developed oak growths on fishpond dams may compensate the loss of bird biodiversity after river regulation. Birds and habitat attributes were recorded on 30 fixed-width line transects (ten in each habitat) during one breeding season 2003. We confirmed significant differences in many attributes among the habitats, relict meanders being the most structurally diversified while regulation has led to the simplest stands. The highest species diversity was found in meanders, especially due to the great richness of forest birds, the presence of hole-nesters and some less common passerines. The results suggest that fishpond dams play an insufficient compensatory role after the destruction of river meanders in terms of support for avian biodiversity. Diverse plantations of native deciduous soft-wood tree species, a stratified vertical profile and a rich shrub layer are our management recommendations.

**665. EURASIAN OTTERS (LUTRA LUTRA) IN SOUTHERN PORTUGAL: WELL FOR HOW LONG?**

**SALES-LUÍS**, **TERESA**, Universidade de Lisboa, Centro de Biologia Ambiental, Portugal; **Freitas**, **Dália**, Universidade de Lisboa, Centro de Biologia Ambiental, Portugal; **Antunes**, **Paula**, ECOMAN, Centro de Economia Ecológica e Gestão Ambiental, Portugal; **Santos-Reis**, **Margarida**, Universidade de Lisboa, Centro de Biologia Ambiental, Portugal

Portugal is considered one of the European strongholds of otters (Lutra lutra), a protected species. A recent national reassessment transferred the species to the "least concerned" category. Since 2002 we have been studying otter distribution and abundance in river Sado basin, south Portugal. The study confirmed the generalised presence, but revealed also the arising threats faced by the species. The basin streams do not have a permanent water regime, and dry partially or completely during summer not only due to the low annual average precipitation but also to the pumping of water for agriculture. Also, pollution due to fertilizers from agriculture upstream and rice fields downstream is high. This has affected the autochthonous fish and amphibian fauna and benefited exotic species like the American crayfish and several predator fish species. This situation has been becoming aggravated as summers become hotter and longer. The long term effects of these changes on otter population dynamic are not known. Efforts are being made through molecular scat analyses to determine real otter abundance in the basin as a starting point for future monitoring. On the other hand, the estuary is a Nature Reserve, but which encloses almost half of the existing marine fish farms in the country. These are regularly visited by otters, and thus a scenario of conflict has arisen. The management of the Reserve clashes with the expansion of fish farms. Lethal methods, although illegal in Portugal, are sometimes used by private owners. We evaluated otter damages to fish farms. A participatory decision-making process was organized and conflict reconciliation has been improved but not yet achieved.

**666. HARPACTICOIDS (CRUSTACEA, COPEPODA) ASSOCIATED WITH MACROPHYTES ALGAE FROM THE NORTH PART OF THE ROMANIAN BLACK SEA LITTORAL WATERS**

**SAMARGIU, MANUELA DIANA**, "Ovidius" University Constanta, Faculty of Natural Sciences, Romania; **Sava, Daciana**, "Ovidius" University Constanta, Faculty of Natural Sciences, Romania

In the last decades the Black Sea basin was the "theatre" of many environmental changes with qualitative and quantitative modifications which have had a great impact on the actual configuration of the coastal ecosystems. One of the most influenced zones was the Romanian shore, and its benthic communities, even on mobile and hard substrata.

Data about composition and density of the harpacticoids species associated with macrophytes, from the middlittoral and infralittoral of the north sector of the Romanian Black Sea coast are given. A sinecological evaluation (F %, D %, W %) about harpacticoids variation in different sites from quantitative algae samples drawn in the last decade is done.

A comparison between harpacticoids density on different types of substrata in north Romanian littoral waters is presented, in order to reveal the most populated one and to highlight characteristic species.

### 667. ESSAYS OF REINTRODUCTION OF A VERY ENDANGERED SPECIES: VERONICA CHAMAEPITHYOIDES LAM. (PLANTAGINACEAE), AN ENDEMIC PLANT OF THE IBERIAN PENINSULA

**SÁNCHEZ AGUDO**, **JOSÉ ÁNGEL**, University of Salamanca, Spain; **González Talaván**, **Alberto**, GBIF.ES - Nodo Nacional de Información en Biodiversidad, Spain; **González-García**, **Mary Paz**, University of Salamanca, Spain; **Delgado Sánchez**, **Luis**, Uiversity of Salamanca, Spain; **Santos Vicente**, **María**, UNiversity of Salamanca, Spain; **Sánchez Sánchez**, **José**, University of Salamanca, Spain; **Rico Hernández**, **Enrique**, University of Salamanca, Spain

Veronica chamaepithyoides Lam. (Scrophulariaceae) is a small annual weed, which only two alive populations that were found in the last seventy years. There are also some old data obtained from herbaria, all of them comming from localities of the center of Spain (mainly Madrid). But in spite of repetitive searches, it seems to be extincted in almost all of them. In order to help this species to survive we have carried out some studies about its germination hability (very sensitive to climatic conditions), and its seeds production. At the meantime we have tried to spread some seeds in potential habitats that were chosen with the help of modelling programs. The first results allow us to be a little optimistic due to the good response of this plant to in vitro techniques.

### 668. GAP DYNAMICAL RESEARCH IN THE KOSZEGI-FORRÁS FOREST RESERVE (HUNGARY)

**SÁRFI**, **NIKOLETTA**, University of Pécs, Hungary; **Kevey**, **Balázs**, University of Pécs, Hungary; **Mányoki**, **Gergely**, University of Pécs, Hungary; **Bátori**, **Zoltán**, University of Pécs, Hungary; **Gerely**, **László**, University of Pécs, Hungary; **PáII-G.**, **Barna**, University of Pécs, Hungary; **Tóth**, **Viktória**, University of Pécs, Hungary; **Szerémy**, **Katalin**, University of Pécs, Hungary

The Mánfa 82C - which is found in the core area of the Koszegi-forrás Forest Reservation - has great nature conservational importance. The area is the most spectacular sample of Helleboro odori-Fagetum: it is active in forest dynamics, 159 years old; the last cutting was in 1973. The main goal of this study was to explore the structure and the pattern of tree stand and understorey vegetation. Along a 300 meter long transect we examined the tree stand structure in systematic points, according to horizontal point sampling and collected physiognomical and coenological data of the understorey vegetation with 2x2 meter quadrats. We found the most expressed gap dynamics in the case of gap-complexes which were formed in a snowbreak in 1995-96. Here we recognized canopy expansion and gap-filling-in too. In the boarder zones of the gaps, the coverage of the fresh forest type indicated herbaceous species generally increase, however here the gap's species also relevant competitors. Despite the browsing pressure of the games, the forest was able to regenerate itself with an adequate force and quality to sign that the reproductional and self-regenerational ability of the forest is excellent.

### 669. STRUCTURE OF BEE (HYMENOPTERA: APOIDEA) ASSEMBLAGES IN EXTENSIVELY AND INTENSIVELY GRAZED GRASSLANDS IN HUNGARY

**SÁROSPATAKI**, **MIKLÓS**, Szent István University, Hungary; **Báldi**, **András**, Hungarian Natural History Museum, Hungary; **Batáry**, **Péter**, Hungarian Natural History Museum, Hungary; **Józan**, **Zsolt**, Hungary; **Erdős**, **Sarolta**, Hungarian Natural History Museum, Hungary; **Rédei**, **Tamás**, Hungary.

Bees are the most specialised pollinators in Europe, and they have a very special and important function in ecosystems. We studied bee assemblages of the three most widespread grassland types in Hungary. There were 7 pairs of extensively and intensively grazed sampling areas at each grassland type. The bees were collected by individual netting and sweep netting. We captured 483 individuals of 124 species in total. This shows a very divers and species rich bee assemblages in these pasture areas. Both the diversity and the percentage of the rare species were highest on the alkaline meadows area. The dominance of Apis mellifera was very low at each sites compared with similar surveys in grazed grasslands of Switzerland and Netherlands. Neither species nor individual numbers differed between extensively and intensively grazed pastures, among regions, and between edge and interior of pastures. However, both species richness and abundance of bees positively correlated with species richness and cover of flowering plants, indicating the important role of food sources. From the landscape parameters the marshes and the built-up areas seems to have effect on bees.

### 670. ECOLOGICAL FACTORS AFFECTING THE DISTRIBUTION OF THE CRYPTIC BAT SPECIES PIPISTRELLUS PYGMAEUS AND PIPISTRELLUS PIPISTRELLUS IN SWITZERLAND

**Sattler**, **Thomas**, Conservation Biology, Switzerland; **Bontadina**, **Fabio**, Conservation Biology, Switzerland; **Arlettaz**, **Raphael**, Conservation Biology, Switzerland

Only in 1997 the Common Pipistrelle (Pipistrellus pipistrellus), a widely distributed bat, has been recognised as two cryptic species. Since then, the new Soprano Pipistrelle (Pipistrellus pygmaeus) was detected in many European countries. In order to clarify its abundance and distribution in Switzerland and the ecological differences between the two species, twenty road transects all over Switzerland were run twice in 2002. We recorded ultrasound bat calls and determined the species based on the spectrograms (N = 981 call sequences). Ecological parameters were compared at the habitat level by GIS-distribution models using the Ecological Niche Factor Analysis ENFA. It could be shown that the newly discovered Soprano Pipistrelle is rare compared to the Common Pipistrelle: on transects, it was observed 33 times less frequently. Additionally its distribution was patchily and limited to areas near water bodies below 800 m altitude. Up to now, P. pipistrellus sensu lato was ranked "not endangered" in Switzerland due to its wide distribution and abundance. The rareness of the newly discovered species and its restricted distribution significantly changes the classification for this cryptic species. We therefore recommend a reassessment of their conservation status.

### 671. DISTRIBUTION OF COMMON SPADEFOOT TOAD (PELOBATES FUSCUS) AND SOIL TYPES IN HUNGARY

**SCHÄFFER**, **DÁVID A.**, MTA-PTE Adaptational Biology Research Group, Hungary; **Pirkhoffer**, **Ervin**, University of Pécs, Faculty of Sciences, Institute of Geography, Hungary; **Horváth**, **Győző**, University of Pécs, Faculty of Sciences, Institute of Biology, Hungary; **Purger**, **J. Jeno**, University of Pécs, Faculty of Sciences, Institute of Biology, Hungary

The Common Spadefoot Toad (Pelobates fuscus) occurs in areas with loose or sandy soils of Eastern and Central Europe. In Hungary it is found in lowlands as well as hilly and montane regions. Its European distribution is well shown in the 50×50 km resolution UTM grid map (Atlas of Amphibians and Reptiles in Europe), however, according to this map it is absent from a considerable part of Hungary. Based on data from publications, collections and researchers we compiled the 10×10 km UTM grid map of the Common Spadefoot Toad's distribution in Hungary. The 800 pieces of data covered 312 UTM grids which is 29,6 percent of all UTM grids in the country's area. Most of the data (~80%) come from research after 1970, so the map is up to date. The distribution of occurrences, irrespectively of the size of the covered area, suggests that the species occurs in all parts of Hungary. The distribution pattern obtained was compared using a GIS analysis with soil types identified in the various UTM grids. Within the distribution range of the species, sandy (34%), a loam (37%) and loamy clay (14%) physical soil types were found to be dominant.

### 672. GENETIC STUDY ON THE AUSTRIAN POPULATION OF EMYS ORBICULARIS

**SCHINDLER**, **MÁRIA**, UNIVERSITY OF VIENNA, Austria; **KOVÁCS**, **TIBOR**, EÖTVÖS LORAND UNIVERSITY OF SCIENCES, Hungary; **Molnár**, **Tamás**, UNIVERSITY OF KAPOSVÁR, Hungary; **Lehoczky**, **István**, UNIVERSITY OF KAPOSVÁR, Hungary

The European Pond Turtle Emys orbicularis L. is a highly endangered species in Austria. The only confirmed population is resident in the Donau Auen National Park and consists of approximately 400 individuals. A conservation programme was started in 1997, including several ecological studies to optimise the basics of conservation management. Additionally a genetic study was initiated in 2003 to distinguish autochtone and allochtone, released turtles. Salivary samples were taken from 105 individuals of 9 different localities of the national park. Investigations of the mitochondrial cytochrome b resulted so far in a high frequency of different allochthone haplotypes (n=28), particulary in the areas close to the city of Vienna and the dominance of a so far unknown haplotype (n=34) in the most isolated parts of the area, which is considered to represent an endemic genotype. The genetic diversity of two isolated locations was investigated by 5 microsatellites. The number of alleles varied between 5 and 16. Both locations showed individual alleles. The Hardy Weinberg test showed significant heterozygote deficit at the majority of the loci. The mean observed heterozygosity (47,80%; 49,87%) was lower than the mean expected heterozygosity (63,32%; 80,32%) in both locations. In 2006 the survey will be extended to the closest expected population in the Hungarian danube floodplains

### 673. A POPULATION VIABILITY ANALYSIS OF THE DECLINING GRASSLAND PLANT TRIFOLIUM MONTANUM IN CENTRAL GERMANY

**SCHLEUNING**, **MATTHIAS**, University of Marburg, Unit of Plant Ecology, Germany; **Matthies**, **Diethart**, Germany

We compared the viability of populations of the declining grassland plant Trifolium montanum in Central Germany. From 2002 to 2005 we carried out demographic studies in nine calcareous grassland sites that differed in their size and productivity. Stochastic growth rates strongly differed among populations and strongly decreased with increasing productivity and increased with the size of a population. Small populations might be declining remnants of formerly larger populations that have suffered from habitat eutrophication. To assess the extinction risk of T. montanum populations, we carried out stochastic simulations by using the year-to-year variability as an estimate for environmental stochasticity. The two declining populations became quickly extinct, while the three growing populations (lambda > 1.1) had very small extinction risks. In the four stable populations with growth rates between 1.0 and 1.1, the minimum size of a population to obtain a survival probability of 95% over the next 100 years was 50 flowering plants. However, only 50% of the populations in the state of Lower Saxony, for instance, are as large. We expect a further decline of T. montanum during the next decades in Central Europe and warn that population decline might even accelerate, if habitat eutrophication continues.

### 674. HYBRIDIZATION, SPECIES STATUS AND POPULATION STRUCTURE OF FOREST ELEPHANTS AND SAVANNAH ELEPHANTS

**SCHMIDT**, **ASTRID MARIA**, Copenhagen university, Denmark

The savannah elephant and the forest elephant that exist in Africa today have recently been classified as two different species, based on skull measurements and genetic sequence divergence. However, there is still much debate about whether the two forms should be classified as subspecies or two separate species. Therefore more research is necessary. The national parks of Uganda offer a unique possibility of investigating this issue because Uganda represents one of the few existing overlapping habitats between the forest and savannah elephants. Despite this, very few samples for genetic analysis have been obtained from elephants here. The objectives in this study have been: To determine if any hybridization is currently occurring in a transition zone between forest and savannah in western Uganda. To investigate if a possible east-west hybridization zone exists across equatorial countries in Africa. With this kind of new information we can contribute to the debate about the species level status by providing new information about the level of genetic integrity, of the two forms. This information is valuable for the management of the elephants in regions where their habitat overlaps.

### 675. THE SPECIES-AREA-ENERGY RELATIONSHIP IN ORCHIDS

**SCHÖDELBAUEROVÁ, IVA**, Department of Theoretical Ecology, Institute of Systems Biology and Ecology AS CR and Faculty of Biological Sciences, University of South Bohemia, Czech republic; **Kindlmann, Pavel**, Department of Theoretical Ecology, Institute of Systems Biology and Ecology AS CR and Faculty of Biological Sciences, University of South Bohemia, Czech republic; **Roberts, David**, Royal Botanic Gardens, United Kingdom

Area, energy available and latitude are the main factors influencing species richness: (1) species richness increases with area – the species-area relationship (SAR); (2) according to the species-energy relationship (SER) the energy available to an assemblage (i.e. that which it can turn into biomass) at a particular spatial resolution influences the species richness; (3) there are more species per unit area in the tropics than in the temperate regions. To test the relative importance of area, energy available and latitude on species richness, we have collected data on species richness of orchids for various areas in the world and calculated the mean Normalized Difference Vegetation Index (NDVI) as a measure of energy availability in these areas. We show that area considered is always very important, and that latitude is more important than energy available.

### 676. THE CARABID FAUNA (COLEOPTERA: CARABIDAE) OF POST-INDUSTRIAL AREAS OF DIFFERENT STAGE OF SUCCESSION IN CENTRAL POLAND

**SCHWERK**, **AXEL**, Laboratory of Evaluation and Assessment of Natural Resources, Poland; **Szyszko**, **Jan**, Laboratory of Evaluation and Assessment of Natural Resources, Poland

Many post-industrial areas exhibit special environmental conditions different from the areas in the surrounding. Therefore, the restoration of these areas is of high interest with respect to aspects of biodiversity conservation. Carabid beetles were collected using pitfalls traps on post-industrial areas in central Poland of different stage of succession in the years 2004 and 2005. Two different types of post-industrial areas were studied: a heap originating from brown coal mining and a heap consisting of ashes produced by a power station. For comparison a pine forest on natural soil was studied, too. In two years of study 1813 individuals from 62 species were sampled. The results indicate, that the post-industrial areas serve as habitat for coenoses of characteristic carabid species, some of them may be assessed to be rare on an regional level. The species exhibit significant fluctuations between the years. Both unconstrained ordination as well as Mean Individual Biomass of Carabidae (MIB) indicate a delayed succession, particularly on the ash heap. The conclusions are drawn that post-industrial areas offer possibilities for conservation of biodiversity and should be taken into account concerning sustained management of landscapes.

### 677. QUALITATIVE INSIGHT INTO PUBLIC KNOWLEDGE AND ATTITUDES TOWARDS BIODIVERSITY CONSERVATION IN SLOVAKIA

**SEDLÁKOVÁ, JANA**, Institute of Landscape Ecology Slovak Academy of Sciences, branch Nitra, Slovak republic; **Marcelová, Noémi**, Institute of Landscape Ecology Slovak Academy of Sciences, branch Nitra, Slovak republic

Successful management of biodiversity strongly depends on relationship between humans and nature. The concept of biodiversity is important for concerned scientists, conservationist and policy-makers. But what does the general public know and think about biodiversity, its changes and its management?
In 3 representative sites, we interviewed 66 respondents aged 19 to 58. All interviews were transcribed and analysed by MAXqda2 software.
We found out that for lay people is more natural to talk about nature than about biodiversity, as they find the concept a bit confused. The concept of nature is closely related to values as harmony, uniqueness, stability, food chain, gene pool, aesthetic and intrinsic values.
The issue of biodiversity management was almost always addressed on a local level. Respondents considered public education, strong legislation and strictly enforced rules as the most important means of biodiversity management. Importance of protected areas was also stressed. But respondents from within a national park would prefer protection in a smaller scale. Here, local socio-economical development is in strong conflict with nature protection.
To create an optimal model of biodiversity conservation in which human activities coexist with nature protection interests require also sociological research into public knowledge and attitudes towards current conservation measures.

### 678. META-POPULATION BIOLOGY OF A DECLINING PLANT SPECIES IN SAND GRASSLANDS IN BRANDENBURG

**SEIFERT**, **BIRGIT**, University of Potsdam, Germany; **Fischer**, **Markus**, University of Potsdam, Germany

Species persist if local extinctions are balanced by (re)colonisations. To promote colonisation, habitat networks have become legal requirements, though little is known about appropriate designs. We study the meta-population biology of Armeria maritima ssp. elongata in three 30 km2 areas in Brandenburg, the state with the highest number of sand grasslands and Armeria populations in Germany. In 2004, we mapped all 70 populations in the three areas. Mean population size was 617 flowering individuals and 26 were smaller than 100 individuals. Several populations were more than 1.5 km from the nearest population, while others were clustered. In 2004, in 24 selected populations many infructescences were predated. This, along with small size and isolation of many populations suggest risks of local extinction, which we will test by monitoring in 2006. In 2005, we sowed seeds in 24 populations and in suitable unoccupied habitats. 9.8 % of the 16000 sown seeds established, without difference between current and potential habitats. We conclude, that colonisation is dispersal limited, and that a grassland network for Armeria needs to be almost continuous.

### 679. EFFECT OF BUFFER STRIP ON SPECIES DIVERSITY IN THE IMMEDIATE SURROUNDINGS OF BOREAL BROOK HABITATS

**SELONEN**, **VILLE A. O.**, University of Jyväskylä, Finland; **Kotiaho**, **Janne S.**, University of Jyväskylä, Finland

In Finland, ensuring biological diversity in the forests is taken into account in both Forest Act and in the Nature Conservation Act. In the Forest Act, certain key biotopes have been defined as habitats of special importance, where rare and demanding species are expected to occur. These habitats will be left out of aggressive forestry operations. In our studies, the main focus is on the width and age of the buffer strip around brooks. Studies are conducted in the boreal coniferous forests in Finland by studying vascular plants and mosses. We found that the plant species community in the vicinity of brook was affected by the interaction of time since harvest and the width of the buffer strip. Number of species declines with time since harvest and the decline is most drastic in the most narrow buffer strips. Moss species in the vicinity of brook were also affected by the width of the buffer strip. In the vicinity of the brook there occurred more rare moss species than further from the brook. In the wider buffer strips, both moss and plant species communities in the vicinity of the brook remained rather constant trough the time. We conclude that wide buffer strips can prevent the effects that harvesting has on species communities on the immediate surrounding of the brook as well as ensure and restore habitats of special importance.

### 680. THE ROLE OF THE MEDICINAL PLANT IN RURAL DEVELOPMENT

**Sen**, **Gökhan**, Karadeniz Techicnal University, Turkey; **BAYRAMOGLU**, **MAHMUT MUHAMMET**, Karadeniz Techicnal University, Turkey

The majorty of people in Trabzon use plant tradional medicines for their care. Demand for medicinal plants is increasing in Trabzon as population grows. The threat posed by over-exploitation of medicinal plants has serious implications on the survival of several plant species, many of which are faced extinction. The pharmaceutical potential of medicinal plants in Trabzon is great. This potential can not be used effectivly due to lack of knowladge and difficulties in the implementing of laws. This study demonstrate what medicinal plants are used and what the current situation regarding medicinal plants is in Trabzon.

### 681. EFFICIENCY OF QUESTIONNAIRE METHOD IN HERONS' COLONIES CENSUS IN UKRAINE FOR MONITORING AND BIODIVERSITY CONSERVATION

**Serebryakov**, **Valentin**, Shevchenko National University, Ukraine; **BONDARCHUK**, **YURY**, Shevchenko National University, Ukraine

In conditions of growing anthropogenous influence on a nature it is important to conduct monitoring of ecosystems for the duly forecast of negative ecological processes. The monitoring of state of birds populations in Ukraine is organized by an effective method with using of special questionnaire. The process of the census is divided into 3 stages: 1. The general questionnaire with questions about the locations of herons' colonies in the current year are dispatched to the addressees (experts, teachers of biology, hunters, inspectors of an ecological service) throughout the Ukraine (February 20 - March 1) 2. The extended questionnaire prepared by us, are repeatedly dispatched to the addressees, which have given the positive answers (April) 3. The extended questionnaire, received by us, are processed As result the database of herons' colonies in Ukraine and the cartographical material are created. The data can be use for establishing of national fauna cadastre. The efficiency of the method is following: research of the large territory for the short period of time, economically favorable, increasing of public awareness in ecology and nature conservation. All this has great importance for biodiversity conservation.

### 682. MHC LOCI AND PATHOGEN RESISTANCE IN AMPHIBIANS

**SHOSHANNA**, **MAY**, University of Sussex, Department of Life Sciences, United Kingdom; **Zeisset, Inga**, University of Sussex, Department of Life Sciences, United Kingdom; **Beebee, Trevor**, University of Sussex, Department of Life Sciences, United Kingdom

The global decrease in amphibian populations is a matter of great international concern. There is increasing evidence for the

hypothesis that pathogens have been important contributors to amphibian population declines in many different parts of the world. Major histocompatability complex (MHC) proteins are critical components of the cellular immune response and MHC class II loci are interesting because they encode cell-surface proteins that bind antigens and play crucial roles in disease resistance. MHC proteins have previously been characterised in Xenopus laevis and Ambystoma mexicanum. Here we have designed degenerate primers based on the MHC class II beta exon 2 sequences for amphibians, fish and reptiles. Using these primers, sequences have been obtained for Rana temporaria, Rana ridibunda, Bufo bufo, and Bufo calamita. From these sequences we hope it will be possible to develop universal primers to characterise the MHC in a wide range of amphibians. The role of the MHC in disease susceptibility, and the diversity and distribution of MHC alleles in wild populations in relation to population size, isolation and pathogen outbreaks will be investigated.

**683. MICROHABITAT SELECTION IN THE ALPINE BLACK GROUSE DURING THE BREEDING PERIOD: IMPLICATIONS FOR SPECIES' PRESERVATION VIA HABITAT MANAGEMENT**

**SIGNORELL**, **NATALINA**, Zoological Institute, University of Berne, Switzerland; **Patthey**, **Patrick**, Zoological Institute, University of Berne, Switzerland; **Rotelli**, **Luca**, Parco Naturale Veglia-Devero, Italy; **Arlettaz**, **Raphaël**, Zoological Institute, University of Berne, Switzerland

Alpine environments experience dramatic changes since spreading winter and summer leisure activities have caused increased habitat alterations and disturbances in montane habitats. To what extent these changes are detrimental to black grouse (Tetrao tetrix), an emblematic species of Alpine ecosystems remains ill-understood. Because reproductive success is an essential component of black grouse population dynamics, we focused on microhabitat selection during the breeding period. We conducted habitat selection analyses with radio-tracked males, breeding and non-breeding females. We compared habitat features at radio-bearing points with those at randomly chosen locations within the individual home ranges. Using logistic regression with microhabitat descriptors as independent variables vs presence-absence data as response variable we tested for trends in habitat selection with respect to sex and reproductive status (males, breeding and non-breeding females, respectively). Results show that females, especially chick-rearing hens, show a distinct preference for drier and warmer, more open (younger) and multifaceted microhabitats than males. Analysing the selected variables on a larger scale with GIS will allow constructing accurate habitat suitability maps for the entire Swiss Alps. This would be a first step for developing appropriate, spatially-explicit habitat management plans.

**684. THE MONITORING OF CARNIVORES IN CEAHLAU NATIONAL PARK**

**SLAVINSCHI**, **BEATRICE-ANA**, Mountain Rescue and Biodiversity Protection Association (NGO), Romania

The Ceahlau National Park is situated in the central part of The Eastern Carpathians, at the crossing of parallel 470° Northern latitude with meridian 260° Eastern longitude and it consists mainly of detritic rocks. The fossil remains certify the presence of a rich fauna a long time ago. The archaeologists discovered in 'Curmatura la scaune' and 'Bofu' hill fossils from reindeer, stag and aurochs. The research period was 1st of November, 2004 – 30th of July, 2005. I studied footprints, tracks and excrements using GPS technology for many locations. Studied carnivores: Canis lupus (gray wolf), Vulpes vulpes (red fox), Felis silvestris (wild cat), Lynx lynx (eurasian lynx), Martes martes (pine marten) and Ursus arctos (brown bear). I used two methods of evaluation: 1.crossing of different basins 2.observation on the feeding places I found a small number of carnivores in Ceahlau raporting to the surface of the Park that is 9.000 hectares; this because there are steep valeys and a small surface with leafy trees (coniferous forest is predominant). But, in spite of the habitat and the conditions of a National Park, Ceahlau remains a big home for many species well adapted to all seasons, including tourists traffic.

**685. THE FUNCTIONAL RESPONSE OF A DECLINING FARMLAND BIRD**

**SMART**, **SIMON**, Centre for Ecology and Hydrology, United Kingdom; **Stillman**, **Richard**, Centre for Ecology and Hydrology, United Kingdom; **Norris**, **Ken**, University of Reading, United Kingdom

Many species associated with farmland have undergone significant declines across much of Europe during the last 30 years. This is in large part due to intensification of agriculture and the resulting decline in food supply. Behaviour-based models could predict and quantify how farmland birds may respond to changes in farming practices. A key component of these models is the functional response, the relationship between food and competitor density and food intake rate. This paper will describe the functional response of a declining farmland bird, the linnet, Cardeulis cannabina. We will report on the results of a series of experiments in which linnets fed on a range of artificial seed densities. Experiments were also performed to investigate the effects of seed distribution and habitat structure. We will also report on the occurrence of interference, a major component of food competition, within foraging linnets and individual variation in foraging ability and intake rates. These results can be used to develop a model that would accurately inform policy makers when considering agricultural developments and the deployment of agri-environment schemes.

**686. FACILITATION OF TREE REGENERATION IN WOOD PASTURES**

**SMIT**, **CHRISTIAN**, University of Castilla-la Mancha, Spain

Wood pastures are traditional semi-natural ecosystems, highly threatened by both intensification and abandonment of management. They are well known for high conservation values, but insight in regulatory processes is needed for sustainable management. Facilitation by grazing-resistant plants, also known as associational resistance, is proposed as one of those regulatory processes driving tree establishment in wood pastures. Empirical evidence is however scarce and factors affecting this process are unknown. This study focused on facilitation of tree regeneration in wood pastures of the Swiss Jura Mountains. Spatial associations between Picea abies saplings and unpalatable plants, rocky outcrops and tree stumps suggested safe sites for tree establishment. These associations did not result from increased seed input or reduced seed predation under nurse structures, but from associational resistance: tree saplings survived better in the direct vicinity of unpalatable plants than without, or with clipped, unpalatable plants. Unpalatable plants reduced the grazing intensity around the tree saplings. However, increased grazing pressure led to severe damage to nurse plants and tree saplings were no longer protected. Concluding, associational resistance is an important regulating process behind the dynamics of wood pastures and is strongly affected by grazing pressure.

**687. INVASIVE SPECIES CONTROL AND RESTORATION OF THE THREATENED NATIVE FLORA OF PITCAIRN ISLAND – A PRACTICAL CONSERVATION MODEL**

**SMYTH**, **NOELEEN,** Trinity College, Dept. of Botany, Ireland; **Waldren, Steve**, Trinity College Botanic Gardens, Ireland

Global and national responses to the loss of biodiversity and the threat of invasive species have in general been maudlin and not constructive. Currently, no habitat on earth remains uninfluenced

and it is estimated that 43% of the world's surface needs some form of restoration.
Island ecosystems provide model systems for research purposes. Tropical islands might provide a preview of the environmental situation that is likely to become more prevalent on the world's continents in the future. This project has been researching invasive plant species control and restoration of threatened native flora on Pitcairn Island
(4 x 2 km 2) South Central Pacific Ocean (2100 km east of Easter Island, 5320 km north-west of New Zealand). The climate on Pitcairn is sub-tropical with mean annual rainfall of 1716mm and temperatures ranging from 17- 26 $^{o}$ C.
We have selected 80 trial plots (10 x 10 m $^{2}$) randomly on the island in areas where *Syzygium jambos* (Roseapple) invasion is proving detrimental to the native vegetation. A two- way factorial design was applied with plot treatment (Roseapple cut or Roseapple injected) and planting density (High & Low) as factors. Baseline information on soil fertility, light conditions (which influence species regeneration) and native species found in association with *S. jambos* were recorded. Investigations into the proportion of *S. jambos* and native species that occur in the seed bank were also being carried out. A small nursery was established to propagate native and rare species to replace *S. jambos* in the trial plots and increase the numbers of the severely threatened endemic plant species.
Data on planted native species survival, growth rates and *S. jambos* mortality were recorded from plots in 2005. The total plant survival in plots was 63.37%. In total; 1927, S. jambos were chemically treated in plots and only 5 of these showed signs of active regrowth in 2005, a mortality rate of 99.75 %. The amount of weedy plant regeneration also varied with plot treatment. The weed cover in plots with canopy, was very low (17.81 %) compared with the weed cover in plots where the canopy had been removed (80.80%).
Two presumed extinct endemic species *Abutilon pitcairnense* and *Myrsine* aff. *niauensis*, were rediscovered during fieldwork and genetically assessed. DNA fingerprinting using amplified fragment length polymorphism (AFLP) of *A. pitcairnense* and its progeny showed that there is still some genetic occurring (Total observed diversity $H_T$ : 0.2479$\pm$ 0.0166 ; Shannon diversity Index $I_s$: 0.3950 & % polymorphic loci: 86.67 % ).Genetic and species recovery work on an endemic island fern *Angiopteris chauliodonta* has recently been completed.
This project puts into effect a more practical and holistic approach to biodiversity conservation, which addresses both habitat and species recovery processes in tandem.

### 688. HYBRIDIZATION AND INTROGRESSION BETWEEN SIKA DEER CERVUS NIPPON AND RED DEER C. ELAPHUS IN EUROPE

**SOLARZ**, **WOJCIECH**, Institute of Nature Conservation, Polish Academy of Sciences, Poland; **Gondek**, **Aleksandra**, Institute of Nature Conservation, Polish Academy of Sciences, Poland; **Nentwig**, **Wolfgang**, University of Bern, Switzerland

When barriers to gene flow are weak, hybridization between alien and native species may lead to rapid introgression of alien genes and phenotypic characters to native genera. Sika deer was introduced to many European countries starting in the1860s. Its influence upon native fauna remains controversial, including the scale of its hybridisation with red deer. Fertile hybrids are known from deer farms in most countries where sika occur. In natural populations, hybridisation was proven with molecular methods only in Scotland and Germany, whereas in Austria it was not detected. In other European countries no genetic studies have been done. Observations of sika and red deer behaviour, and records of atypical individuals indicate the possibility of hybridisation in the Czech Republic, Ukraine and in one of two sika populations occurring in Poland. No traces of hybridisation in nature have been found in Denmark, Lithuania, Hungary and a part of Poland. In order to determine the actual scale of hybridisation in these countries, analyses of 10 microsatellite loci and mitochondrial DNA began in 2006. DNA samples of both species were collected from areas in which they have co-occurred for different periods of time and from museum specimens. Results obtained so far do not confirm hybridisation between the two species.

### 689. CONSERVATION BIOGEOGRAPHY OF LAND SNAILS IN HUNGARY

**SÓLYMOS**, **PÉTER**, Szent István University, Faculty of Veterinary Science, Hungary

Large scale patterns of species richness and composition are results of historical and contemporary environmental factors. Saving the biota requires greater efforts to preserve not only the pattern of biodiversity but also the processes and mechanisms that generate and maintain it. Thus I used data of 121 land snail species in ca. 50×50 km units in Hungary to analyses the roles of these mechanisms. Total species richness was lowest in the plains, intermediate in the hills, and highest in the mountains. Regional variation in the number of species with wide ranges was similar to the pattern of total species richness. The number of species with narrow ranges was exceptionally high in the Northern Mountains. Climate had primary impact on the variation of species richness and species composition among regions. Sampling intensity, presence of calcareous substrate and area had significant positive effect on total species richness. Historical factors contributed to regional differences of species composition as expressed by the occurrence of the regional species with narrow ranges.

### 690. THE EFFECT OF CALAMAGROSTIS EPIGEIOS DOMINANCE ON THE SPECIES TURNOVER OF A NATURAL GRASSLAND STAND

**SOMODI**, **IMELDA**, Eötvös Loránd University, Hungary; **Virágh**, **Klára**, Institute for Ecology and Botany of the Hungarian Academy of Sciences, Hungary

The spread of Calamagrostis epigeios into near-natural grasslands following abandonment of human management often hampers the conservation of species rich communities. Our aim was to discover the mechanism and underlying causes of species loss observed in such cases. Our study was carried out at a sample site, where Calamagrostis started to spread following abandonement of grazing. Appearance and disappearance rates of species in micro-plots were compared between a patch of the near-natural grassland and the adjoining patch, which was conquered by Calamagrostis a decade before. While disappearance rate did not differ in near-natural and Calamagrostis-covered plots, appearance rate was significantly lower in the latter ones. We also investigated whether percentage cover, number of shoots or the length of Calamagrostis occupancy in the plots determine the pattern of appearance rate, if several stages of Calamagrostis establishment are taken into account. It was the cover of Calamagrostis epigeios which showed the best correspondence with the decline of appearance rate. These results point out that Calamagrostis lowers the species number of the grassland by hindering the establishment process in the turnover characteristic to the natural state, and it is directly its cover (probably through differring microclimate), which affects appearance rate.

### 691. PHYSICAL AND CHEMICAL RELEVANT PARAMETERS FOR MANAGING THE HABITAT OF THE HERITAGE WHITE-CLAWED CRAYFISH (AUSTROPOTAMOBIUS PALLIPES) IN WESTERN FRANCE

**SOUTY-GROSSET**, **CATHERINE**, Laboratoire de Génétique et de Biologie des Populations de Crustacés, France; **Grandjean, Frédéric**, Laboratoire de Génétique et de Biologie des Populations de Crustacés, France; **Parinet, Bernard**, Laboratoire de Chimie de lEau et de lEnvironnement, France; **Trouilhe, Marie-Cécile**, Laboratoire de Génétique et de Biologie des Populations de Crustacés, France

The white-clawed crayfish (Austropotamobius pallipes) is a threatened native crayfish from western Europe. Literature

reports that A. pallipes is sensitive to water pollution and is a bioindicator of good water quality. Nevertheless, little is known in France about A. pallipes ecological requirements. It is why a three year study (2002-2005) was conducted on 8 brooks harbouring A. pallipes from 4 different catchments in the Deux-Sèvres department (Western France). Two sample sites were chosen per brook: the first being where the population was present and the second 2 to 3 km downstream of the population. Both sites have been monitored regularly to analyse 23 physical and chemical parameters in order to characterize A. pallipes habitat. The use of multivariate analyses (i) showed that water organic matter discharge seemed to discriminate A. pallipes distribution and (ii) allowed to reduce the number of measured parameters to 6 relevant parameters (Total Organic Carbon, Absorbance UV at 254nm, pH, Nitrate concentration, Conductivity) without altering the results. In view of restocking plans, these results, linked to biotic factors, could allow to test quickly and easily the suitability of a brook section to harbour A. pallipes.

### 692. ENVIRONMENTAL CRITERION OF EVALUATION THE WETLANDS IN THE ORAVA BASIN

**SPULEROVA**, **JANA**, Institute of Landscape Ecology of the Slovak Academy of Sciences, Slovakia

The Orava basin belongs among the three most important peat land areas in Slovakia. The Wetlands of the Orava Basin was written into the List of Wetlands of International Importance in 1998 as the Ramsar site. Habitats were mapped and evaluated in 2001-2004 for preparing Management plan of the wetlands in the Orava basin. Raised bogs, transitional bogs, fens and an extensive complex of swamp bog forests have been preserved here on the area of approximately 520 ha. The site has mostly natural vegetation with relatively low human influence. Mosaics of wetland communities are characterized by rich biodiversity and occurrence of rare and endangered species of plants and animals of Slovakia and Europe. For evaluating of habitats we determined factors, which can impact their quality – if they are natural, or impacted by man with positive, limited or modified impact. Negative natural factors are succession, wind calamity, decrease of groundwater level. Negative human influence in the site include melioration of surrounding agriculture land, insufficient management of wetlands, picking up the forest fruits in peat lands, illegal commercial collection of insects, peat mining in locality Suchá Hora and others. This work was supported by Research and Development Support Agency under the contract No. APVT-51-035102 “Creation of environmental limits for sustainable development (on example of model territories)“.

### 693. CBSG EUROPE – A NEW TOOLBOX FOR CONSERVATION IN EUROPE

**STELVIG, MIKKEL FRANCK**, Copenhagen Zoo, Department of Science & Conservation, Denmark

CBSG Europe is one of the nine regional offi ces of the IUCN/SSC Conservation Breeding Specialist Group (CBSG). The European office was established in September 2002 in order to make the CBSG services more easily available to the European conservation community and to ensure an European input in the further development of conservation planning tools that is one of the main fields of expertise of CBSG.
CBSG Europe will assist European NGOs and GOs to conduct conservation planning in and outside Europe and conduct training workshops in conservation planning for relevant parties of the European conservation community.
CBSG’s main area of expertise is conservation planning. We do not conduct the actual fieldwork. Instead we create a scientifi cally sound basis for the planning, setting of priorities, and initiation of the projects, to strengthen the capacity of local partners to carry out the fieldwork.
Our participatory workshop processes combine small population and conservation biology, human demography and social learning to produce outcomes ranging from specific management recommendations for a single species to assessments of a nation’s biodiversity.
All CBSG workshops are characterised by having a large stakeholder participance. Lokal decision makers as well as other local representatives are invited in order to ensure a sound basis for the implementation of recommendations resulting from the workshop.

### 694. THE NORDIC SAPROXYLIC DATABASE – A COMPREHENSIVE OVERVIEW OF THE BIOLOGICAL DIVERSITY IN DEAD WOOD

**Stokland**, **Jogeir N.**, Norwegian Forest and Landscape Institute, Norway; **Dahlberg**, **Anders**, Swedish Species Information Centre, Sweden; **MEYKE**, **EVGENIY**, University of Helsinki, Finland; **Schigel**, **Dmitry**, University of Helsinki, Finland; **Siitonen**, **Juha**, Finnish Forest Research Institute, Finland

The species diversity in dead wood is tremendously rich. In Scandinavia, we estimate that 6000-7000 species or about 25 % of all forest species depend upon decaying wood. Species experts in Denmark, Finland, Norway and Sweden are developing a joint database with information about species-specific ecology and preferences for different dead wood attributes. Currently, the database has information for about 5000 species, including 2021 fungi (Basidiomycetes, Ascomycetes), 1257 beetles, 905 gnats and flies (Diptera) and more than 500 wasps, etc. (Hymenoptera). The information content shows that less than 20 % of the species prefer individual host tree species or genera, but 90 % of the species are associated to either coniferous or broad-leaved trees. The species diversity peaks in medium decayed wood, but there is a distinct species turnover from live/dying trees to strongly decayed wood. A large proportion of the known species prefer diameters above 20 cm and many of these are confined to big trunks (> 40 cm), but a distinct proportion prefer trunks and branches with small diameters (< 10 cm). Other important attributes are mortality cause, position (standing vs. lying) and the surrounding environment. The database will become available on Internet to serve research, nature management and the interested public.

### 695. FISHERY MANAGEMENT IN LAKES OF THE NATIONAL PARK KENOZERSKY (ARKHANGELSK REGION, RUSSIA)

**STUDENOV**, **IGOR**, SevPINRO, Russian Federation

The Kenozersky national park locates in the south-west of Arkhangelsk region, on the water-parting of the White sea and the Baltic sea. The area of the national park is 1396,63 km2 from which more than 160 km2 it accounts for 150 lakes. The national park was formed in 1991 and in its territory were enclosed more than 10 villages with population several thousands people. Main businesses of the local people were agriculture, tim-ber facilities, and fishery before the park creation. In the park lakes inhabit 21 fish species from which 8 species use by commercial fishery. Three types of fishery are recommended for the na-tional park: traditional commercial fishery in interest of the local people, non-commercial fishery for the local people and recreational fishery for the tourists. On recreational fishery are used fish-ing tackles with hooks, on rest types - a nets and traps. Fishery is conducting in 3 stages during year: winter period, summer-autumn period and vendace commercial fishery period. Total year catch of all fish on the all types of fishery is reaches 100-120 metric tons. The biological parame-ters of fish at the last years stable that is indicative of absence of the negative influence fishing on populations.

### 696. THE ALIENS ON ANTHROPOGENOUS HABITATS CITIES ULAN-UDES (REPUBLIC BURYATIYA)

**SUTKIN**, **ALEXEI**, Institute of general and experimental biology, Russian Federation

Ulan-Ude – is a capital of Republic Buryatiya (the Western Transbaikalia). The city is based in 1666. City occupied territory 346.5 km2. The population of city contains more than 400

thousand. The Ulan-Ude city flora contais 562 species and subspecies concerning to 302 genus and 85 families. As a result of our researches on anthropogenous habitats of Ulan-Ude 50 (8,9 from all flora) aliens is registered. The basic way of drift aliens – the Transsiberian trunk-railway, which crosses city from the West on the East. As a result of rail transportation for last 10 years (1995 – 2005) in territory of city Amaranthus albus L., Amaranthus blitoides S.Wats., Zygophyllum pterocarpum Bunge, Xanthium strumarium L. have appeared, first two now actively extend in places with the broken vegetative cover. As a result of introduction, there were significant changes in structure of tree-shrub flora of Ulan-Ude. Now everywhere on anthropogenous habitats of Ulan-Ude Populus balsamifera L., Populus alba L., Acer negundo L. are spread, whereas earlier in this territory there were wood communities from Pinus sylvestris L. with a underbrush from Rhododendron dauricum L., Cotoneaster melanocarpus Fisher. ex Blytt., etc. Thus, for last 100 years updating adventitious flora of Ulan-Ude occured basically due to introduction of foreign plants.

### 697. HUMAN DISTURBANCES ALONG ROADS REDUCE PREDATION ON EXPERIMENTAL NESTS IN A HIGHLY FRAGMENTED FOREST LANDSCAPE

**SVOBODODOVÁ**, **JANA**, Czech Agriculture University, Czech Republic; **ŠÁLEK**, **MIROSLAV**, Czech Agriculture University, Czech Republic; **ALBRECHT**, **TOMÁŠ**, Academy of Sciences of the Czech Republic, Czech Republic

Modern forestry may alter avian reproductive success indirectly through affecting predator-prey interactions. Here we evaluate the influence of road type on nest predation of ground-nesting birds in a highly fragmented forest area interspersed by a dense network of roads and forest paths, with one third of the area covered by a red-deer enclosure. Experimental nests (n = 276) resembling black grouse (Tetrao tetrix) nests were proportionally installed along three types of roads discriminated by utility (road type, from frequently used to unused: tarred roads, gravel roads and forest paths) and inside/outside the red-deer enclosure. The nests were placed in couples, with one nest placed close to the road edge and the second placed inside the surrounding forest habitat to assess the “travel line” hypothesis. We found that nests were depredated most frequently by predators with large home ranges (mainly fox). The “travel line” hypothesis was not supported because there was a similar predation rate among edge and interior nests. However, edge nests along tarred roads and interior nests inside the enclosure were predated with lower intensity than other nests, suggesting that frequent human disturbances in these habitats could have a repellent effect on predators of ground nests in the study area.

### 698. ECOLOGICAL, ECONOMIC AND SOCIAL IMPACTS OF THE FOREST BIODIVERSITY PROGRAMME FOR SOUTHERN FINLAND 2003-2007

**SYRJÄNEN, KIMMO**, Finnish Environment Institute, Finland; **Horne, Paula**, Finnish Forest Research Institute, Finland

In southern part of Finland only about 2 % of forest land is set aside for biodiversity protection. As 72 % of forests are owned by private families, a large-scale compulsory protection programme would cause negative effects on social acceptability and include high acquisition costs. The forest biodiversity programme for southern Finland (the METSO Programme) include several pilot projects to test voluntary measures to increase biodiversity protection in privately-owned forests. Land-owners can manage, rent or sell their forests for biodiversity conservation and receive a full compensation for the foregone benefits. Other projects of METSO include e.g. restoration of present conservation areas. In site selection, attention is paid on certain habitat types (e.g. herb-rich woodlands, spruce mires, exposed sandy eskers, flooded woodlands, wooded meadows and pastures) and structural characters (e.g. coarse woody debris, charred wood, old trees). Large area and location close to a conservation area are favored. Most of the sites obtained have been small in size (1-7 ha), but research indicates of good ecological quality. Especially fixed-term conservation contracts have been criticized to be ecologically uncertain. However, the voluntary measures has improved the forest owners' attitude towards forest conservation, and could thus indirectly benefit biodiversity conservation in the management of commercial forests as well.

### 699. CONSERVATION OF FRAGMENTED DRY GRASSLANDS IN VOJVODINA (S&M)

**SZABADOS, KLARA**, Institute for Nature Conservation of Serbia, Department in Novi Sad, Serbia&Montenegro; **Stojsic, Vida**, Institute for Nature Conservation of Serbia, Department in Novi Sad, Serbia&Montenegro; **Butorac, Branislava**, Institute for Nature Conservation of Serbia, Department in Novi Sad, Serbia&Montenegro

Vojvodina is a typical agricultural area within the Pannonic biogeographical region characterised by fragmented natural habitats. The remnants of dry grasslands are scattered along the steep loess slopes or between forest plantations. Conservation oriented survey of these habitat patches has resulted in the inventory of fragments. Inventory comprise data about the landscape characteristics (area, shape, surroundings, isolation) of the sites, detected vegetation type and protected species as well as the observed threatening factors. The proportion of the habitat destruction is assessed by landsape history research. Data analysis provided base for the proposed conservation measures. Most of the dry grassland fragments are unfavourable shaped, isolated and characterised by degraded natural vegetation. The lowest values of the size of valuable fragments (less than 1 hectar) are found in the region of the Backa loess platou. The total area of fragments of the pannonic steppe habitats on sand is less then 2% of the estimated original habitat size. The most common threatening factors are exotic plant invasions, establishment of forest monocultures and disturbations from neigbouring fields. The realization of the proposed conservation measures (habitat restoration, creation of ecological network) needs the sthrengtening of the legal backgound of nature conservation.

### 700. EDUCATION FOR BIODIVERSITY THROUGH YOUTH PARTICIPATION IN PROTECTED AREA MANAGEMENT IN ROMANIA

**SZABO**, **ALINA**, University of Oxford, United Kingdom; **Lawrence**, **Anna**, University of Oxford, United Kingdom; **Canney**, **Susan**, University of Oxford, United Kingdom; **Iusan**, **Claudiu**, Administration of Rodna Mountains National Park, Romania

In a research project funded by the Darwin Initiative, the Environmental Change Institute at the University of Oxford and the Administration of Rodna Mountains National Park are developing the first management plan for this protected area in Romania. An essential and original element in this process is the participation of students from local schools in biodiversity assessment and monitoring activities that provide an opportunity for education and increasing local awareness of biodiversity. We present an example of participatory assessment and monitoring of biodiversity put into practice within the context of a country lacking tradition in employing participation in environmental decision-making. Indeed, this method is new in Romania and documents a unique case where students apply environmental education for the benefit of both biodiversity and local people. Data were collected on the values and perceptions of students with regard to biodiversity and its components, and indicators and monitoring methods were selected accordingly. The results of monitoring are used to implement park management objectives. This research emphasises the role of the methods used in creating an enabling environment where students applied what they learned to affect outcomes and the merits of action-learning in environmental education projects.

### 701. GENETIC DIVERSITY OF GREAT BUSTARD (OTIS TARDA) POPULATIONS IN HUNGARY

**SZABÓ, KRISZTIÁN**, Biological Research Center, Institute of Genetics, Hungary; **Bozsó, Miklós**, Biological Research Center, Institute of Genetics, Hungary; **Pénzes, Zsolt**, Biological Research Center, Institute of Genetics, Hungary

Great Bustard is as a globally endangered Palearctic bird whose populations have declined markedly in the 19th and 20th century due to hunting and arthropogenic habitat-changes. Nowadays, major populations persist only in Spain, on the steppes of Ukraine and Russia, and in the Carpathian Basin. During the last decades, the Carpathian Basin population suffered dramatic declines, with a recent population size of approximately 1200 specimens in 9 fragmented subpopulations. As flagship of the hungarian conservation biology, Great Bustard received much attention and conservation effort, genetic diversity of the hungarian population was, however, not yet investigated.
Here we present a molecular analysis of of the mitochondrial control region of Great Bustards from different hungarian subpopulations. Analyisis of a 606 bp control region segment revealed a very low level of mitochondrial sequence diversity within the whole population. Hungarian haplotypes were not to differentiate from the haplotypes of the bustards' living on the russian steplands, Carpathian Basin population can be therefore considered as a part of this great East European stepland population (where genetic diversity is much greater).

### 702. THE ESTIMATION OF POPULATION DENSITY OF GOLDEN JACKAL (CANIS AUREUS L., 1758) BY ACOUSTIC METHODS IN TWO DIFFERENT AREAS OF SOUTH-HUNGARY

**SZABÓ**, **LÁSZLÓ**, Saint István University, Hungary; **Heltai**, **Miklós**, Saint István University, Hungary; **Lanszki**, **József**, University of Kaposvár, Hungary

The golden jackal-listed in the Hungarian Red Data Book- has resettled spontaneously since the nineties. In our work we studied it's fluctuation of population density between 2004-2005 on it's two typical spreading areas. We used acoustic methods every half year (in spring and autumn), there were 18-20 locations in the district of Hajós-Szentgyörgy and 18-30 near Kétújfalu. If we count 1 km earshot, then the walked area ranged between 56,52 km2-94.20 km2 on each territory. We observed 25 lone answering individual's. According to earlier publications we counted 4 individuals for the families answering in choir. Depending on this we estimated the density in every half year and in each areas. There were 13 answers from 22 locations in Hajós, in the spring of 2004, the estimated population density (d) was 0,95 specimen(sp)/km2 (Kétújfalu (K):12/28, d=0,86 sp/km2). 4 answers were from 21 locations in autumn, d=0,33 sp/km2 (K:16/30, d=0,70 sp/km2). Next year, in spring we heard 10 answers from 18 locations in Hajós, d=0,85 sp/km2 (K:6/20, d=0,25 sp/km2). There were 11 answers from 18 locations in autumn, d=1,31 sp/km2 (K:9/18, d=1,36 sp/km2). On both research area the density was above the highest fox density (2002: 1,30 sp/km2) ever estimated on Transdanubia, according to the results of autumn (2005).

### 703. LONG-TERM LIGHT TRAP STUDIES ON THE MACRO-MOTH (LEPIDOPTERA: MACROHETEROCERA) FAUNA OF THE AGGTELEK NATIONAL PARK

**SZABÓ**, **SÁNDOR**, University of Debrecen, Hungary; **Árnyas**, **Ervin**, University of Debrecen, Hungary; **Tóthmérész**, **Béla**, University of Debrecen, Hungary; **Varga**, **Zoltán**, University of Debrecen, Hungary

We analyzed the night-active Macrolepidoptera fauna in the Tohonya valley (ANP) near Jósvafo by Jermy-type light-trap in 1990 and during 1999-2004. In each year the trap functioned from 5 March until 5 November. During the seven years we collected altogether 115.392 specimens belonging to 585 species. 218 species occurred in each studied year. The species of families Noctuidae and Geometridae were the most abundant. Arctiidae, Lasiocampidae, Notodontidae and Sphingidae were also represented in a considerable proportion. The analysis of the flight curves shows two summer peaks and also a smaller spring and an autumn peak. The zoogeographical composition of species and their abundance, respectively, is the following: Transpalearctic (48.55%, 56.87%), Boreo Continental (18.8%, 8.15%), South Continental (2.05%, 0.79%), West Palearctic (28.72%, 33.83%), Xeromontane (0.85%, 0.04%) and Extrapalearctic (1.03%, 0.32%). The faunal components: euryoecious (12.14%, 19.91%), silvicolous (17.09%, 20.47%), nemoral (8.55%, 10.11%), quercetal (11.96%, 12.25%), helophilous (5.64%, 1.8%), boreo-montane (1.2%, 1.13%), altoherbosa (5.47%, 4.69%), meso-hygrophilous (7.18%, 6.07%), steppe (10.43%, 6.04%), lichenophagous (2.05%, 14.09%), other (18.29%, 3.44%).

### 704. THE ROLE OF TRADITIONALLY MANAGED CHESTNUT ORCHARDS AS FORAGING AND ROOSTING AREAS FOR THE MIGRATORY BAT NYCTALUS LEISLERI

**Szentkuti**, **Susanne**, Zoological Institute, University of Bern, Switzerland; **Bontadina**, **Fabio**, Zoological Institute, University of Bern, Switzerland; **Moretti**, **Marco**, WSL Swiss Federal Research Institute, Switzerland; **Spada**, **Martina**, Università degli Studi dellInsubria, Italy; **Zambelli**, **Nicola**, Centro protezione chirotteri Ticino (CPT), Switzerland; **Martinoli**, **Adriano**, Università degli Studi dellInsubria, Italy; **Arlettaz**, **Raphaël**, Zoological Institute, University of Bern, Switzerland

Woodland habitats have undergone major changes during the last century by abandonment of traditional management practices and increase in intensively cultivated plantations. In Southern Europe traditionally managed chestnut orchards form a particular park-like landscape structure with mature trees providing roosts for many species. We found the migratory bat species Nyctalus leisleri during pre- and post-lactation periods remarkably abundant (97% of 990 bats) in 200 bat boxes in managed chestnut orchards compared to their occurrence in unmanaged orchards. In order to explain this pattern we investigated a) habitat selection in foraging areas, b) roost microclimate and c) roost availability by means of radio-tracking and roost temperature loggers. The 12 radio-marked Leisler's bat selected deciduous woodlands over coniferous woodlands, pastures and settlements. But within woodlands there was no significant selection of managed orchards as foraging area although chestnut woodlands were frequently used habitats. There were no temperature differences between bat boxes in differently managed orchards and the observed roost use revealed no differences in the availability of natural shelters in differently managed woods. Thus we suggest that for the lek-mating system of Leisler's bat an optimal arena is presented by the accumulation of roosts with the semi-open vegetation structure in managed chestnut orchards.

### 705. REGULATION OF NATIONAL AND NATURE PARKS IN EUROPE

**SZILÁGYI, SZILVIA**, H-Gestor Kft., Hungary; **Rózs, Magdolna**, H-Gestor Kft., Hungary; **Illés, Zoltán**, CEU-Central European University, Hungary

Hungary is full of natural treasures. For decades the countrywide network of national parks has protected these treasures.
Our research studied national and nature park regulation in Europe. We tried to compile Hungary's possibilities to protect its nature reserves and alter its regulations.
We analyzed various positions, such as the goals, methods and content of regulations for protected areas; planning systems and the parks' tasks; the authorities responsible for protection; natural resource management methods; etc.
Our experiences show that Europe's countries cannot be grouped into a single unified classification system. Each country uses different regulations to achieve their primary goal, to protect their natural resources, but common ground can be

found in specific areas, primarily when countries pass their own regulations to comply with international accords or protocols.
We recommend that Hungary should similarly - capitalizing on the experiences and practices of other European countries - further develop its national and nature park regulations. Either the national protection law should be modified and extended, or a new national and nature park law passed. A new law would be able to handle all pertinent questions in detail, at the same time increasing awareness of the importance of protecting these parks.

### 706. THE ADVANTAGES OF GIS APPLICATIONS IN CONSERVATION BIOLOGY

**TAKÁCS, ANDRÁS ATTILA,** Ministry of Environment and Water, Development Directorate, Hungary; **Lőrincz, Tamás,** Ministry of Environment and Water, Development Directorate, Hungary;**Váczi, Olivér,** Ministry of Environment and Water, Development Directorate, Hungary

It is necessary to record spatial and time dimension during the study of any synbiological phenomenon. The uncertain spatial localisation of traditional biotic data (species distribution, rough vegetation/habitat maps) creates significant problems in biodiversity monitoring, especially in case of time series analyses. It is unrealistic to carry out any field studies on the Conservation Biology without support of Geographical Information System (GIS) applications. The field data collection is more effective in a GIS environment and more accurate with the use of satellite controlled Global Positioning System. The disturbance of the natural environment could be reduced due to the use of GPS, as it is not necessary to mark the plots with artificial tools. In the GIS the time dimension changes (monitoring) are easy to detect. With the aid of Remote Sensing the disturbance of an ecological state surveying could be further reduced, and data collecting of out-of-the-way areas (e.g. fens, extended marshes) could be possible. Authors present the possible use of GIS applications in conservation biology with case studies.

### 707. HOST ANT SPECIFICITY OF *MACULINEA* BUTTERFLIES (LEPIDOPTERA: LYCAENIDAE) IN HUNGARY: RESULTS FOR LOCAL TREATMENTS

**TARTALLY, ANDRÁS**, Department of Evolutionary Zoology and Human Biology. University of Debrecen, Faculty of Sciences, Hungary; **Varga, Zoltán**, HAS-UD Evolutionary Genetics and Conservation Biology Research Group, Hungary

Larvae of *Maculinea* spp. are obligate parasites of *Myrmica* (Hymenoptera: Formicidae) colonies. Knowledge of the host ant species is crucial for the protection of these endangered butterflies. The aim was to obtain data on the host ants of *Maculinea* butterflies in Hungary. Field surveys were done just before the flying periods between 2000 and 2005 by examining *Myrmica* nests situated within 2 m of *Maculinea* initial host plants. In 23 sites 141 infested nests contained totally 890 *Maculinea* specimens (larvae, pupae and exuvia). *Maculinea alcon* specimens were found predominantly in *Myrmica scabrinodis* and sometimes also in *M. salina* and *M. vandeli* nests. *Maculinea rebeli* specimens were mostly found in *Myrmica scabrinodis, M. sabuleti, M. schencki* and sometimes in *M. lonae* and *M. specioides* nests. *Maculinea teleius* specimens were mainly found in *Myrmica scabrinodis* but often in *M. gallienii, M. salina, M. rubra* and once in a *M. specioides* nest. *Myrmica rubra* was the only host of *Maculinea nausithous*. These results show that the Hungarian *Maculinea* populations often simultaneously use host ant species which can be different from species which are known from other regions. Therefore differentiated management is suggested for conservation.

### 708. A CASE STUDY ABOUT THE IMPACTS OF HUMAN ACTIVITIES ON FEN VEGETATIONS

**TATÁR**, **SÁNDOR**, University of Pécs, Hungary

The aim of the study is to show the consequences of human impact on fen vegetations. Historical and recent maps, landscape history and water quality data, flora lists were used in the research. In the first part of the 20th century the Malom pond was recorded among the unique Hungarian habitats for it's floating mires and inshore fen communities fed by the stream and spring water. In the second half of the 20th century new artificial fishing-lakes were created in the watershed basin of the pond accompanied by the removal of reeds and peat. The introduction of herbivorous fish species was the primary cause of the extinction of sedgy floating mires and luxuriate reed-grass vegetations. The fen vegetation of the shore became extinct because of landscaping and dredging. Houses were built around the pond therefore the cesspits have begun to pollute the water. Nowadays the new-built sewage farm is one of the most considerable pollutants of the watershed basin, and it causes eutrofication processes and increases in the numbers of algae and bacteria in the pond. The natural self-cleaning capacity of Malom pond reduced and weeds of extremely nitrogen rich habitats appeared. The number of species that indicate the natural condition (mostly plants of nitrogen poor habitats) has considerably decreased. The degradation of ecosystem services has serious social and economic effects too.

### 709. POPULATION AND IMMUNOCOMPETENT GENETIC VARIATION: A FIELD BASED STUDY

**TEACHER**, **AMBER**, Zoological Society of London, United Kingdom

Since 1985 there have been records of unusual mass mortalities of the common frog (Rana temporaria) across the U.K. and in 1995 research showed that these mass die-offs were due to ranavirus (family Iridoviridae) emergence. Today the geographic distribution of virus-related mortalities has expanded from the south of England to encompass most of central and southern Britain, excluding Ireland. Investigating the long-term effects of ranavirus on common frog populations and determining if ranavirus might pose an extinction risk to U.K. common frogs is crucial. A 20 locus microsatellite system and MHC class 1a will be used to look for signals of selection in order to determine whether these are random mortalities with respect to host genotype, or whether genotype-specific patterns of mortality are occurring. Frogs will be tested for viral antibodies to confirm ranavirus as the cause. This case of disease emergence offers an exciting opportunity for basic research as well as conservation, and allows theories of population genetics to be tested using empirical data.

### 710. IMPACT OF EXOTIC SLIDER TURTLES ON FRESHWATER COMMUNITIES: AN EXPERIMENTAL APPROACH

**TEILLAC-DESCHAMPS**, **PAULINE**, UMR 8079 Laboratory Ecology, Systematics and Evolution, France; **Prevot-Julliard**, **Anne-Caroline**, UMR 8079 Laboratory Ecology, Systematics and Evolution, France

New-born American red-eared slider turtles (Trachemys scripta elegans) have been massively sold in France and other developed countries as pet. These juvenile turtles, when kept in good conditions, have grown and led to more inconvenience that pleasure for naive owner. Therefore, many owners, ignoring the potential consequences of their act, released their turtle in natural freshwater ecosystems. As a part of a general project concerning invasion potentialities of slider turtles in France, we want to provide information on the impact on red-eared slider turtles on French freshwater ecosystems. To answer this question we compared, in April-August 2005, macro-invertebrate communities, amphibian communities and vegetation of semi-natural ponds (4 x 5 meters) submitted or not to the presence of slider turtles, combined with a density effect (4 ponds without

turtles, 4 ponds with one turtle, and 4 ponds with three turtles). Field data underline an impact of turtles on freshwater some compartments of freshwater communities when at high density (i.e. 3 turtles), whereas no impact is detected at low density (1 turtle).

### 711. THE PRIOLO PROJECT: THE LAST CHANCE TO SAVE THE SPECIES?

**TEODOSIO**, **JOAQUIM**, SPEA, LIFE Priolo Project, Portugal; **Farragolo**, **António**, SPEA, Portugal; **Gil**, **Artur**, SPEA, Portugal; **Silva**, **Elsa**, SPEA, Portugal; **Costa**, **Luís**, SPEA, Portugal; **Ramos**, **Jaime**, Universidade de Coimbra, Dept. Zoologia, Institute of Marine Research, Portugal; **Tavares**, **José**, Royal Society for the Protection of Birds, United Kingdom

The Azores Bullfinch (Pyrrhula murina), or Priolo, is a globally threatened species, with about 200 individuals surviving strictly in an area of 6,000 hectares in the island of São Miguel, Azores. A LIFE project is under way in order to save the Priolo from extinction by restoring 300 ha of natural laurel forest in the main distribution area. The main objectives are: • to secure a stable population through the implementation of long-term habitat management actions • to secure the legal protection of the species • to secure the continuity and sustainability of the measures through a management plan involving all the local stakeholders Concrete habitat management actions are being carried out to improve the habitat for the Priolo, involving the clearance of exotic invasive plant species and the planting of native species that provide food to the birds, as well as creating fruit tree orchards to improve food availability in the end of the winter (one of the limiting factors). Most of the actions consist in recurring habitat management actions .We also tested and implemented chemical methods to control the exotic plants. This ambitious and complex project is, probably, our last chance to save this highly threatened bird species.

### 712. PROMOTION OF SPECIES DIVERSITY RATHER THAN SPECIES CONSERVATION

**TESTER, URS,** Pro Natura, Switzerland

Swiss conservationists have been unable to clearly determine whether the development undergone by certain animal and plant species should be judged as being positive or negative. Deducing the regional aims from the global species conservation aims apparently poses a problem. This problem is related to limitations of species conservation on the regional level - regional rarity of species gets a too high significance. Conservation goals are based on historical prevalence. Regional species conservation is static. Each change is therefore judged as being negative. With “Promotion of species diversity rather than species conservation” the Swiss nature conservation organization Pro Natura proposes a new approach to species conservation on the regional level. The natural habitats and species diversity typical for a region are promoted and where necessary restored. If animal and plant species are present only in secondary habitats then these secondary habitats are conserved for the time required for the species to re-colonize their natural habitat. The diversity of wild animal and plant species in a cultivated landscape is allowed to change but not to decrease. Measures for the protection of single species should concentrate on species for which the region has a great responsibility.

### 713. ELABORATION OF MONITORING PLANS FOR PROTECTED PLANT SPECIES OF WESTERN CRETE, GREECE

**THANOS, COSTAS A**., National & Kapodistrian University of Athens, Dept. of Botany, Greece; **Dimopoulos, Panayotis**, University of Ioannina, Dept. of Environmental and Natural Resources Management, Greece; **Bergmeier, Erwin**, University of Goettingen, Dept. Vegetation & Phytodiversity Analysis, Albrecht-von-Haller Institute for Plant Sciences, Germany; **Georghiou, Kyriacos,** National & Kapodistrian University of Athens, Dept. of Botany, Greece

Within the framework of the LIFE-NATURE-2004 project *A Pilot Network of Plant Micro-Reserves in Western Crete (Chania Prefecture)*, monitoring plans were elaborated for the Annex II (Directive 92/43/EEC) priority plant species *Androcymbium rechingeri*, *Anthemis glaberrima*, *Bupleurum kakiskalae*, *Cephalanthera cucullata*, *Hypericum aciferum*, *Nepeta sphaciotica* and the priority habitat type 9370, Palm groves of *Phoenix*. Monitoring is to take place within the boundaries of the respective 7 micro-reserves, already established in the field (in 3 pSCIs). The stages of the elaboration of the plans have been: a) collection of existing information on the species’ biology, taxonomy, distribution and habitats; b) preparatory field work aiming to improve knowledge on species life cycle, phenology, population size, distribution pattern, habitat and threats; and c) compilation of plan. The monitoring plans include: a) summary of each species’ biology, detailed population, growth and reproduction data, description of habitat and threats and assessment of its conservation status (new IUCN categories); b) establishment of monitoring rationale, methods and parameters; c) guidelines for the establishment of permanent plots and meteorological dataloggers, in each micro-reserve, for long-term monitoring and d) instructions for parameter estimation and analysis of results.

### 714. SURVIVAL AND DEVELOPMENT OF ANCIENT WOODLAND PLANTS IN RECENT FARMLAND AFFORESTATIONS : IMPACT OF TREE SPECIES AND RELATED SOIL AND LIGHT CHARACTERISTICS

**THOMAES, ARNO**, Research Institute for Nature and Forest, Belgium; **De Keersmaeker, Luc**, Research Institute for Nature and Forest, Belgium; **Vandekerkhove, Kris**, Research Institute for Nature and Forest, Belgium

Forest cover on silt soils of Flanders has been fragmented during the past centuries and the remaining ancient woodlands are threatened by soil acidification. Colonization capacities of ancient woodland species were studied by means of an introduction experiment in a 30 year old reforestation of farmland with 8 different tree species. Based on their varying ecological demands for soil acidity and light, six ancient woodland species were selected for an introduction experiment. Survival, growth and reproduction of these species under different tree species was monitored and related to the growing conditions. Highly significant differences were observed in soil conditions, as soil pH ranged between 3.8 (*Alnus glutinosa*) and 5.6 (*Populus* cv.). Low survival rates of *Primula elatior, Anemona nemorosa* and *Mercurialis perennis* were observed on acid soils. *Oxalis acetosella* and *Pteridium aquifolium* performed best in stands with a low canopy cover. *Scilla non-scripta* seemed to be very indifferent to site conditions. Overall, species performed best on a *Populus cv*. clearcut area, while introduction was least successful in the *Fagus sylvatica* stand, with a dense canopy, a thick litter layer and an acid soil.

### 715. DANGEROUS RACIAL RELATIONS? GENETIC RESOLUTION OF A PHYLOGEOGRAPHIC CLADE OF WATER VOLES (ARVICOLA TERRESTRIS): IMPLICATIONS FOR REINTRODUCTIONS.

**THOMAS**, **MARTIN**, University of Central Lancashire, United Kingdom; **Iyengar**, **Arati**, University of Central Lancashire, United Kingdom; **Ramsey**, **Andrew**, University of Central Lancashire, United Kingdom

Recent surveys of water voles (Arvicola terrestris) in the UK have exposed one of the most catastrophic recorded declines of any European mammal in the 20th century with little hope of a natural recovery to former numbers. The discovery of two distinct phylogeographic clades of water voles, which colonised postglacially from Iberian and eastern European refugia, has consequences for conservation; reintroduction of the incorrect race may impact the phylogenetic integrity of any existing wild populations. Therefore, with the commencement of an ex-situ breeding programme intent on releasing water voles in Cumbria, the necessity to identify appropriate animals for a founder population is of great significance. To resolve this predicament, mitochondrial DNA was purified and sequenced from hair samples from a small remnant population and compared to known 736-base pair control regions established from other UK samples of both clades. Lessons learned in this study of water voles have implications for a wide range of ex-situ breeding, reintroduction and translocation schemes across many species.

### 716. POPULATION SIZE AND STRUCTURE OF THE THREATENED LONGHORN BEETLE *LEPTURA MACULATA*

**TIKKAMÄKI, TUULI**, University of Joensuu, Faculty of Forest Sciences, Finland; **Komonen, Atte**, University of Joensuu, Faculty of Forest Sciences, Finland

The northernmost European population of the longhorn beetle *Leptura maculata* is restricted to a small area in south-eastern Finland. The species is common in Central Europe but classified as threatened in Finland. We studied the population size and structure of the species using mark-recapture technique along a 1.2 km roadside between 12 July - 3 August 2005. Overall, 383 *L. maculata* individuals were captured (53% males, 28% females, 19% undetermed). Of the marked *L. maculata*, 90 individuals were recaptured (total number of recaptures was 121). The average ± SD time between capture and recapture was 5.2 ± 4.9 days (max. 20). Movement of individuals within the study area was restricted, which suggests that there is also limited dispersal between local populations in the current range of the species in Finland. Small proportion of individuals recaptured indicates that the local population size in the study area is thousands rather than hundreds. Our results show there is no immediate risk of extinction under current land use regime, comprising forestry and farming. Sedentary behavior of the species may explain why *L. maculata* has a restricted range in Finland.

### 717. GENETIC AND ECOLOGICAL ANALYSIS OF ENDEMIC PLANTS OF THE DIRECTIVE 92/43/EEC IN CRETE

**TJIRKALLI**, **ELLI**, University of Ioannina, Greece; **Tsiamis**, **George**, University of Ioannina, Greece; **Thanos**, **Costas**, University of Athens, Greece; **Dimopoulos**, **Panayotis**, University of Ioannina, Greece; **Bourtzis**, **Kostas**, University of Ioannina, Greece

Androcymbium rechingeri, Bupleurum kakiskalae, Nepeta sphaciotica and Phoenix theophrasti are endemic (the latter subendemic) to the island of Crete, Greece. Their limited population size and a number of threats make them critically endangered, and in need of active conservation. Moreover, these plants are of Community priority according to the Directive 92/43/EEC. Genetic surveys using genetic markers rbcL and matK genes of cpDNA and internal transcribed spacers of 18S-26S nrDNA were undertaken to investigate genetic diversity within each species to provide genetic data for the conservation programme LIFE-Nature 2004: A Pilot Network of Plant Micro-Reserves in Western Crete (Chania Prefecture). PCR amplified products were used to analyze phylogenetic relationships among the species. No genetic variation was found at intraspesific level based on the cpDNA genes. The conservation status of these species has been evaluated and it is recommended that additional surveys using microsatellites loci must be performed in order to further evaluate the genetic diversity of the species.

### 718. FIRE AND CREATING DEAD WOOD IN THE RESTORATION OF BOREAL FORESTS: THE EFFECTS ON BEETLE DIVERSITY

**TOIVANEN**, **TERO**, University of Jyväskylä, Finland; **Kotiaho**, **Janne**, University of Jyväskylä, Finland

Young successional stages of boreal forests are an important habitat for saproxylic species. Today, these habitats of natural origin are rare in Fennoscandia and restoration is required. Here, we present two studies concerning the effects of restoration on beetle diversity. First, we tested whether silvicultural burnings can maintain populations of rare and threatened species. We sampled beetles from 1-16-years-old burnings and seed-tree cuts. There were no differences in the abundance of beetles but burnt sites had more species. The numbers of rare and threatened species were greatest at burnt sites younger than ten years. We conclude that silvicultural burnings are effective in conservation of disturbance-adapted species but they remain a suitable habitat for a limited time only. Second, we constructed a large-scale experiment comparing two restoration practices, controlled burning and harvesting with creating dead wood. Both burning and harvesting increased the species richness of beetles and they resulted in different species assemblages. Rare and threatened species, especially saproxylic ones, preferred burnt sites. The volume of dead wood had no short-term effect. In conclusion, fire can be successfully used in restoration of managed forests to increase species diversity but long-term monitoring is needed to clarify the effects of creating dead wood.

### 719. IDENTIFYING DANGEROUS GROUNDS FOR FAST FERRIES AND FISHERIES -THE MODEL OF A PERMANENT PASSIVE ACOUSTIC SONAR SYSTEM FOR MONITORING CETACEAN MOVEMENTS

**TORDA**, **GERGELY**, University of Las Palmas de Gran Canaria, Spain; **Lopez Jurado**, **Luis Felipe**, University of Las Palmas de Gran Canaria, Spain

Fast ferries' routes and fishery grounds are usually designated ignoring Cetacean distribution, despite that acoustic pollution in key frequencies causes severe hearing loss, which reduces the overall fitness of these animals, and fishery bycatch and collisions with fast ferries are additional factors to natural mortality rate, which can lead to the extinction of whole local populations in species with such low reproduction rate. This is mainly because habitat use of Cetacean species is poorly known due to the difficulties of tracking individuals for longer periods of time, and local hotspots are rarely identified. Through the case study of the Canary Islands, the model of a permanently set passive acoustic sonar system, which uses Cetacean vocalizations to monitor movements of dolphin and whale individuals is presented here as an alternative solution for identifying long-term habitat use and real-time animal distribution in an area. The system comprises of sonobuoys anchored to sea bottom by a grid-design corresponding to the vocal characteristics of the species in question and the area's ambient noise level, radio transmitters, which transmit recorded vocalizations to a central computer, where sound source localization is calculated, displayed on a real-time GIS application for immediate use by stakeholders, and archived digitally for subsequent long-term analysis.

### 720. EFFECT OF CUTTING ON SPECIES RICHNESS, FLOWERING SUCCESS AND SEEDBANK COMPOSITION OF ABANDONED *MOLINION* MEADOWS IN HUNGARY

**TÖRÖK, PÉTER**, University of Debrecen, Department of Ecology, Hungary; **Arany, Ildikó**, CEEWEB Hungarian Office, Hungary; **Matus, Gábor**, University of Debrecen, Department of Botany, Hungary; **Tóthmérész, Béla**, University of Debrecen, Department of Ecology, Hungary;

In 1993 the species-rich Gyertyánkút Meadows of Zemplén Mts., NE Hungary was selected for a long-term restoration experiment. Effect of annual summer cutting on vegetation and seedbank was studied on abandoned *Junco-Molinion* stands. Four 100 $m^2$ sized plots (2 cut, 2 control) was surveyed in 2004. Number of species and flowering shoots was counted in 1$m^2$ subplots (n=20/plot). Aboveground phytomass samples (10×10 cm, n=32) were sorted as i) dead, ii) graminoid and iii) herbaceous. In April 2005 30 soil samples/plot were taken, and two vertical segments separated. After concentration by sieving, the soil seedbank were studied using the seedling emergence method in a greenhouse.
Higher species number ($p<0.01$), number of herbaceous ($p<0.001$) and flowering herbaceous ($p<0.001$) species were detected in the cut plots. Lower dead and graminoid phytomass were also sampled here. *Juncus conglomeratus* dominated the seedbank. *Campanula patula*, *Myosotis palustris*, *Lychnis flos-cuculi* ($p<0,01$) was more abundant, *Molinia coerulea* ($p<0,001$) and *Deschampsia cespitosa* ($p<0,05$) less abundant in the seedbank of mown plots.
Our results suggest that annual cutting is an appropriate tool to restore species-richness of abandoned wet hay-making meadows and to maintain high reproductive performance of meadow species by decreasing phytomass of *Molinia* and other competitive graminoids.

### 721. WHERE AND HOW TO REINTRODUCE LADY'S SLIPPER (CYPRIPEDIUM CALCEOLUS) AT THE ORDESA AND MONTE PERDIDO NATIONAL PARK?

**TORRES**, **ELENA**, Universidad Politécnica de Madrid, Spain; **Parra-Quijano**, **Mauricio**, Universidad Nacional de Colombia, Colombia; **De La Cruz**, **Marcelino**, Universidad Politécnica de Madrid, Spain; **Iriondo**, **Jose Maria**, Universidad Politécnica de Madrid, Spain

As part of the Recovery Plan of this endangered orchid, a logistic regression model was built to identify suitable sites for the species in the park. Sixteen environmental variables were used, and sites with a probability over 0.95 were selected. Additionally, the territory of the park was categorized and evaluated according to seven factors that could contribute to the success of the reintroduction. Crossing the areas selected through logistic regression model with those that obtained the highest score in the evaluation, 360 squares (10 x 10 m) were proposed. Secondly, 1060 ramets of a population in good condition were mapped to obtain information on the spatial arrangement of individuals. The number of flowers and fruits on each ramet, as well as light conditions were also included. Ryley's L and distance/direction plot showed a clustered pattern of ramets, and a clear anisotropy at distances over 2.5 m that may be related to seed dispersal by water courses. These analyses also detected a flowering spatial pattern which had no effect on fruit set. Ramets located in semi-shaded or open sites flowered more. Therefore, light conditions seem to be more important for the reproductive success of lady's slipper that distances between individuals.

### 722. BACKWATERS OF RIVER TISZA, HABITATS OF RARE ROTATORIA SPECIES

**TÓTH, ADRIENN**, Department of Hydrobiology, University of Debrecen, Hungary; **Zsuga, Katalin**, VITUKI Kht. Hungary; **Nagy**, **Sándor Alex**, Department of Hydrobiology, University of Debrecen, Hungary

In terms of Rotifera conservation biology is a difficult problem. Since, there is a little information about biology and ecology of this group, its protection is a complicated question.
Generally accepted that they are cosmopolitan, however in spite of this, mosaic structure and plant covering of an area considerably determines the occurrence of species. Hungarian shallow standing waters are determined by macrophytes. Backwaters are valuable and unique habitats but lesser-known water bodies in Hungary. Samples were collected from six eustatic backwaters in 2003 and from five semistatic backwaters in 2005, furthermore in 2000, 2001 we studied 17 backwaters which have conservation biological importance. In order to study the effect of mosaic structure of a habitat, we took samples from Hordódi-Holt-Tisza backwater. Our study revealed rare species, *Dicranophorus robustus*— which has been described only once in Hungary up to the present — and an interesting Trichocerca species whose taxonomic situation has not been clarified. Presence of *Postclausa hyptopus, Lopocharis salpina, Lecane ohioensis* are precious data in our samples. Our results revealed that the diverse species composition of backwaters may be object for important conservation biology research. We will extend our study to sessile species and examine the effects of annual variation of plant covering on macrophytes.

### 723. ARE THERE CRYPTIC SUBSPECIES IN MACULINEA ARION IN HUNGARY?

**TÓTH**, **ANDREA**, University of Debrecen, Hungary; **Pecsenye**, **Katalin**, University of Debrecen, Hungary; **Bereczki**, **Judit**, University of Debrecen, Hungary; **Varga**, **Zoltán**, University of Debrecen, Hungary

M. arion samples originated from 7 populations in Hungary and in Transylvania. Altogether 15 samples were collected between 2000 and 2004. The sampled populations used either Thymus spp. (M. a. spring and summer type) or Origanum vulgare and Thymus pulegioides (M. a. summer type) as food plant. Enzyme polymorphism was investigated at 16 enzyme loci. In the analysis of the data, the parameters of polymorphism were first estimated and F-statistics was computed where the total genetic variation was partitioned into within and between population components. Nei's genetic distances were calculated and UPGMA dendrogram was constructed on the basis of the distance matrix. Hierarchical F-statistics and AMOVA was computed to study the pattern of genetic differentiation among the samples. PCA analysis was also carried out using the allele frequencies of the samples to show the size of overlap in the genetic variation of the populations in a reduced space of variables. Our results indicated a relatively high level of genetic variation in the Large Blue populations coupled with strong differentiation among them. Moreover, the variation among samples originating from different generations of the same population was also sizeable suggesting a fairly strong effect of genetic drift. We, however, could not detect genetic differentiation between the spring and the summer type populations collect

### 724. FEEDING ACTIVITY OF MALE AND FEMALE MARSH HARRIER (CIRCUS AERUGINOSUS) AND DIET COMPOSITION OF NESTLINGS

**TÓTH**, **LÁSZLÓ**, Károly Róbert College, Hungary

We studied the daily changes in feeding activity of parents and the diet composition of nestling Marsh Harriers. Visits of parents have continuously been recorded for two weeks at a brood with four young from early morning to late evening. A camera was put out close to the nest and picture was transformed to radio signal. Some kilometers far the signal were retransformed and recorded

on videocasettes. We analysed more than 200 hours of observation. We recorded a total of 203 feeding visits when parents brought food items. 60% of visits were made by the male while 40% was made by the female. 101 out of 205 visits (combined for the parents) happened between 9 am. and 13 pm., while the rest (102 visits) belonged to other 12 hours of the day. Parents brought 205 prey items to the nest, the proportion of main food types are:as follows: lizards 46%, small rodents 22%, other mammals 2%, birds 15%, indet. 15%. There was no considerable differences regarding the food allocation of female for the four young. However, the youngest nestling had the 31% of the total of 329 feeding, while the others had 21%, 25% and 23% respectively.

### 725. DEFINITION, DISTRIBUTION AND GAP ANALYSIS OF NATURAL STEPPE HABITATS IN SPAIN: ABUNDANT, BUT POORLY PROTECTED

**Traba**, **Juan**, Universidad Autónoma Madrid, Spain; **CARRILES**, **EDUARDO**, Universidad Autónoma Madrid, Spain; **Morales**, **Manuel**, Universidad Autónoma Madrid, Spain. **García De La Morena**, **Eladio L.**, Universidad Autónoma Madrid, Spain

Iberia holds the largest surface of natural steppe habitats in western Europe, which host a significant proportion of the most threatened bird community in Europe. We have identified using floristic and ornithological criteria five natural steppe habitats among those included in Annex I of the EU Habitat Directive (EU codes: 1310, 1430, 1510 and part of the 4090), which occupy 472000 ha, with a mean fragment size of 81 ha. Considering only well conserved fragments (surface cover of characteristic plant species over 50 %), reduced total surface to 53328 ha (mean fragment size, 62 ha). The gap analysis assessing the efficiency of the Natura 2000 Network showed that hardly 43 % of total, and 26 % of well conserved natural steppe habitat is included in SCIs. The presence of natural steppe in 10 x 10 UTM cells showed a positive relationship with steppe bird species richness (Multiple Regression, $R = 0.201$, $F = 42.288$, $p < 0.0001$). A gap analysis using SPAs slightly increased the cover of well conserved steppes (28.7 %). Consequently, the Nature 2000 cover of natural steppes in peninsular Spain is limited, particularly for the best-preserved fragments, in spite of their high floristic and ornithological interest.

### 726. DOES DIFFERENT VEGETATION TYPES INFLUENCE NEST PREDATION RISK OF REED PASSERINE BIRDS?

**TRNKA**, **ALFRÉD**, Trnava University, Slovakia; **Batáry, Péter**, Hungarian Natural History Museum, Hungary

Habitat type has been recognised as one of the most important variables influencing nest success of birds. Vegetation structure may play a crucial role there. In reed passerine birds, reed and reed mace are considered traditional breeding habitats in Central Europe. As they differ markedly in density and height of stems, differences in rate of nest predation of birds nesting in these two habitats may be expected. To test this, we performed experiments with artificial nests that were placed in homogeneous stands of common reed and reed mace at ponds near Trnava, SW Slovakia, in 2005. Overall, 29.2% of all nests were depredated during study period. There were significant differences in daily survival rates of them between reed and reed mace beds. The nests were significantly more depredated at the grassland-reed edge in both habitat types, while no edge effect was found at reed-water edge either in reed or reed mace beds. Further we also found significant differences in seasonal trend of nest predation in the reed mace bed, where survival of artificial nests in May was significantly lower than that at the beginning and at the end of breeding season. The study clearly demonstrates the effect of vegetation type on nest predation rates in reed passerine birds. However, other factors, such as breeding patterns of individual species may also have influence on this.

### 727. CAN A SEMI-URBAN SETTING RIVAL UNDISTURBED HABITATS FOR A PROTECTED SPECIES? NUMBERS AND DENSITIES OF THE COMMON WALL LIZARD IN DIFFERENT HABITAT TYPES

**TRÓCSÁNYI, BALÁZS**, Danube-Drava National Park Directorate, Hungary; **Korsós, Zoltán**, Hungarian Natural History Museum, Hungary

The common wall lizard (*Podarcis muralis*) is protected by both Hungarian national measures and European conventions. A wall lizard population repeatedly producing totally black individuals in Mecsek Hills, Southern Hungary, was studied in 1998, to reveal high abundance and density and suggest high carrying capacity in the surveyed semi-urban habitat plots. It was then hypothesised that the commencement of a prolonged infrastructural investment in the same spot gave the site an even more artificial character, possibly having an effect on the unique lizard population occurring there. In order to find out whether there are other habitat patches around with the rare melanic phenotype surviving there, and to compare abundance and density values, 9 undisturbed, natural or near-natural habitats were selected within the oak-woods of the central ranges of Mecsek Hills, characterised with the *Inulo-spiraeifoliae-Quercetum pubescentis* association, and their wall lizard populations were investigated in 2005-2006. The authors present rates of melanism and differences in population sizes and density values among the studied microhabitats.

### 728. NATURA 2000 ECOLOGICAL NETWORK IN GREECE: CURRENT STATE AND PERSPECTIVES

**Tryfon, Eleni**, Nature Management Section, Environmental Planning Division, Hellenic Ministry for the Environment, Physical Planning and Public Works, Greece; **DIMOPOULOS**, **PANAYOTIS,** Lab. of Ecology and Biodiversity Conservation, Dept. of Environmental and Natural Resources Management, University of Ioannina, Greece; **Kati**, **Vassiliki**, Lab. of Ecology and Biodiversity Conservation, Dept. of Environmental and Natural Resources Management, University of Ioannina, Greece

The 359 sites of the Greek part of the Ecological Network Natura 2000 can be categorized as follows: 208 sites have been designated Sites of Community Importance (SCIs), 120 sites as SPAs (Special Protection Areas), and 31 are designated as both SCIs and SPAs. The terrestrial area of these sites covers 2,526,556ha (19.1% of the total terrestrial area of Greece) and the marine area of these sites covers 624,646ha. Greece harbours 115 habitat types, of which 85 are listed in Annex I of the Habitats Directive; 17 are priority habitat types and 30 are additional Hellenic habitat types (not included in the Directive). The Greek catalogue of Annex II of the Habitats Directive lists 70 animal species, of which 11 are of priority, 40 plant species, of which 26 are of priority, 125 bird species of the 'Birds Directive', and 216 migratory birds. To commence management and monitoring within the protected areas, twenty-seven (27) decentralized Management Bodies (established in 2001 and 2003) are responsible for implementing management plans in 78 Natura 2000 sites. The Management Bodies are authorized to undertake various responsibilities including the elaboration of management plans and regulations, and the monitoring and evaluation of regulation application. An overall National Natura 2000 Committee has a consultative role for the implementation of Dir. 92/43/EEC. Currently, it is of utmost importance to support and establish Management Bodies and to start working on preparatory actions for the application of monitoring and management plans.

### 729. CONFLICTS BETWEEN HUMANS AND WOLF IN TURKEY: DAMAGES AND ATTITUDES IN BOZDAG (CENTRAL TURKEY) AND ATTACKS ON HUMANS REPORTED FOR THE COUNTRY

**TUG**, **SENEM**, Middle East Technical University, Turkey; **Bilgin**, **Can**, Middle East Technical University, Turkey

Canis lupus is one of the least studied species of Turkish fauna, and livestock depredation and recently increased number of

publications on attacks on humans intensifies the human-wildlife conflict. In this study, wolf depredation and human attitude is studied in Bozdag, Konya where conflicts between wolves and livestock holders are known. Also, recent wolf attacks on humans in Turkey are compiled from 21 news sources on the Internet and records of rabid wolves are sought from various sources. 13 shepherds from nine villages and a small town with 50,000 sheep are interviewed in 2004-2005. Each flock is attended by a shepherd and several livestock guarding dogs (LGDs), and experiences 1.96 wolf attacks per year, on average, independent of flock size. The quality of the LGDs is more important because the flocks with less LGDs are attacked less. Corrals that are attended by a shepherd and good quality LGDs appears to be the most effective husbandry method to decrease depredation. Perception of wolf is generally negative; 73 percent of shepherds approve of its eradication. There were five publicized cases of attacks on humans, but no verified records of deaths between 2000 and 2005. Rabies stands out as the primary reason for wolf attacks, but further research is required because proper records are missing.

### 730. INVASIVE LEAF-MINERS SPECIES IN EASTERN-ROMANIA

**URECHE**, **CAMELIA**, University of Bacau,

Three species of leaf-miner moths were studied during 2002-2005: Parectopa robiniella Clem. and Phyllonorycter robiniella Clem. on the black locust (Robinia pseudacacia L.) and Cameraria ohridella D&D on the chestnut-tree (Aesculus hippocastanum L.). All three are monophagous species and caused premature defoliation of the host plants. Parectopa robiniella Clem. was first reported in Romania in 1988 but the infestation level has increased very much in the last 5 years. The black locust is strongly infested by the two species (Parectopa robiniella on the upper surface of the leaf while Phyllonorycter robiniella on the lower surface). Cameraria ohridella D&D was first reported in Romania in 2000 and the infestation level rapidly increased producing important damages in the chestnut-trees.

### 731. GENETIC DIFFERENTIATION IN THE SIX ISOPHYA SPECIES (ORTHOPTERA: TETTIGONOIDEA) LIVING IN HUNGARY

**VADKERTI**, **EDIT**, University of Pécs, Hungary; **Pecsenye**, **Katalin**, University of Debrecen, Hungary; **Varga**, **Zoltán**, University of Debrecen, Hungary

Allozyme polymorphism was studied in 17 populations of six Isophya species (I. kraussi, I. stysi, I. modesta, I. modestior, I. costata and I. camptoxypha). Samples were collected in six regions of Hungary: Aggtelek Karst, Zemplén Mts., Bereg plain, Mecsek Mts., Villány Mts. and Baranya Hills. Enzyme polymorphism was investigated by polyacrylamide gel electrophoresis at twelve loci.
Isophya populations had a slightly higher than average level of polymorphism: the mean portion of polymorphic loci was 47.2% and the average frequency of heterozygotes 0.112. aGpdh, Ldh and Pgm proved to be diagnostic loci as they had unique alleles in at least one species. We detected high FIT values implying a high level of total genetic variation. The positive FIS values suggested a tendency of heterozygote deficiency in all species. The highly significant overall FST values indicated strong genetic differentiation among the investigated populations. The results of AMOVA revealed that most of the between population variation was explained by the strong genetic differentiation among the six species. The differences among the local populations within the species only accounted for a relatively low portion of the total genetic variation. The dendrogram constructed on the basis of Nei's genetic distances and the results of the PCA analyses fully confirmed those obtained by AMOVA.

### 732. CRIME ANALYSIS; PREDICTING WOLVERINE GULO GULO DEPREDATION OCCURRENCE IN NORWAY

**VAN DIJK**, **JISKA**, Norwegian Institute for Nature Research, Norway; **May**, **Roel**, Norwegian Institute for Nature Research, Norway; **Landa**, **Arild**, Norwegian Institute for Nature Research, Norway; **Andersen**, **Reidar**, Norwegian University of Science and Technology, Norway; **Linnel**, **John**, Norwegian Institute for Nature Research, Norway; **Andersen**, **Roy**, Norwegian Institute for Nature Research, Norway

In Norway wolverines are involved in conflicts with man because of their depredation on free-ranging domestic sheep during summer. Wolverine depredation on livestock has been one of the main reasons for their control and historical population decline. Ever since their protection there have been possibilities for livestock owners to apply for depredation-control permits. It has however never been clear why depredation losses seem to increase during the grazing season and why certain grazing areas have high depredation losses. To investigate wolverine depredation, data on wolverine-killed sheep (2000 – 2005) were analysed in combination with detailed information from the different sheep grazing areas (2001-2004). Thus, a combination of individual characters (i.e. hunting and hoarding techniques) together with spatial characteristics (e.g. sheep densities, percentage forest, wolverine reproductions and removals) were used to analyse seasonal and inter-annual depredation patterns. High depredation losses were best explained by a combination of sheep densities and forest availability. Seasonal depredation patterns were correlated with reproduction and subsequent independence of cubs. These results may help to explain why removal of wolverines has failed to reduce livestock depredation in the past.

### 733. MOORLAND POOL RESTORATION FACILITATES THE INVASIVE PUMPKINSEED SUNFISH ( LEPOMIS GIBBOSUS)

**VAN KLEEF**, **HEIN**, Bargerveen Foundation/ University of Nijmegen, Netherlands; **Van Der Velde**, **Gerard**, University of Nijmegen, Netherlands; **Leuven**, **Rob**, University of Nijmegen, Netherlands; **Esselink**, **Hans**, Bargerveen foundation/ University of Nijmegen, Netherlands

The Pumpkinseed Sunfish (Lepomis gibbosus) is an introduced fish species in Europe originating from the United States. It is a popular aquarium and garden pond fish. Because they reproduce very well, many people dump these fishes in the natural waters, where in most cases they cause no big problems. However, in moorland pools, were restoration measures have been taken, the Pumpkinseed can reach high population densities. Analysis of the distribution of Pumpkinseeds in the Netherlands indicates that the most important dispersal mechanism is introduction of the species from nearby urban settlements. Analysis of the gut content and species assemblages in invaded with non-invaded moorland pools shows that the Pumpkinseed has a major impact on populations of native species. Finally an overview is given of the costs involved in moorland pool management and Pumpkinseed control.

### 734. VEGETATION CHANGES OF AN ACTIVE FLOODPLAIN THROUGH IN LATEST 60 YEARS IN THE UPPER-TISZA REGION IN NORTH-HUNGARY

**VARGA, KATALIN**, University of Debrecen, Department of Ecology, Faculty of Natural Sciences, Hungary; **Tóthmérész, Béla**, University of Debrecen, Department of Ecology, Faculty of Natural Sciences, Hungary; **Dévai, György**, University of Debrecen, Department of Hydrobiology, Faculty of Natural Sciences, Hungary

An active floodplain on the Upper-Tisza-Region (Boroszló-kerti hullámtéröblözet, NE-Hungary) were studied; we analysed the extension of close-to-nature forests and the changes in the structure of arable lands during the studied period [military maps I. (1782-85), II. (1819-1869), III. (1869-1884), 1944, 1956, 1966,

1975, 1988, 1995, 1997, 2000, 2002, 2004). ArcView3.2. was used during the work. We created a new category-system to compare the present and former landscape usage. In 2004 we also created a habitat map of the studied area based on the Hungarian National General Habitat Classification System ("Á-NÉR") and Corine Biotops habitat classification system. For each characteristic category and additional information was provided during the field work based on 20m by 20 m plots. Our result showed that the characteristic of this country have changed strongly. In 1944 more than 50% of the area was cowered with gallery forest. Parallel with disappearance of considerable part of forests, the extension of arable lands and orchards was increased. In 2004 the ratios of the different kinds of habitats were as follows: close-to-nature habitats 37%, agricultural and degraded habitats 53% and secondary habitats 10%.

**735. PANNONIAN SEMI-DRY SWARDS OF THE AGGTELEK KARST: HABITATS OF ORTHOPTERA AND LEPIDOPTERA ASSEMBLAGES**

**VARGA-SIPOS, JULIANNA**, Department of Evolutionary Zoology, University of Debrecen – HAS-DE Research Group for Evolutionary Genetics and Conservation Biology, Hungary; **Varga, Zoltán**, Department of Evolutionary Zoology, University of Debrecen – HAS-DE Research Group for Evolutionary Genetics and Conservation Biology, Hungary

Pannonian semi-dry swards have replaced light-penetrated xerothermic oak forests and karstic oak-hornbeam forests or they are nature-like steppic grasslands correlated with extreme edaphic conditions. They mostly belong to the alliance *Cirsio pannonicae -Brachypodion pinnati*. The semi-natural grasslands were stabilised by traditional use (mowing) which was abandoned in the sixties-seventies. Thus, the cover of polycormon-forming and tall-forb species, typical to the forest-fringes, has increased ("Versaumung"). The floristic richness of these grasslands is correlated with the evenness of different phytosociological components. They show an ecological gradient according to the Ellenberg-Zólyomi characteristica. The microclimatically sensible, but trophically not specialized Orthoptera-assemblages reflect mostly the physiognomical structure of vegetation. They proved as good indicators of structural changes of vegetation based on their life-form types. Their assemblages have been subdivided according to the elevation and humidity of habitats by IndVal analysis. Oppositely, butterflies are often food-plant specialized. Thus, their meta-populations often cover a larger area which can be characterized by smaller spots of larval food-plants, stands of nectar-sources and also by a landscape-scale structure of sigma-associations. It means that they have an indicative value mostly on the landscape scale.

**736. ASSESSING THE SITUATION OF THE ONLY CENTRAL EUROPEAN POPULATION OF POECILIMON BRUNNERI FRIVALDSZKY, 1867 (ORTHOPTERA: PHANEROPTERIDAE) IN HUNGARY**

**VARI, ÁGNES,** Eötvös Lóránd University, Department of Systematic Zoology and Ecology, Hungary; **Szövényi, Gergely,** Eötvös Loránd University, Department of Systematic Zoology and Ecology, Hungary

This research, conducted in summer 2005 in the hilly country around Gödöllo, examines the only recently discovered and within Central Europe singular population of Poecilimon brunneri. The species' distribution otherwise stretches all around the Carpathians while strictly excluding the Carpathian Basin, covering most of the Balkan (Serbia, Bosnia-Herzegovina, Romania, Moldavia, Bulgaria, Albania, Kosovo, Macedonia, Greece). Population size was estimated by counting individuals using 25 m2 square plots distributed in a grid at different times in the year, thus obtaining data for various stages of the population from the first nymphal instars till the adult population. Although population size estimation gave a fairly high number, the researched population of Poecilimon brunneri was found nevertheless threatened, regarding its extremly isolated geographical situation as well as considering the results of the examination of its migratory abilities, which showed them being rather poor. Excluding by this the probability of re-colonisation, a possible loss of habitat would most likely result in the extinction of this population, thereby causing the complete loss of this species for Central Europe.

**737. RANGE USE OF A EURASIAN BLACK VULTURE AEGYPIUS MONACHUS POPULATION IN THE DADIA NATIONAL PARK AND THE ADJACENT AREAS, THRACE, NE GREECE**

**VASILAKIS**, **DIMITRIS**, WWF Greece, Greece; **Poirazidis**, **Konstantinos**, WWF Greece, Greece; **Elorriaga**, **Javier**, WWF Greece, Greece

Telemetry was employed to reveal range use patterns for a Black Vulture Aegypius monachus population in order to promote its management in a larger scale. Vultures were tracked using standard radio-tracking techniques. The average home range was estimated with 95% MCP and 95% FK and in the breeding season was 91300 39600 ha and 61200 22400 ha while in the non-breeding season was 72300 59600 ha and 59900 38900 ha, respectively. Inside the home ranges activity centres were detected and during the breeding season were 48 while in the non-breeding season were 15, covering 23% and 27% of the individual ranges, respectively. The overall area used in the non-breeding season (MCP: 186700 ha; FK: 195900 ha) was bigger than the breeding season (MCP: 178200 ha; FK: 137100 ha). The vultures prospect a much wider area than Dadia National Park during their foraging. The breeders had home range size smaller than the immature and all of them showed devotion to the colony. The juveniles were attached to the natal area. Actions have to be taken to protect the foraging areas that were identified and to prevent the rural depopulation and the abandonment of traditional stock-raising practices.

**738. HOW WELL PROTECTED AREAS COVER PLANT DIVERSITY: A NATIONAL SCALE STUDY**

**VELLAK**, **AIN**, University of Tartu, Estonia; **Pärtel**, **Meelis**, University of Tartu, Estonia; **Vellak**, **Kai**, University of Tartu, Estonia

Protected areas should cover different types of rare species. Recently we elaborated a typology of vascular plant with conservation activities need for their protection in Estonia. Each species was associated with four natural rarity causes (restricted global distribution, restricted national distribution, very specific habitat, small population sizes) and four human induced rarity causes (lack of grassland management, lack of forest disturbances, lack of traditional farming, collecting for ornamental or medical use). Here we analyse how well the Estonian protected area system is covering different types of rarities, and how IUCN reserve categories corresponds to the number of species with different conservation need. As results, species with restricted distribution both at the global and national levels were occurring in relatively few protected areas. At the same time, species with potential threat due to collecting were located in relatively many protected areas. IUCN categories were not correlated to the number of species associated with any of the conservation aspects. Our results are showing that the present system of protected areas is quite a random sample from the natural vegetation and there is need for improvement of the national protected area network.

**739. BREEDING BIRD ATLAS DATA AS A TOOL FOR IBA-EVALUATION AND FUTURE DEVELOPMENT IN FLANDERS, BELGIUM**

**VERMEERSCH, GLENN**, Research Institue for Nature and Forest, Belgium; **Anselin, Anny**, Research Institue for Nature and Forest, Belgium; **Devos, Koen**, Research Institue for Nature and Forest, Belgium

The further development of the IBA-structure in Flanders (Dutch-speeking part of Belgium) has urged the Flemish Government's

administration to gather information on recent breeding bird numbers and analyse trends within and outside existing IBA's. The Research Institute for Nature and Forest was asked for proposals for new IBA's, based on recent data. To achieve this goal, we have used both monitoring data on rare and colonial species and recent atlas distribution data. Atlas data were collected in the period 2000-2003. The inventory was based on the UTM 5x5 km grid. For approximately 60 % of all breeding bird species exact point-locations were mapped. For all other species, relative abundance maps were available based on data collected in 1x1 km grid squares. A GIS-based model combining all data allowed us to evaluate the existing IBA's. The method assessed the shortcomings of existing areas. As a result of the analasys, new potential IBA's were indicated and described in function of their importance for breeding bird species. This is very important as new proposals should withstand critiques by other 'interest groups' as the agricultural and hunting lobby. Recently, the resulting map and report was handed over to the Flemish Government's nature policy makers.

### 740. A NEW CONSERVATION UNIT IN THE BUTTERFLY *EREBIA TRIARIA* (NYMPHALIDAE) AS REVEALED BY NUCLEAR AND MITOCHONDRIAL MARKERS

**VILA, MARTA**, Department of Cell and Molecular Biology (Genetics), University of A Coruna, Spain; **Lundhagen, Anna Cassel**, Department of Entomology, Swedish University of Agricultural Sciences, Sweden; **Thuman, Katherine A**., Integrative Ecology Unit, Division of Population Biology, University of Helsinki, Finland; **Stone, Jonathon R.**, Biology Faculty, Life Sciences Building, McMaster University, Canada; **Björklund, Mats,** Department of Evolutionary Ecology (Animal Ecology), Evolutionary Biology Centre, Uppsala University, Sweden

Priorities for conservation of biological units should ideally combine ecology and genetics. The European butterfly *Erebia triaria* (Nymphalidae: Satyrinae) has gone extinct in several sites in Europe during the 20$^{th}$ century. In order to assess the conservation values of this species in NW Iberia, we screened the genetic variability and differentiation of four nuclear microsatellite markers in five populations of this area. We used a Pyrenean population as an outgroup. One particular population (Xistral, NW Iberia) was significantly differentiated from the others. Thus, the nuclear results fully agreed with the pattern found using mitochondrial DNA sequences, and the hypothesis of incipient speciation of this population, due to an ancient isolation event, gained additional support. By combining our genetic findings with morpho- and ecological data, we argue that this population be considered a distinct unit for conservation.

### 741. COLONIZATION OF SPOIL HEAPS BY AMPHIBIANS IN NORTH-WEST BOHEMIA (CZECH REPUBLIC): NEW OPPORTUNITY FOR ENDANGERED SPECIES

**VOJAR**, **JIRÍ**, Czech Agriculture University, Czech Republic

Amphibians are in decline worldwide. The chief causes of this phenomenon include destruction of and changes to the landscape, as a result, e.g., of brown coal mining. After the end of mining, interesting habitats began to arise, which are gradually being colonized by organisms including amphibians. The species diversity and the colonization of post-mining landscape by amphibians have been studied in the Most and Sokolov mining districts, (North-west Bohemia, Czech Republic). Sampling was carried out by the pitfall traps on 19 water habitats in 9 heaps different from their age and reclamation. The 12 species of amphibians have been found completely, 9 in Most district and 8 in Sokolov district. Both districts have a portion of specific species but species diversity between districts was not statistically significant. The species composition and diversity are changing during succession in connection with environmental conditions, especially due to type of used reclamation. In accord with other studies of plants and animals, this study reveals that spontaneous succession of post-mining landscape brings higher landscape heterogeneity and species diversity of amphibians than in technically reclaimed territories. Although spontaneous succession is much cheaper reclamation alternative, only technical reclamation is systematically used in the Czech Republic.

### 742. ON THE EVOLUTIONARY ORIGIN OF A RECENTLY DISCOVERED POPULATION OF BOMBINA VARIEGATA (ANURA, DISCOGLOSSIDAE) FROM THE PILIS MTS. (HUNGARY)

**VÖRÖS**, **JUDIT**, Hungarian Natural History Museum, Hungary; **Martínez-Solano**, **Iñigo**, University of Berkeley, United States

Previous studies have revealed deep genetic differences within the European toad species Bombina variegata. According to mitochondrial DNA data, there are two old intraspecific lineages of B. variegata in Europe: Alpine (western) and Carpathian (eastern). These lineages probably split well before the onset of the glaciations of the Pleistocene, during which their populations were repeatedly retreated to refugia from which present day distributions were later configured. Both lineages are present in Hungary, with the Alpine lineage distributed in the Transdanubian mountains, and the Carpathian lineage inhabiting the mountains of the Northern Middle Range, separated by the Danube river. A new population of B. variegata was recently discovered in the Pilis Mts., which is the easternmost part of the Transdanubian Middle Range, located on the western bank of the Danube river. The aim of our study was to investigate the evolutionary origin of this population. We carried out phylogenetic analyses including mt-DNA data from representatives of both B. variegata lineages from Hungary and the new population in order to characterize the evolutionary affinities of the Pilis population. The results indicate a Carpathian origin for this Transdanubian population. We discuss the possible biogeographic scenarios accounting for these results and their conservation implications.

### 743. ISLAND POPULATIONS OF THE COMMON SHREW (SOREX ARANEUS ) - A NATURAL EXPERIMENT IN CONSERVATION GENETICS

**WHITE**, **THOMAS**, University of York, United Kingdom

Populations of many species are currently being fragmented and reduced by human interactions. These processes will tend to reduce genetic diversity within populations due to genetic drift, inbreeding and reduced migration. Conservation biologists will need to know the effect of population size on genetic diversity as this is likely to influence a populations ability to persist. Island populations represent an ideal natural experiment with which to study this problem. 500 common shrews from 13 islands of different sizes and 6 mainland sites were trapped and genotyped at 10 microsatellite loci. Analysis of the data showed that all the island populations were significantly divergent from one another. Bayesian methods also revealed very low gene flow between populations. All island populations exhibited lower allelic diversity and heterozygosity than the mainland populations, and these measures of genetic diversity were positively correlated with island size.

### 744. OXBOW LAKES - HIDDEN BIODIVERSITY

**WILK-WOŹNIAK, ELŻBIETA**, Institute of Nature Conservation PAS, Poland; **Ligęza, Sławomir**, Institute of Soil Sciences and Environment Management Agricultural University of Lublin, Poland; **Pociecha, Agnieszka**, Institute of Nature Conservation PAS, Poland

Oxbow lakes are very interesting freshwater ecosystems. They are mostly small water bodies which offer different habitats very close to each other. It means that a lot of different species exist in a very small area. We studied plankton diversity in three small oxbow lakes: ZA Puławy reservoir, Wiślisko Kobyle reservoir, and NN reservoir. All of them are oxbows of the Vistula. The first one is used by the Fertilizer Factory and its water is

characterized by high concentrations of nutrients and a high temperature of water. The second one is a protected area located in the forest. It is not directly affected by agriculture or industry. The third one is located on a terrace of the Vistula river. We present the diversity of planktonic algae and planktonic animals. We also show the seasonal dynamics and the reply response of small algae to natural processes in oxbow lakes. Our study indicates that in small ecosystems we can find an extremely rich world of species which are very important for biodiversity but very difficult to protect.

### 745. ALLELOPATHIC POTENTIAL OF BUCKTHORN (RHAMNUS CATHARTICA) IN OAK SAVANAS AND WOODLANDS IN MINNESOTA, USA

**WILSON**, **CHESTER**, University of St. Thomas, United States

Allelopathy, the chemical inhibition of one plant species by another, may play a role in successful establishment of the common or European buckthorn (Rhamnus cathartica) within woodlands and savannas of the upper Midwest. Seeds of annual ryegrass (Lolium multiflorum) germinate at significantly lower rates and grow more slowly when exposed to aqueous extracts of buckthorn tissues than they do when exposed tapwater or to extracts from analogous tissues of native oaks and maples. All tissues sampled, including leaves, roots, bark, and fruits, inhibit the germination and growth of ryegrass, but the effect is weaker for some tissues than others. The effect also varies over the course of the season, getting stronger later in the summer and fall, and from year to year. Additional experiments are underway to examine variation of allelopathic effects among individual buckthorn plants and to examine the effects of buckthorn extracts on native understory and savanna species.

### 746. CLOUDED LEOPARDS, THE SECRETIVE TOP-CARNIVORE OF SOUTH-EAST ASIAN RAINFORESTS. DISTRIBUTION, STATUS AND CONSERVATION NEEDS IN SABAH, MALAYSIA

**WILTING**, **ANDREAS**, University of Würzburg, Germany

Associated with the continuous loss of tropical rainforest most top carnivores are endangered. Most methods to determine the status of top carnivore populations are costly in terms of equipment and time. We present the first approach of a rigorous track classification method combined with analysis of photographs to estimate population size and density of clouded leopards (Neofelis nebulosa) in Tabin Wildlife Reserve in north-eastern Borneo (Sabah). We obtained densities of clouded leopards based on the population estimates of 9 ( 4.36 SE for tracks) and 10.5 ( 3.1 SE for photographs) per 100 km² in Tabin Wildlife Reserve. The consistent population estimates from our two independently applied methods allowed us to conclude that the total density is between 9 and 14 individuals per 100 km². We demonstrate that previous density estimates of 25 animals / 100 km² most likely overestimated the true density of clouded leopards. Additionally we extrapolated our local-scale results to the regional landscape level. In total we calculated a rough number of 1700-2650 clouded leopards to be present in Sabah. However, only 310 - 480 of these animals inhabit the four totally protected reserves, large enough to hold a long-term viable population of > 50 individuals.

### 747. IMPACTS OF EGG COLLECTING ON THE BREEDING SUCCESS OF BLACK-HEADED GULLS

**WOOD**, **PHILIPPA**, University of Southampton, United Kingdom; **Hudson**, **Malcolm**, University of Southampton, United Kingdom; **Doncaster**, **Patrick**, University of Southampton, United Kingdom

Controlled collection of Black-headed Gull Larus ridibundus eggs for human consumption is potentially a good example of sustainable exploitation of natural resources supported by the 1993 Biological Diversity Convention. However, the EU Habitats Directive requires that consent for operations on protected sites only be given if it can be ascertained that the operations will not significantly disturb or adversely affect the site. We analysed differences in breeding success at collected and un-collected SPA and SAC protected sites in Southern England, using in-situ (egg volumes and ringing chicks) and ex-situ (volumes of egg components) measurements. Egg volume was influenced by colony size and position, independently of egg collecting. The collected colony had 1st eggs of a clutch with a smaller and decreasing ratio of yolk to albumen through laying, compared to a larger and increasing ratio at the uncollected colony. The collected colony had more frequent incomplete clutches, a higher proportion of exceptionally small eggs and unpigmented eggs, a higher incidence of hatching failure and chicks found dead in the nest (mostly attributable to starvation). We conclude that commercial egg collecting has no positive effects, and an accumulation of negative impacts from egg laying through incubation to hatching and chick survival.

### 748. THE FORAGE FLORA IN XEROTHERMIC PHYTOCENOSES IN CENTRAL EASTERN PART OF POLAND

**WRZESIEN**, **MALGORZATA**, Maria Curie-Sklodowska University, Poland; **Denisow**, **Bozena**, Agricultural University, Poland

The forage flora delivers pollen and nectar and makes the feeding base for Apoidea. The proper quality and quantity of food is essential for good development of bees and keeps populations on the sufficient level. The xerotermic swards of central eastern part of Poland differ from climatically dependent south-eastern Europe steppe formations and form habitat islands in agricultural landscape of the region. The communities are extraordinarily reach in xerotermic species phytosociologicaly connected with Festuco-Brometea, Trifolio-Geranietea, Molinio-Arrhenatheretea and Rhamno-Prunetea. Among others there are a lot valuable melliferous species ensures unbroken food band for Apiodea mainly in the early spring and in critical flowless period between blooming of Robinia and Tillia. In analyzed patches the highest participation of nectariferous and polleniferous species are among xerotermic taxons – 40%, lagg communities - 15%, meadows – 10%, and termophilous shrubs – 5%. Among them predominate perennials, hemicryptophytes and geophytes witch confirm the stability of patches. The remaining 30% are accompanying species which migrate from the neighborhood habitats and are of no great importance for Apoidea. The xerotermic association should be protected not only because of the floral richness but also forage taxons providing food in critical periods before and after blooming of the main cultivated crop.

### 749. CONSERVATION OF SMALL STREAM ECOSYSTEMS IN URBAN LAND USE PLANNING: A CASE REKOLANOJA IN VANTAA, SOUTHERN FINLAND

**YLI-PELKONEN, VESA**, Department of Biological and Environmental Sciences, University of Helsinki, Finland

Urban stream ecosystems have often been seen as channels of water flow rather than valuable parts of urban green space system providing ecosystem services. To address the current conservational status of urban stream ecosystems, the ecological and social importance of stream Rekolanoja ecosystem (in the city of Vantaa, southern Finland) was studied in the context of urban planning. The data from the case study area were gathered from existing ecological studies, and by conducting semi-structured interviews, a resident inquiry and a writing contest. The results from the case show that intense management of the streamside vegetation and the treatment of the stream channel in construction projects have decreased the species richness and diminished valuable streamside biotopes. However, the stream corridor can function as an important recreational and educational element within the local green space network, and thereby become a symbol of local identity. The case indicates that planners and residents see the value of

such an aquatic element increasingly important for urban biodiversity and ecological corridor function, as well as for local human health and social well-being. The future land use decisions will show whether a genuine change in values and thinking of planners and decisionmakers is taking place.

### 750. THE DIVERSITY OF THE BEECH FOREST PLANT COMMUNITIES FROM THE CEAHLAU MOUNTAIN NATIONAL PARK

**Zamfirescu**, **Oana**, AL. I. Cuza University, Romania; **ZAMFIRESCU**, **STEFAN**, AL. I. Cuza University, Romania; **Chifu**, **Toader**, AL. I. Cuza University, Romania

The aim of this research was to assess the diversity of the plant communities in the beech forests from the Ceahlau Mountain National Park. Their high productivity and resilience to disturbances partly result from their diversity. Plant association identification employed phytosociological methods elaborated by J. Braun-Balnqet. The diversity was assessed through the SHE analysis, which takes into account the species richness (S), the Shannon index (H), and the species evenness (E). The results were statistically described and compared (Kruskal-Wallis ANOVA). The investigated communities were classified in four associations: Symphyto cordati-Fagetum, Galio schultesii-Fagetum, Pulmonario rubrae-Fagetum, and Leucanthemum waldsteinii-Fagetum. In the last ones the diversity was significantly higher, whereas the first one had the least diverse communities. This condition results from the altitudinal distribution of the communities: the first occur higher than the second and lower than the other two, and therefore, it does not benefit from the presence of species of other types of forests. In all associations occurred situations were high species richness was balanced by low evenness. The diversity estimates of the associations were significantly different. The beech forest diversity is essential for the future of the Ceahlau Mountain National Park.

### 751. DIVERSITY IN THE IRIS FROM KASHMIR HIMALAYAS

**ZEERAK**, **NAZEER**, s.k.university of agricultural sciences and technology of kashmir,jk,india., India; **Wani**, **Shafiq**, skuast-k, India; **Peer**, **Arif Sultan**, SKUAST-K,SHALIMAR,KASHMIR,JK,INDIA, India; **Anjum**, **Talat**, skuast-k, India

The Indian state of Jammu and Kashmir,falling in the North Western Sub-Himalayan region of India is a rich repository of biological heritage especially in respect of plant genetic resources for food and agriculture.The Kashmir Himalayas, forming a prominent part of the state hosts a wealth of food,medicinal and aromatic plants,ornamentals,crop wild relatives and a variety of under utilised wild food plants.In an attempt to collect, document and conserve the rich agro-biodiversity of this Himalayan region extensive explorations were conducted and hundreds of germplasm accessions collected for their long term conservation and eventual use in future. Irises , growing abundantly across alpine/sub-alpine pastural lands and valley plains of kashmir form an important part of the luxuriant plant diversity of the region and the genus is represented by several wild , endemic and some naturalised species such as Iris kashmiriana ,I.ensata, I.germanica, I.pallida, I I.reticulata, I.hookeriana, etc. The diversity of Irises is inextricably woven into the social fabric of the life of the local people , being traditionally used as medicine,fodder,for thatching roofs, making mats,ropes,snow shoes and for beautifying cemetries and graveyards. In the present paper the diversity of fifteen Iris taxa has been discussed w.r.t. their occurence , habitat, morphology, pliody level and ethano botanical uses

### 752. PLANT SALE AT BUS RANKS AND CONSERVATION OF THREATENED PLANT SPECIES BY RURAL COMMUNITY MEMBERS OF NORTHERN KWAZULU-NATAL (SOUTH AFRICA)

**Zobolo**, **Alpheus**, Univesity of Zululand, South Africa; **Ndawonde**, **Busi**, University of Zululand, South Africa; **Dlamini**, **Eunice**, University of Zululand, South Africa

The objectives of this study were a) to document threatened medicinal plants that are sold by plant traders and b) to educate plant traders on propagation and establishment of medicinal gardens within the community. A survey of the use of medicinal plants was conducted through questionnaires among 90 plant traders in the communal areas of northern KwaZulu-Natal in South Africa. The areas surveyed were located at Kwadlangezwa, Mtubatuba, Nongoma, Richards Bay and Ulundi. Plant traders reported that they were unable to satisfy the needs of their customers because some endangered plant species that were in demand were scarce in the field. These were shown by the low percentage of plant traders in possession of species such as Mondia whitei (44%), Bowieia volubilis (43%), Alepidea amatymbica (33%), Eriospermum mackenii (33%), Cyrtorchis arcuata (32%), Prunus africana (25%), Dioscorea dregeana (14%), Haworthia limifolia (5%), Bulbine asphodeloides (5%) and Warburgia salutaris (3%). A workshop on plant propagation was held among community members, government officials and the project leaders at the University of Zululand. A decision was taken to establish several gardens within the rural community. An experimental nursery was established at the University of Zululand for propagation of threatened species.

### 753. NATURE CONSERVATION VALUES: ROTATORIA COMMUNITY OF KIS-BALATON

**ZSUGA, KATALIN**, VITUKI Kht., Hungary; **Tóth, Adrienn**, Department of Hydrobiology, University of Debrecen, Hungary

Before drainage of Kis-Balaton area 117 Rotatoria species were known, Varga (1945) mentioned only some euplanktonic species besides mostly metaphytic organisms from that area.
After restoration of Kis-Balaton Water Protection System, quantitative and qualitative samples have been taken since 1993.
In years after flooding, cosmopolitan and eurytop organisms were dominant. Initially, tendency of diversity decreased. Species composition changed, rate of certain dominant organisms increased proving mosaic structure and continuous changing. Nowadays variety of the open and covered water results in significant spatial heterogenity. On the basis of individuals, species composition and diversity value, the Rotatoria fauna is very mosaic.
Among more than 130 planktonic Rotatoria, occurrence of many rare species were registrated, hence database supporting Kis - Balaton Conservation Value increased with valuable faunistic data. While Varga (1945) mentioned just a few sessile Rotatoria living on macrophytes from the area of Kis-Balaton, during our researches 18 sessile species were revealed. Some of them proved to be new or rare species in the Hungarian fauna.
The community of several rare and indicator species of Kis-Balaton wetland represents internationally considerable Nature Conservation value.

# AUTHOR INDEX

A



B

C

D



E

H



I



J

M

N



O

P



Q



R

T

U



V



W