CARNIVORES

THE COMEBACK OF THE SNOW LEOPARD TO THE SAGARMATHA NATIONAL PARK, NEPAL

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The snow leopard *Uncia uncia* (Schreber, 1775) is an endangered species of large cat (world pop. size: 2500-5000 mature breeding individuals) with a declining trend because of habitat loss and persecution (IUCN/SSC www.redlist.org). In the 1960s, the snow leopard was extirpated by man from what is now Sagarmatha (Mt. Everest) National Park. In 1987, signs of an individual were reported, probably made by a transient cat from Tibet, in the Gokyo area of the Park, at 5000 m a.s.l.. The Park (114,800 ha) was established in 1976 and, after three decades of effective protection measures, the virtual cessation of hunting as well as the recovery of the local wild ungulate populations, snow leopards have recently come back. Aim of our work has been to document the effects of the return of the snow leopard on the population of its main wild prey, the Himalayan tahr *Hemitragus jemlahicus* (SMITH, 1826), a "vulnerable" Caprin (IUCN/SSC www.redlist.org), in Sagarmatha National Park, north-eastern Nepal. This park includes several mountains amongst the highest in the world (Everest, Lhotse, Cho-oyu: > 8000 m), but also valleys which run down to less than 3000 m.

Signs (scrape, scat, rubbing site, pugmark and urine spray) were recorded and scats were collected along a fixed trail (about 18 km) to assess the presence and food habits of the snow leopard in the park, from 2004 to 2006. Himalayan tahr, musk deer and livestock (*Bos* spp.) were the most frequent prey. In both seasons, summer and autumn, the Himalayan tahr was the staple of the diet, building up well over 60% of relative frequency of occurrence in the season of the monsoons and decreasing to about 40% in the autumn. With the decrease of tahr, other prey (especially livestock) increased in the diet of the snow leopard. After the birth season (early summer), the young-to-female ratio of tahr suggested a regular birth-rate (0.8-0.9). However, decrease of the young-to-female ratio down to 0.1-0.2 in autumn (2002-2006) implies that predation was mainly addressed to young Himalayan tahr, thus destructuring the whole population. Small, isolated herds of wild Caprinae are sensitive to stochastic predation events by predators specialising on them. They may risk local extinction. If predation on livestock will keep growing, together with the decrease of Himalayan tahr, retaliatory killing of snow leopards by local people may soon be expected, eventually leading again to the local extinction of this large cat.

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ANALYSIS OF WOLF PREDATION ON LIVESTOCK IN A STUDY AREA OF ABRUZZO REGION: WHAT ABOUT "SURPLUS KILLING" IN APENNINE CONTEXT?

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In the Majella National Park and in the Gran Sasso-Laga National Park, in the last five years, the cases of livestock depredation have been analysed using a standardized assessment procedure which, together with the medical-legal valuation, made up by the veterinary, for the determination of the compensations, has allowed to obtain objective data for the comprehension and knowledge of the phenomenon. In this paper, carried out from march 2002 to march 2007 in a study area of 2250 km^2 (which includes the two mentioned Parks), we considered all the assessments made up on sheep and goats, in which each wolf (*Canis lupus*) had killed more heads than those expected in relation to actual knowledge in literature and in the study area. We collected information about the contexts of livestock vulnerability, by means of: periods of the year, moments of the day, weather conditions, physiological and pathological status of the prey and the management practices which occur in case of a predatory act on a consistent number of subjects. Those observations have led to a definition of the contexts observed in the episodes of "surplus killing" considered as an adaptive behaviour undertaken by a predator with the purpose to acquire much food resources as possible at the minimum energetic expense, in relation with the local characteristics of grazing livestock management.

MESOPREDATOR RELEASE: THE RELATIONSHIP BETWEEN THE RED AND THE ARCTIC FOX

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Intraguild predation occurs when two predator species compete for the same prey and one of them also feeds upon its competitor and current theory suggests that this can have strong effects on the population dynamics of the inferior. This is a comparatively common phenomenon among Carnivora. However, it is difficult to demonstrate the effects of such intraguild relationships for long-lived species living at relatively low density. The red fox shows such relationship with the arctic fox being a competitor of food, dens and territories, and preying on both juvenile and adult arctic foxes. However, the arctic fox is threatened to go extinct in Sweden, Finland and Norway and is a priority species according to the EC Habitat directive. At the present population size with less than 150 individuals in mainland Europe, even a small change in demographic parameters or pure "accidents", can affect the risk of extinction dramatically. We suggest that the disappearance of the wolf from the Fennoscandian fauna has resulted in an increase of the red fox as a mesopredator in northerly areas with a cascade effect on the arctic fox. We have used a supplementary feeding programme to increase reproductive output and juvenile survival, and a red fox control programme to safeguard the best arctic fox territories. During the winters of 2001-2006 we managed to reduce the number of red foxes significantly in an area of about 600 km^2 with about 15-80 red foxes during each winter. The arctic fox dens where red foxes were shot had a significantly higher probability to be inhabited by arctic foxes the following season. This action has thus shown to be an important component of the conservation programme to preserve the arctic fox. It also demonstrates the relationship between a larger generalist and a smaller specialist.

EXPERIENCES OBTAINED FROM CAMERA TRAPPING THE WILDCAT IN SICILY (ITALY)

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Sicily is characterized by the presence of one of the most important insular population of the threatened European wildcat. Not many studies have been carried out about this *taxon* on the island since the 1980's, therefore at the beginning of 2006 a pilot study with camera traps was started in the southwest part of Etna Regional Park. Camera trapping is a rather new, non-invasive technique that could be successfully applied to monitor rare and particularly elusive species like felids. The aim of our project is to test whether or not camera trapping could be helpful for detecting and identifying wildcat specimens. Five 35 mm camera traps with passive infrared motion/heat sensors were used and placed in an area of 2020 ha. The camera trapping program was carried out during two different periods: in the first one (from April 11 to August 8) healthy domestic cat's scent lure was used to attract the wildcat, on the contrary in the second period (from September 26 to December 16) no attractants or baits were used. All together camera traps worked for 824 trap-days (518 during the first period and 306 in the second). Twenty four pictures of wildcats were taken (14 during the first period and 10 in the second). To determine the number of different specimens that were photographed, pictures of wildcats showing the same body region (right side) were compared (N=14). Based on morphological criteria, 9 different wildcats were identified (6 in the first period and 3 in the second) in an area of 662 ha. The rate of "catching" success was 1 capture/37 trap-days during the first period and 1/31 trap-days in the second. Our results show that camera trapping is a valuable technique to monitor the wildcat, confirm its presence in this area of Sicily and suggest a rather high density of this population.

WHAT ARE THE REASONS AND THE RESULTS OF SIBLING AGGRESSION IN LYNX?

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Early sibling aggression in Eurasian lynx litters starts with a spontaneous attack of one kitten to its sibs and lead to severe fights. These fights occurred in a short period of lynx ontogeny at the age of 36-64 day (6th -10th weeks). Sixty percents of all fights were observed during their 7th weeks of kittens' life. This period is very important in kitten's development. To the moment canines and incisors are already cut and cubs start to take solid food, their growth rate decreases. The similar fights were observed in both Iberian lynx litters born in 2005-2006. The aim of our study was to estimate mechanisms and consequences of early sibling aggression in European lynx litters. The fights occurred in 15 litters out of 29 (52 %) with two-four kittens. The probability of fights was just slightly higher in triplets (63%) than in twins (42 %). We found no relations of sex ratio and fights probability. Growth rate influenced aggression: fights occurred more often in litters with a smaller daily gain in body mass (<20g; 5 of 6 litters) than in litters with a larger daily gain (>30 g; 1 of 7 litters) (χ^2=26.9, d.f.=1, P<0.001). These fights could be related with the adrenal glands activity. We found no enhancement in androgen (androstendione, testosterone) level coincided with sibling aggression period, but cortisol level slightly increased. ACTH-challenge test during the fights period caused an increase of cortisol level and of fights probability in lynx kittens. Comparison of observed and expected play frequencies shown that fights led to the changes of sibling relations. After the fight an asymmetry in playful contacts increased significantly (18% and 55%; χ^2=5.87, P<0.05) and an asymmetry in affiliative contacts decreased. Feeding order changed after the fight and loser fed the last in its litter (χ^2 test: P<0.05). After the fights the winners increased their daily body mass gain for 17 grams per day, but the losers decreased it for 10 g to the day 30-th after fight (T=0; Z=2.37; P<0.05). Kittens that won the fights got the advantage in body mass development in comparison to the losers probably due the changes in their hierarchical ranks. Probability of these fights was related to growth rate decrease and possibly to the activity of the adrenal glands.

THE SOCIAL STRESS IN IBERIAN WOLVES: A COST OF THE DOMINANCE

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In social species the agonistic and aggressive interactions may act as stressors. However, it is unknown whether physiological stress responses are related with the faecal marking behaviour and therefore with the social rank of the animals. The aim of this study was to correlate faecal glucocorticoid concentrations, faecal marking behaviour and social rank in a wild population of Iberian wolves in Northwest Spain. Visual and scent marking behaviour is associated to social dominance in wolf. Many studies showed that the marks are only deposited by the alpha pair and that these individuals are the only ones that reproduce in the pack. Faeces may act as visual and scent marks being deposited on substrates and/or zones that increase their efficiency. Therefore, physical characterisation of faecal deposition places was done by recording several variables: type of substrate (conspicuous/inconspicuous), height (above ground level/at ground level), strategic zones (crossroads/outside crossroads) and re-marking. The faeces that had a function in chemical communication showed higher glucocorticoid levels and sexual hormones (testosterone, progesterone and estradiol), being these faeces deposited mainly by dominant individuals. Therefore, in Iberian wolves the alpha pair is subject to higher social stress than subordinate individuals. Social rank is a good predictor of faecal glucocorticoid levels in Iberian wolves.

THE REINTRODUCTION OF *FELIS SILVESTRIS SILVESTRIS* IN MAREMMA REGIONAL PARK (GROSSETO, ITALY)

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At the beginning of '70s, the European wildcat was considered threatened in the Thyrrenian coastal area of Italy and, since 1969, extinct in Maremma Regional Park. After a 2-year survey in this protected area, no sign of presence was recorded. Given that a population at very low density level was a valid alternative hypothesis, in 1989 a translocation project was activated. A couple of adult wildcats captured in the wild (at private estate few kilometres from the Park) was released and followed by telemetry. In 1995 two second generation males and, in 1998, one third generation male and one third generation female were trapped, collared and released. In the same year, one of the 1995 males was re-captured. The project was interrupted in 1999 because of a lack of funds. In October 2006, after a 31 trap-nights effort, a fine adult male wildcat was captured. This is the first result of a new, ongoing, monitoring program of the species in this protected area. We have collected data on space use, social organisation and habitat selection which constitute a sound basis for the assessment of the return of European wildcat in Maremma Regional Park.

RELATIONSHIP BETWEEN DOMINANCE RANK AND TERRITORIAL MARKING BEHAVIOUR IN AN URBAN FERAL DOMESTIC CAT COLONY

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Mammals are predicted to mark more frequently the higher their aggressive motivation towards a conspecific of the same sex and the higher their likelihood of winning a conflict against such conspecific. Consequently, in social mammals a positive correlation may be expected between dominance rank and marking rate. We tested this hypothesis in a social group of feral domestic cats living in an urban environment. The cat group consisted of 13 adult individuals (8 males and 5 females). We used the focal animal sampling technique to study the behaviour of one individual at once (557 hours of observation) and recorded all occurrences of agonistic interactions and of behavioural patterns that have been traditionally thought to accomplish the function of territorial marking. These included: urine spraying, rubbing the perioral and cheek regions of the face on objects and scratching with fore-claws. A significantly linear dominance hierarchy, including both males and females, was detected on the basis of the direction of 360 submissive interactions, recorded in absence of any sources of competition (Improved linearity test: $P = 0.026$). Gender had a significant effect on the frequency of both urine spraying and rubbing the perioral and cheek regions of the face on objects, with males recording the highest scores, but not on scratching with fore-claws. For males, frequency of urine spraying was highly, positively correlated with dominance rank ($r_s = 0.929$, $P < 0.001$); rubbing the perioral and cheek regions of the face on objects tended to be positively correlated to rank ($r_s = 0.667$, $P = 0.07$) and was significantly correlated with urine spraying ($r_s = 0.810$, $P = 0.015$). Conversely, scratching with fore-claws was correlated neither to rank, nor to urine spraying, nor to rubbing the perioral and cheek regions of the face on objects. In conclusion, these results support the view that, in a social group, higher-ranking individuals are more likely to display territorial marking behaviour. Also, it is suggested that scratching with fore-claws does not achieve the function of territorial marking behaviour in the domestic cat.

DIET COMPOSITION OF GOLDEN JACKALS IN ISRAEL: MANAGEMENT OF AN OVERABUNDANT POPULATION

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During the last few decades, golden jackal (*Canis aureus*) numbers have been increasing and at present the species is the most numerous large predator in Israel. As a generalist, it presumably affects (directly and indirectly) numerous other species. Existing methods of controlling jackal numbers are costly or of limited efficiency. Therefore, it seems important to study its diet composition to understand the factors supporting high jackal densities. According to common speculation, dead birds thrown out by poultry farmers, garbage or cattle carcasses are responsible for the increase of jackal density, but there has been no study of this issue. We analysed 396 jackal scats collected in 2002 and 2003 in Park Britannia (c.a. 4000 ha), central Israel. The area could be divided into two parts which differed in the level of human pressure with more human settlements and tourists in the north than in the south. The scats were divided into two seasons: summer (June-September) and autumn (October-November). In summer, some scats were collected around 9 jackal dens to capture fine-scale differences in the diet. Often the most recorded (39.4%, frequency of occurrence) food category were ungulates, of which over 80% were domestic animals. Other common food items were fruits (31.3%), birds (30%, of which chickens and turkeys constituted 47%), small mammals (23.5%) and invertebrates (21.2%). Garbage was found in 9.1% of scats. Biomass of jackal diet was dominated by ungulates (67.3%) with domestic ungulates comprising 84% of this. Biomass of any other food category did not exceed 7%. Chickens and turkeys reached 5.6% of the biomass and garbage 0.1%. Jackal diet did not differ by the season nor the level of human pressure (north *vs.* south of the study area). However, diet composition differed significantly among the dens (for each food category $P \leq 0.001$). Our results suggest that the high availability of domestic animal carcasses may be responsible for present jackal.

RELATIONSHIP BETWEEN TWO SYMPATRIC CARNIVOROUS SPECIES, THE LEAST WEASEL (M*USTELA NIVALIS*) AND THE STOAT (*M. ERMINEA*): COMPETITION OR COEXISTENCE?

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The coexistence of similar species is possible when they solated in space and time. When ecological similarly species coexist, from evolutionary theory point of view one of these species (the best fit) should alive, when another should disappear. However, the similarly of two carnivorous species such as: least weasel and stoat do not fit this theory. To answer of the question why it is possible - we studied population of these two predators in the same area - Biebrza National Park, Poland. It is simple ecosystem with one main prey - the root vole. During the study we monitored simultaneously population of two predators and the root vole from 2003 (low phase of vole cycle) till 2006 (peak phase of vole cycle). In this study we try to find the mechanisms that allow these two predators to coexist in the same area. Three different techniques were used in this field study: radio-tracking, live-trapping and snow-tracking. During the study 70 weasels and 7 stoats were caught. All captured stoats (7) and 10 weasels were radio-tracked during the late summer and autumn. Habitat selection during the winter time was studied by snow tracking in February thru three consecutive winters: 2003/03, 2004/05, 2005/06. In studied population body mass o these two species strongly overlapped between weasel males and stoat females in range from 120 to 150g. It suggests strong trophic competition between them. Some differences in habitat selection by two carnivorous species were observed. During the late summer and autumn weasel preferred meadow, avoided willow and elevated habitats, whereas stoats preferred elevated habitat with willow trees. However, during the winter time both species prefer the same elevated habitats covered by trees. It is strong evidence that in critical for food resources winter period these two species coexist in the same habitat. Daily activity rhythm of these two predators differs: stoat was active both during the day and night whereas weasel was active only during the day. We concluded that in our study area weasel and stoat coexist rather than compete with each other. While weasel population dynamics is strongly dependent on vole population dynamics, stoat population dynamics is independent from voles. It suggests that in studied stoat population root vole is not a basic food resource which shapes their population dynamics.

SOCIAL ORGANIZATION OF A GROUP OF SUBURBAN STRAY DOGS

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In western countries the presence of stray dogs is forbidden by law. Therefore, excluding dogs of commercial breeders, social groups of dogs suitable for behavioural studies are not available. Consequently the researches concerning intraspecific social relationships are rare. However since a few years in some Italian regions trap, spay/neuter, register, and release as an alternative to shelter housing of captured stray dogs have been allowed by law. One consequence could be the possibility of formation of social groups of free-ranging stray dogs into urban environments. Available literature on the eco-ethology of stray/feral dogs concerns limited-size (1-8 dogs) groups in which the dominance hierarchies and its influences on social dynamics have never been studied systematically.

The aim of this study is to analyse, in different contexts (without source of competition, in presence of food and in presence of receptive females) the social structure of a group of dogs belonging to a population of about 100 individuals which could breed and move freely, but were dependent on human beings for food.

The study was carried out in Rome between May 2005 and April 2006; throughout this period the number of individuals ranged from 42 to 22 dogs. Data were collected by 'focal animal sampling' method for a total of 281 hours of recording.

A linear dominance hierarchy based on direction of agonistic behaviour was found. The rank order didn't change in different contexts. Frequency of agonistic behaviours is higher in presence of receptive females and even higher in presence of food. Rank and territorial marking behaviour resulted positively correlated. Group home range measured 61 ha. Group members cooperated to the territorial and resources defence against intruders. Boundaries of the area defence and boundaries of the home range didn't coincide: the size of territory was smaller. High-ranking females preferred high-ranking males and were more courted than young females. Oestrus and birth have favoured the recruiting of new dogs and the departure of others. In this group individuals cooperated to the territorial defence and some adult males helped females in pup defence, as observed in other species of social canids. Dogs' sociality seems to be more complex than what asserted recently. In Italy, because of the laws in force, these researches are important to assess the impact of release of dogs on territory.

DIGITAL ANALYSIS OF BROWN BEAR FOOT-PRINT FOR DEFINING MORPHOMETRIC INDICES

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The presence of Brown bear (*Ursus arctos*) in Friuli-Venezia Giulia (North East Italy) is due to a natural process of recolonisation from the Brown bear population living in the Dinaric Alps, started in 70th years, combined with seasonal movements. The aim of this study is to evaluate a new technique for processing the digital images in order to obtain biometric parameters, from Brown bear foot-print, useful for distinguish footprints of different size and from different animals, especially in the case of low quality and incomplete images. This study is combined with the hair traps and snow and mud tracking, aimed to collect pictures of Brown bear tracks and hairs for DNA genotyping.
The study was carried on during 2003 and 2004 in an area that can be subdivided into four sub-areas: Natisone and Torre's Valleys, the Prealpi Giulie Regional Park, Val Canale and Triest Karst. These areas have been chosen on the base of historical direct and indirect reports of the Brown bear presence. The total number of footprints analysed images was 111, 79 of which are forefoot tracks and 32 are hind foot. "Image J" software was used for images processing and for the measurement of the following 5 parameters: area and perimeter, pad length and pad width, total length (nails excluded). The parameters were compared in pairs in order to define a linear regression model.
The analysis between the chosen parameters given the following relationships, for the hind leg: area and perimeter (R^2=0.905), total length and pad length (R^2=0.691), area and pad length (R^2=0.670), perimeter e width (R^2=0.633), width and total length (R^2=0.542), width and length pad (R^2=0.341). For the foreleg: area and perimeter (R^2=0.918), total length and pad length (R^2=0.914), width and area (R^2=0.783) and width and perimeter (R^2=0.737), width and total length (R^2=0.676), and width and length pad (R^2=0.620). Using the formula E(y)=b0(pad width)b1, modified and derived from Black bear, we estimated weight and age of the different animals using only one data (pad width of foreleg), which was measured directly from images or derived by other measures. The relevance of the presented study is providing simple methods to measure foot-print size, to add to the non-invasive studies and management of elusive animals with low-density populations.

HOME RANGE AND HABITAT USE OF PINE MARTEN *MARTES MARTES* IN SCOTTISH PLANTATION FORESTRY

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Pine marten (*Martes martes*) habitat use was analysed using radiotracking data collected in a coniferous plantation forest in the north east Highlands of Scotland. Although there have been several studies of marten ranging behaviour in Scotland, and more widely in Europe, there is limited knowledge about how this species utilises the plantantion forests that may aid in marten range expansion. Home ranges were examined using minimum convex polygon (MCP), and probablistic kernel methods. Habitat composition was analysed both within and outside core use areas. Habitat selection was investigated both at the home range scale and at a finer forest stand scale using logistic regression of stand level variables. The implications of these results will be discussed with reference to prey availability, and available forest habitat composition.

A ROBUST RAPID ASSESSMENT METHOD FOR MONITORING OTTER POPULATIONS

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National surveys of otter distribution conducted at 7-10 year intervals are widely used across Europe. These involve selecting sites at intervals of 5-8 km along a river and searching lengths of up to 600 m of bank at each, recording the presence or absence of otters.

Such surveys are labour intensive and time consuming, but they do provide large scale trend data. However, deductions at a more local level e.g. small to medium sized catchments are not normally possible.

To address this, a complementary rapid assessment technique was developed by Chanin (2005) as the basis for monitoring Special Areas of Conservation (SACs). This approach has now been field tested in both the UK and Ireland. 40-75 sites per catchment were subjected to a pared down version of the standard survey. By confining searches for otter signs to the close proximity of bridges and only searching spraint sites within 50 m of them, the number of sites visited in one day can be considerably increased. Site assessments took 12-18 minutes on average, including driving time between sites. As a result, large catchments can be surveyed in 4-5 days.

The rapid assessment protocol was field tested in 9 sites: 5 rivers in England and 4 sites in Ireland. The 5 English SACs where otters are a primary feature of interest were surveyed: Camel, Derwent, Eden, Tweed and Wye. The Irish sites were: two rivers catchments, a large lake system and a coastal site with islands.

The protocol provides a simple, quick, but robust and cost effective monitoring mechanism that yields data amenable to statistical testing. As such it presents a practical way forward for monitoring the conservation status of otters both within and without SACs, as required of EU Member States under the Habitats Directive.

It is envisaged that catchments could be re-surveyed at regular (e.g. annual or 2 yearly) intervals. This would provide focussed appraisals of otter population trends at the catchment level, in turn informing catchment specific management measures.

We conclude that the survey technique is appropriate to the conditions in which we have tested it, both in terms of topography and density of otters. Further field testing is required to confirm whether this methodology can be recommended for monitoring otters where populations are low.

DIET OF THE BLACK-BACKED JACKAL, *CANIS MESOMELAS*, IN THE GREAT FISH RIVER RESERVE (SOUTH AFRICA)

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Black-backed jackals *Canis mesomelas* are regarded as opportunistic foragers, whose diet is generally dominated by the food resources which are geographically and temporally more abundant and/or profitable. The dietary habits of these mesopredators in the xeric succulent thicket of southern Africa were determined through the analysis of 109 scats. Faeces were sampled in autumn from two areas of the Great Fish River Reserve (GFRR), South Africa, that differ in habitat structure and composition. The analyses revealed that a sample size of about 40 to 60 scats is sufficient to identify main food remains, but at least 100 scats are required to accurately determine seasonal food composition. Comparison of the feeding habits of jackals from the two sampling sites revealed high and similar diversity and niche breadth indices, associated with an important diet overlap. Overall, the most important prey categories found in jackal faeces were arthropods (17.6% in relative volume), bushbuck *Tragelaphus scriptus* (10.9%) and plant material (10.5%), followed by rock hyrax *Procavia capensis* (8.3%), warthog *Phacochoerus africanus* (7.6%), fruits/berries (7.3%) and greater kudu *Tragelaphus strepsiceros* (5.4%). Other mammalian prey (32.4% in total) acted as supplementary food sources. Comparison with other black-backed jackal food studies conducted in southern Africa showed that the dietary diversity and the niche breadth recorded in the GFRR were among the highest reported. It is argued that the consumption of a large food spectrum without dominant elements probably represents a functional response of this opportunistic carnivore to the absence of highly profitable food resources (low to medium availability and/or obtainability) in a given local and seasonal context.

RED FOX GAINS NEW TERRAIN IN ALPINE ECOSYSTEMS DUE TO HUMAN DEVELOPMENT

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Human development alters habitats and landscapes, also in terms of resource availability for animals and plants. Resource availability is a strong limiting factor on species distribution and affects both inter- and intra-guild competition. Changes in species distribution and abundance may lead to species homogenization and local extinctions. We expect effects due to human development to be even stronger in marginal areas with limited over-all resource availability such as alpine ecosystems. The red fox in alpine landscapes follows in the wake of human development, such as new cabin resorts, roads and power lines. The red fox tracks such areas for food resources. Human development in alpine landscapes alters alpine habitats from being characteristically instable, to become more stable and predictable both in terms of spatial and temporal availability of important food resources for red fox. Power tension lines cause higher mortality of birds, and hence increase prey availability at spatially predictable sites. Cabin resorts without garbage delivery scheme represent stable dumps of organic waste and important food resources to the red fox. During the last hundred years, Norwegian alpine landscapes have gone through massive changes caused by human development. Such changes open the otherwise unsuitable alpine habitats to the red fox, which might play an important role explaining the retreat of the arctic fox from the Fennoscandian mountains. Red fox has displaced the arctic fox and taken over important den sites in the low alpine tundra.

REPRODUCTIVE BEHAVIOUR OF LYNX FEMALES

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Eurasian lynx lives solitary but during the mating season some males may follow one female. The aim of this study was to describe females' behavioural strategies during the courtship of few males. We simulate natural situation in captivity and tried to describe female pre-copulatory choice and estimate their reproductive success. The study was conducted at the "Chernogolovka" station in 2002-2005. All experiments were done in March during the mating season. Females were combined with two males in the enclosures of 74 m^2 (males were introduced in the enclosure separately to exclude injures of animals). Three males and eleven females were used for the experiments. It was found that the duration of lynx pregnancy may be only 68-72 days and females have an induced type of ovulation. Multi-male mating result in to increase of females reproductive success, however, the number of copulations did not affect on females reproductive success per se. Females relations varied significantly depending on the familiarity of the males. Average duration of the time-interval "pairing-the first mating" was 18 min 18 sec (SD 19 min 15 sec) with the familiar male and 84 min 12 sec (SD 94 min 48 sec) with the unfamiliar male (Wilcoxon matched-pair test: $t=8$, $P<0.05$, $N=10$). Average duration of the mating was 144±96 sec (min-max: 41-715 sec), but females mated longer with the familiar male than with the unfamiliar one (correspondingly 180±106 sec, N=10, and 123±38 sec, N=9, $t=3.47$, $P<0.01$). There were some significant preferences in females' behaviour dependently on the individuality of males. Females showed more acts of courtship behaviour towards the one of the males (to the male number one – 14.83±2.72, N=6, acts/per one hour of activity; to the second – 8.32±6.32, N=6; $T=1$, $P<0.05$). In opposite the frequency of the aggressive behaviour was always higher to the male "two" (8.72±4.10, N=6 *vs.* 3.13±1.43, N=6; $T=0$, $P<0.05$) which mainly sired the kittens. Such way, polyandrous mating strategy gave some benefits to females but pre-copulatory mating choice does not affect much final males reproductive success.

EXTENSIVE GENE CONVERSION BETWEEN CCR2 AND CCR5 IN DOMESTIC CAT (*FELIS CATUS*)

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Chemokine receptors are seven-transmembrane-domains G-protein-coupled receptors which play an important role in signal transduction. Several cases of gene conversion between chromosomally proximal (CC-motif)-chemokine receptors have been reported. Here we present an outstanding case of evolutionary convergence between the CCR2 and CCR5 chemokine receptors in domestic cat (*Felis catus*). The sequences comparison of CDS regions revealed an unusually high degree of sequence homology between these genes. The sharing of derived character states suggests that this is due to extensive gene conversions within the feline lineage. Regions encoding the more exposed extracellular protein domains did not show such signs of homogenisations, suggesting that structural differentiation at these domains is biologically important. The comparison of *Felis catus* CCR2 and CCR5 revealed respectively two and eleven polymorphic amino acid position. Furthermore a 145 bp microsatellite was found in the CCR5 gene, located at 164 bp 5' of the start codon of the coding region.

COLONIZATION GENETICS AND EXPANSION OF THE ITALIAN WOLF (*CANIS LUPUS*) POPULATION

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Wolves in Italy strongly declined in the past and were confined south of the Alps since the turn of the last century, reduced in the 1970s to approximately 100 individuals surviving in two fragmented subpopulations in the central-southern Apennine. Legal protection and changes in the ecology of mountain areas led the Italian wolves to expand in the Apennine and recolonize the Alps in Italy, France and Switzerland. The ongoing expansion wave should be monitored to describe the genetic and demographic structure of wolf populations, and develop sound management strategies aiming to minimize social conflicts generated by livestock predations. Wolves are elusive and population data (i.e. population size, inter-packs connectivity, dispersal rate) can be obtained by integrating field observations and non-invasive genetic approaches (NGS). Here we report results of a long term monitoring project aimed to elucidate some aspects of the wolf expansion process in Italy. Both invasive (tissue) and non-invasive (mainly scat) samples were genotyped at mtDNA, Y-chromosome and microsatellite loci to describe local population structure, pack composition and distribution, dispersal rates, bottleneck and founder effects during colonization, rates of gene flow between source and colonies. Results allow to infer number and distribution of wolf patches in the study areas, to estimate the (open) population size, the number of dispersal events and gene flow between source population and colonies.

LIVESTOCK DAMAGE AND WOLF PRESENCE, IN A RURAL AREA OF NORTHEASTERN APPENNINES, TUSCANY, ITALY

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Depredation on livestock and wolf pack (*Canis lupus*) distribution were investigated in the province of Arezzo from 1998 to 2001. Although livestock was uniformly distributed, damage level and distribution were focused in the mountainous area inhabited by wolf packs so there were huge differences between areas with and without wolves. Few farms (6%) were persistently affected by predation, and they reported a wide percentage of the total attacks and losses (38%; 37%). Mass slaughter phenomena involved only sheep and goat farms, affecting 18% of the total. Thirty-five attacks (14% of the total attacks) reported 536 kills (44% of the total head killed in the whole province of Arezzo). Compensation costs and prevention funding devolved by the province were examined. During the study period wolf population was stable: wolf packs were distributed on 47% of the whole province (1,504 km^2); with a density estimated at 2.9 ± 0.7 pack/100 km^2.

GENETIC STRUCTURE AND RECENT POPULATION DECLINE IN EURASIAN OTTER POPULATIONS IN THE CZECH AND SLOVAK REPUBLICS

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Over the latter part of the 20th century, Eurasian otter *Lutra lutra* populations suffered dramatic declines, resulting in extinction or fragmentation of populations in many Western and Central European countries. In the Czech Republic, otter population became totally isolated around 1970-80s, while the Slovak population remained partly connected to the relatively continuous Central and Eastern European otter distribution range. We studied the genetic structure and past demographic history of otters in the Czech and Slovak Republics, using microsatellite nuclear markers amplified from DNA extracted from tissue and faecal samples. A relatively high level of genetic differentiation was found between the Czech and Slovak populations (F_{ST} = 0.154, P = 0.0002), supported by a perfect assignment in Bayesian cluster analysis. Both the Czech and Slovak populations showed significant heterozygosity excess (assuming an infinite allele model), indicating recent population bottlenecks. A very recent population decline was also suggested by coalescent analysis, inferring a drop to c. 25% of past effective population size in both populations. The timing of the decline was in accordance with published data from otter surveys, suggesting that the strongest decline probably occurred between 1970 and 1995. Although otter populations have recently started to recover in most European countries, results of our study indicate that their present effective population size in Slovakia, and especially in the Czech Republic, is still very low. Therefore, the populations remain vulnerable to any violent demographic change and, despite the claims of fish-farmers and anglers for legal culls, it is highly desirable that they remain a strongly protected species in both countries. The spreading and reconnection of otter populations observed recently is essential for the future health of the populations, and should be supported through habitat conservation.

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URBAN STONE MARTENS (*MARTES FOINA*): TRANSIENT VISITORS OR SPECIALIZED RESIDENTS?

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The stone marten (*Martes foina*) is common throughout continental Europe. While martens are cryptic animals and are rarely observed, their presence in urban environments often manifests itself through conflicts with human interests like noise in attics or damaged car engine components. In order to determine whether martens encountered in urban areas reside there year-round or only enter towns sporadically we used radio-telemetry to study the socio-spatial organisation and the denning behaviour of 13 individuals in two towns in Luxembourg. Female and male home ranges averaged 36 ha (N=10) and 115 ha (N=3) respectively. The martens maintained stable, year-round territories within the boundaries of the towns even though rural and forested areas were within easy reach. Population density was limited by a pattern of strict intra-sexual territoriality. The martens used between 3 and 6 different dens per 15-day periods. On the vast majority of days they denned in buildings both inhabited and uninhabited by humans. Natural den sites were used only rarely (<1% of days). We conclude that habitat use and den selection clearly demonstrated the presence of well-established populations of stone martens specialized to residing year-round in urban areas.

LANDSCAPE AND THE COMMUNITY OF CARNIVORES IN SE FINLAND - THE KEY HABITATS FOR RABIES SPREAD?

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Medium-sized carnivores, i.e. red foxes *Vulpes vulpes*, European badgers *Meles meles*, raccoon dogs *Nyctereutes procyonoides*, and domestic cats *Felis silvestris catus* were radio-tracked between 2000 and 2004 in Virolahti, SE Finland. The study area was a mosaic of agricultural land, deciduous, coniferous and mixed industrial forests.

Habitat use was analyzed at two levels: in the landscape and within the home range. Use was compared to availability with yearly and seasonal home ranges (Kernel 95% and core areas) and nightly routes of animals. Habitat use was analyzed mainly with GIS and compositional analysis. Home range sizes, habitat proportions, habitat patch size and patch dispersion in the home ranges were compared between species to discover important characteristics in the landscape. Also the habitat types in the overlapping areas of home ranges were analyzed.

Habitat use of all species was non-random. Most frequently used habitats were partly the same for different species. In the landscape (home range versus study area), foxes favoured deciduous forests and fields, but within home ranges (total home range versus core area) open areas, seeding stands and spruce forests were the most favoured. Badgers favoured in the landscape deciduous forests and fields. These and mixed forests were also frequently used within home ranges. Moreover, home range size of badgers correlated positively with the dispersion of deciduous forest patches. Raccoon dogs favoured in the landscape deciduous forests and fields, which were also preferred within their home range. Furthermore, their home range size correlated positively with the dispersion of deciduous patches. Cats' favoured deciduous forests, field and open areas in the landscape, but within home range they clearly favoured only deciduous forests. These results are discussed in the light of species relationships and disease (such as rabies) spread.

FACTORS AFFECTING THE LOCATION OF URBAN BADGER SETTS

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In Great Britain, Eurasian badgers (*Meles meles*) are increasingly found in urban environments. Due to their digging and foraging activities, badgers can cause damage to human property. Thus, while the majority of humans view urban wildlife positively, wildlife managers are receiving an increasing number of complaints related to badger setts. The aim of this study was to describe the characteristics of urban badger setts and to identify habitat factors related to their presence in urban and suburban areas. Using a GIS-based approach and binary logistic regression analysis, we identified habitat factors (including human population density) associated with the presence of badger setts in four cities in England. The density, size and dispersion of setts in these cities and other rural study areas were also investigated. Badger sett densities in urban areas were comparable to sett densities in most rural parts of the UK, indicating that badgers can achieve relatively high population densities in urban environments. Rural and urban setts did not differ in size, and in both habitat types it was possible to distinguish main setts from other setts. Main setts in urban and rural areas were overdispersed, which may be indicative of territorial exclusion. The single most important factor predicting sett location was the type of habitat at a given location, followed by the slope of the ground at that location. Badgers also preferred areas with intermediate human population densities. These results indicate that urban badger setts are similar in size, function and distribution to rural setts. The population density of badgers in urban and suburban environments appears to be mainly related to the availability of suitable places for locating setts, rather than to factors that would be expected to reflect food availability. This information will help to predict potential sites of badger-related problems and may be relevant to understanding the ecological requirements of other carnivore species that inhabit urban environments.

THE PREDATION RISKS OF INTERSPECIFIC EAVESDROPPING

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Animals do not live in isolation from other species, but typically coexist in assemblages comprising closely - related species using similar communication systems. The ability to eavesdrop on these heterospecific signals to gain information about shared resources or predators will likely be of benefit. But this complex mosaic of signals is also open to exploitation by eavesdropping predators, and if the signals of one species are attractive to a predator, they pose a threat not only to the donor species, but also to other sympatric prey species. In Finland, two species of voles, the sibling vole and the field vole, co-occur in open agricultural habitats and both species rely upon scent marks to communicate. Both vole species are also prey to a range of terrestrial scent hunting predators such as least weasels and stoats, but the competitively superior sibling voles are taken preferentially, partially because of their gregarious social organisation. We tested whether field voles eavesdrop on the signals of its competitor, and whether they behave as though this eavesdropping carries a risk of predation. We presented field voles with scent marks from unknown conspecifics and sibling voles under high (weasel present) and low (weasel absent) predation risk. Field voles readily investigated the social signals of the other species when the risk of predation was low, however the presence of the least weasel prompted them to reduce this heterospecific odour investigation. This represents the first study of its kind to show such complexity in the uses of social signals and that inter-specific communication by competitors is sensitive to the potential for increased predation risk.

DEVELOPMENT OF MONGOOSE-PROOF LOW-HEIGHT FENCE ON OKINAWA ISLAND, RYUKYU ARCHIPELAGO, JAPAN

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Okinawa Island is located in the subtropical region to the south-east of the main Islands of Japan. In 1910, 17 mongooses were introduced into the southern part of the island to control Habu snakes and sugarcane rats. However, the invasive mongooses spread to northern Okinawa and invaded the Yanbaru forest region, which is inhabited by many endangered species. Okinawa Prefectural Office initiated a mongoose control project in October 2000, with the goal of complete eradication of the mongoose in the Yanbaru forest region by March 31, 2014. Wire mesh live traps were set at 4771 points throughout the Yanbaru forest region, and a total of 6593 mongooses were caught and exterminated by March 2005. The mongoose population in the area is decreasing but is not approaching zero. A new capture method is required for the low-density mongoose population to protect endangered and native species in Yanbaru forest region from this invasive species. We have developed two types of mongoose-proof fence: a metal fence 1.2 m in height constructed from smooth metal plate and a metal fence of the same height with flexible outriggers. We also developed a mongoose-proof low-height (0.5 m) fence.

A prototype fence, 0.5 m in height, was constructed from plastic netting and metal poles and was set along a 300-m fence line in the field. A control line of the same length with no fence was also set nearby. The behaviour of feral mongooses along these fence lines was observed using 14 automatic still cameras and 4 automatic video cameras over a period of two weeks, after which the fence lines were exchanged and the same observations were conducted. The observations regarding mongoose behaviour along the fence line (N=90) were as follows: no mongooses climbed over the prototype fence; the average number of mongooses per day that walked over 50 m along the fence line was 2.5, while that along the no-fence line was 2.4. The mean distances walked (mean walked time) were 67 m (1 min 35 s) on the fence line and 80 m (1 m 25 s) on the no-fence line. These observations suggest that the prototype fence can prevent mongoose invasion and facilitate capture.

GENETIC EROSION WITHIN OCELOT POPULATIONS IN THE UNITED STATES OVER THE 20TH CENTURY

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Ocelot (*Leopardus pardalis*) populations in the United States have been drastically reduced and fragmented over the past century and currently exhibit low levels of genetic diversity. The mitochondrial control region and nuclear microsatellite loci were used to examine historic levels of diversity in ocelot populations from 1890 to 1956 and temporal changes that occurred over the 20th century. Levels of genetic diversity were higher in historical ocelot populations than in extant populations from Texas. The greatest loss of mitochondrial haplotype diversity occurred in the ocelot population at Laguna Atascosa National Wildlife Refuge. The second extant population in Texas retained higher levels of genetic diversity through the 1990s, but appeared to have lost diversity over the last 10 years. A similar pattern was also observed for microsatellite loci. The greatest amount of genetic diversity was observed in ocelots from the southern portion of Tamaulipas, Mexico. We show that the low levels of genetic diversity in the United States are related to recent population reductions and increased habitat fragmentation. Genetic augmentation through translocation, increased population connectivity with landscape corridors, and other remedial strategies will be identified.

BEHAVIOURAL COMPARISON OF TWO FOX SPECIES: THE CAPE FOX (*VULPES CHAMA*) AND THE FENNEC (*VULPES ZERDA*)

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The Cape fox (*Vulpes chama*) is one of the least studied canids in the world, particularly from the view of its ecology and behaviour. The species occupies arid and semiarid areas of sub-Saharan Africa, where it forms monogamous pairs. This fox represents the basal species of Vulpinae. The fennec (*Vulpes zerda*) inhabits extremely arid regions of North Africa and is thought to live in groups consisting of several related individuals. The aim of our study was to compare behavioural patterns of the two foxes from an evolutionary perspective. Obtained data were mapped onto the phylogeny of the Canidae to reveal the direction of their evolution. Observations were conducted in Czech zoos. Behavioural data were obtained by focal sampling method of selected behavioural characters, allowing for interspecies comparison. We focused on evolutionary conservative characters showing low intraspecific variability, as are e.g. submissive or dominant displays. Given the restricted conditions in captivity, only presence/absence of a character was recorded. The Cape fox displayed rather ancestral behavioural characters (e.g. orientation of attack towards cheeks during agonistic interactions) in comparison to the fennec. On the other hand, the fennec performed certain behavioural patterns that were known only in the genus *Canis* (*C. lupus*, *C. latrans*, *C. aureus*). These similarities (e.g. so-called T-position), however, developed most likely independently. Differences in visual communication between the both species could be related to their social organization. While the Cape fox lives in monogamous pairs, the fennec probably forms larger groups and thus behavioural synapomorphies with some group-living *Canis* species could evolve.

THE HISTORY OF THE RED FOX (*VULPES VULPES*) RANGE DEVELOPMENT

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A modern zoogeography of the red fox based on historic data and a conjectured history of its Holarctic range is evaluated with prehistoric data. The first appearance of Vulpini line in Eurasia is dated at early Pliocene as immigration of forms originated in the New World, where their ancient lines were presumably extinct. The deep relationship of the red fox predecessor to the arid landscapes is supported by several fossils of Villafranchian foxes among the other arid land species. *Vulpes vulpes* fossils are abundant in the deposits of the Middle Pleistocene and early Holocene, with an environment of widespread arid steppe and forest-steppe. The fact that the majority of the recent *Vulpes* species inhabit the arid open countries of the Palearctic (Central Asia and North Africa) also supports this argument. The development of the native red fox range in Eurasia has presumably taken place from southern arid open and semi-open lands northward to boreal forests. The agricultural activities in the boreal forest resulted in habitat changes that in general have been highly favourable to the red fox. While the configuration of the distributional area has remained relatively stable during the historic period in Eurasia, the interior structure of the range has changed remarkably. The fossil history of foxes in North America indicates them immigrated to the Nearctic probably before the Wisconsinan glaciation. The distribution of the native red fox in North America prior to colonization by Europeans encompassed primarily boreal forests of Canada and mountain forests of the western USA. The development of its range, in opposition to Eurasian pattern, has mainly taken place from the north south-westward, from boreal forest to temperate woodland and to prairies. This extension has happened only during historic times within habitat change and direct human impact (introduction of animals for sport hunting and fur farms establishment). Native populations were characterised by the highest densities in northern boreal regions. The optimum of the range has shifted nowadays southward to the transition belt between coniferous and deciduous forests and to temperate woodlands. Today the red fox inhabits practically all natural biomes within its range in Holarctic and it also thrives in the areas which are densely peopled. But only the historical-biogeographical analysis discovers the deep distinctions in the evolution of its distributional range on the both continents.

ARE BEARS IN AUSTRIA FACING A SECOND EXTIRPATION?

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The bear population in north-central Austria was founded by one male that immigrated from Slovenia in the 1970s and three bears released between 1989 and 1993. The small nucleus did well and regular reproductions resulted in at least twelve individuals in 1999. After that, the population declined and the estimates for spring 2007 point to no more than five individuals. Genetic monitoring started in 2000 and therefore we have extensive data on the presence and absence of individual bears. Annual recovery rates of individuals in consecutive years are high (41 out of 44 bear years) and allow us to pinpoint the year of disappearance and thus estimate survival rates. The analysis of these demographic data showed a high mortality rate of the yearlings after family break-up (0.57) and also a significant mortality rate of two-year-old bears (0.30). Cubs of the year and bears older than two years seem to survive much better (mortality rates of 0.14 and 0.12, respectively). These rates are similar to those of bear populations in Sweden or North America. A spatial analysis showed that the last records of most of the bears that disappeared were outside of the core distribution area. The most likely explanation for the high mortality of dispersing bears is illegal killings by private hunters in the periphery of the bear core area. Contrary to the periphery the core area largely consists of formerly state owned forest. A further evaluation of the situation is presently conducted through an attitude survey of different groups of hunters and will be finished within the summer 2007. First results indicate that hunters, who are also farmers and own small hunting units of 100-200 ha, oppose bear conservation rather strongly. Among hunters, who rented larger hunting units, there are many in favour of bears, but some of them are indifferent. Based on the final results we will develop conservation measures hopefully averting the extirpation and ensuring a recovery of Austria's brown bear population.

WHY DON'T FINNISH WOLVES DISPERSE INTO SCANDINAVIAN POPULATION?

ILPO KOJOLA

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Dispersal has a vital role for population viability. Scandinavian wolf (*Canis lupus*) population is rooting from 3 founders is suffering from inbreeding depression in terms of low litter size and congenital anomalies, and has been isolated for the last 16 years. The distances from the western edge of the neighbouring Finnish population via the two most potential routes are 650 and 880 km. The shorter of these routes calls for moving over the Gulf of Bothnia and the longer one via the area of reindeer management in the north. Our data comprised 35 wolves that dispersed from their home territories in north-central Finland. We could assess the location of the new territory for 27 wolves of which 10 were equipped with transmitters including both GPS (global positioning system) and GSM (global system for mobile). Half of the dispersal routes were longer than 800 km but all dispersal distances shorter than 500 km. Wolves cause remarkable depredation in semi-domesticated reindeer herds and wolf management is therefore more liberal in the north. All collared wolves that directed their movements to the reindeer management area were killed before they were able to reproduce while elsewhere the majority of wolves succeeded in reproducing at least once. Although the number of wolves dispersing from Finnish packs is today manifold higher than ten years ago, the movements over the Gulf of Bothnia is still quite unlikely because wolves depart their natal territories in spring arrive coast of the bay when ice is melting or already melted. In our 4 examples the wolf either settled down at the coastal region or moved back to inland before the sea got frozen again. Recent findings indicate that the number of migrating wolves have increased in the north. Although mortality among these wolves is high both in Finnish and Swedish territory, the probability of successful dispersal incidents seemed be increased

A WOLF POPULATION CENSUS IN POLISH CARPATHIANS

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A wolf population census has been conducted in Polish part of Carpathian Mountains during winter-spring season of 2004/05. A total of 506 faeces have been collected by local foresters, hunters and NGOs. Thanks to modification of DNA isolation procedure it was possible to obtain genotypes for 11 microsatellite loci and sex markers with a multiple-tube approach. In the set of 382 successfully typed faeces 188 distinct genotypes have been found of which 7 genotypes belonged probably to wild-ranging dogs. The factual wolf population size in the study area was estimated to fall into a range between 274 to 300 individuals. Occasional hybridization with dogs has been revealed.

WILDLIFE MANAGEMENT IS NOT ABOUT "WILD ANIMALS", IT IS ABOUT "WILD PEOPLE". THE BERLIN PUBLIC AND THE WILD BOARS - DOWNTOWN!

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Destroyed backyards, agitated soccer stadiums, ravaged parks are just a few problems wild boars cause in Berlin. Fear and feeding intensify the problem between humans and wild animals. The differing stakeholders their concerns, opinions and behaviour (pro and contra wild boars), the frequency of encounter between men and animals as well as the source of information for the citizens have been examined. A representative enquiry using a standardised questionnaire, yielded to the empiric data ascertainment. For this purpose 485 questionnaires (return rate approx. 99%), collected at public events, have been evaluated. Especially citizens of the boroughs of Charlottenburg and Zehlendorf feeled affected, in particular housewives, senior citizens, households with attached compost heaps and vegetable patches, as well as households with children not having domestic animals. About a tenth feed the wild boars and about the same amount does touch them. 45% of the respondents encounter wild boars at least once a year and about 60% have met them at least once in a time. 6% of the citizens are affected once a week or daily. The main sources of information about wild boars for the citizens are: the press (67%), friends (65%) and television (60%). There's a deeply divided opinion (pro and contra wild boars) not only in the population, also in one and the same person. The encounter between men and wild boar is clearly given in Berlin. The public authorities hardly reach the citizens, as the main sources of information are scarcely used by the competent authorities. There clearly exists a strong need of education, which could be achieved by selective use of information carriers and a reorganisation of the concerned public authority agencies. A national cooperation with other authorities and organisations led by a professional wildlife management team is highly recommended.

THE EVALUATION OF DOMESTIC CAT (*FELIS CATUS*) PREDATION USING THREE DIFFERENT METHODS

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Domestic cats are one of the most numerous predators in Poland. These pets are commonly kept at farms but hardly controlled and poorly fed so they roam freely and penetrate wide range of environments. Due to this fact some groups (i.e. hunters, bird protectors) claim that cats exert strong pressure on population of small game and birds and they call for swift action that may limit cat population. However, few studies concerning the diet of cats in Poland were done so far and data on the role of cats as predators is scarce. Therefore, in 2004 we began research on ecology of cats of rural areas and on the role they play in ecosystems. We have studied cat diet by means of three methods: prey collection, faeces analyses and stomach content analyses. All in all about two thousand prey items were recorded, with small mammals (mostly common species) accounting for the biggest share. Also small game and rare species were noted. Hunting activity varied between seasons (the lowest being in winter time), also cats diet composition differed significantly throughout the whole year. Moreover, each method used was subject to particular limitation (i.e. problems with reporting all the prey or finding the faeces, uncooperative cat owners, law regulations) thus the results obtained were slightly different.

FOOD RESOURCE PARTITIONING BETWEEN SYMPATRIC GOLDEN JACKAL AND RED FOX IN HUNGARY

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Ecological theory predicts that two similar and closely related carnivores, must reduce interspecific competition to coexist by partitioning resources. Less is known about how trophic niche segregation beside high food overlap may realize in the Pannonian ecoregion (Carpathian basin, Hungary) between the spontaneously repatriated and expanding golden jackals (*Canis aureus*), and sympatric red foxes (*Vulpes vulpes*). According to scat analysis, both jackals and foxes consumed primarily open field-living animals. Both canids preferred open field-living animals (Ivlev's index, jackal: Ei = 0.15, fox: Ei = 0.13) and less preferred (avoided) forest-living species (Ei = -0.52 and Ei = -0.43, respectively); the interspecific difference in capture site was not significant. Jackals similarly preferred small mammals than foxes (jackal: Ei = 0.38, fox: Ei = 0.39), less preferred wild boar (Ei = -0.43 and Ei = -0.56, respectively) and cervids (Ei = -0.92 and Ei = -0.94, respectively). Jackals preferred pheasant less than foxes did (Ei = 0.06 and Ei = 0.51, respectively). In case of lower small mammal availability, the jackal consumed more wild boar, while red fox consumed more cervids and more birds. Consequently, the secondary (alternative) food consumption of the red fox depended more on the small mammal availability, than that of jackal. But, there was not close relationship between the available small mammal biomass and the consumption rate of small mammals; primary food resource (small mammals) was characteristically unlimited in the studied agricultural environment. It seems, that in the Carpathian basin there is no restriction in the further spreading of the generalist golden jackal, which in habitat and in food requirement is quite similar to the red fox. The two native canids are able to coexist in Central European agricultural habits without or less competition.

POST MORTEM ANALYSIS OF OTTERS (L*UTRA LUTRA*) IN HUNGARY

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Biological parameters (morphologic characteristics, wounds, cause of death, characteristics of reproduction parameters, stomach content, weight of inner organs and toxicological status) of the strictly protected otter (*Lutra lutra*) were examined on carcasses (N=127, male 67, female 57 and unknown 3) collected between 1999 and 2006. Mean (±SE) weight of adult males was 8.68±0.29 kg, and that of females was 6.02±0.13 kg. Values of the condition index (KI) of adult males and females were 1.31 and 0.95 respectively ($P<0.0001$). KI was not conditioned significantly by seasons ($P>0.05$). Occurrence of wounds on food pads and claws (19 and 16 cases respectively) were accidental. There were no relationships between wounds and sex, body weight or condition. The percentage of ran down by traffic was 90.6% respecting death causes. Therewith, poaching, bite wounds by dogs, assumable poisoning and drowning in fish-trap (together 7.9%), and rarely attack by otters and disease (1.6%) also occurred. Condition (KI) of road-killed otters were significantly better, in comparison with others ($P<0.05$). One female was pregnant (3 embryos). In the uterine horns of previously pregnant females (N=18) the mean number of placenta scars was 2.2±0.17. In adult males highest gonado-somatic index (testicle weight per body weight) value was found in summer, but no significant difference was found among seasons (N=39, $P>0.05$). The stomach was empty in 31% of the examined cases; the mean weight of the stomach content was 49 g. In weight of stomach contents there were no significant differences ($P>0.05$) among sexes, age classes and seasons. The main food eaten by otters was fish (78.4%), mainly Prussian carp. In adult females a higher index of kidney ($P<0.01$) and adrenal gland ($P<0.05$) was found than in males, but no significant ($P>0.05$) difference between sexes were found in other inner organs (e.g. heart, liver, spleen, thyroid gland or lung). Heavy metal concentrations measured in otter livers (N=120) were the following, Hg: 1.26±0.12, Cu: 7.14±0.33, Zn: 33.6±1.3 mg/kg (wet weight). Higher ($P<0.05$) Hg concentration was found in females. Higher Hg concentration ($P<0.05$) along the Danube river, higher Cu concentration ($P<0.05$) was found along the Danube and Tisza rivers, than in other regions. Negative relationship was found between KI and Hg ($r_P= -0.24$, $P<0.05$), and between KI and Zn concentrations ($r_P= -0.45$, $P<0.0001$).

PRELIMINARY DATA FROM A GPS MONITORING OF A WOLF IN THE GRAN SASSO - LAGA NATIONAL PARK

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In this paper we present and discuss preliminary data from the first months of monitoring of a wolf (*Canis lupus*) fitted with GPS-VHF radio-collar. The wolf, named Ivo, was found wounded on the 28/10/2006, within the boundaries of Amatrice (RI) just outside the borders of the Gran Sasso - Monti della Laga National Park. After being cured and healed at the Wildlife Recovery Centre of Popoli (PE), the wolf has been freed on December 14, 2006, near the place where it had been found. The recovery and the monitoring of that animal provided a rare and important opportunity for increasing the knowledge on the species' ecology and biology. The outcoming data will be very helpful for the implementation and the improvement of sound conservation policies within a protected area. The monitoring schedule envisaged six localisations per day, in general. For brief periods, the localisations were gathered with an increased frequency of one every hour, for four days a month. Here we provide data on home range, core areas used by the wolf, daily activity trends, average length of movements, habitat types and resting sites used. The wolf hanged around human settlements for long periods, at elevations ranging from 800 and 1300 m a.s.l. (359831 E; 4721052 N). Data highlighted a definite "synanthropy" of the wolf. It, in fact, utilised quarters relatively densely inhabited, with refuge areas limited to small creeks, small and isolated bushes, showing the hazards that Ivo faced day by day. The data were also used for showing the ecological corridors preferentially used by the wolf for moving from the Gran Sasso-Laga National Park to other adjacent protected areas. Our data confirm the necessity, for all protected areas, to envisage the protection of contiguous areas and ecological corridors for the safeguard and conservation of critical species, like the wolf and the brown bear.

SPACING PATTERN AND HABITAT SELECTION OF THE WEASEL (*MUSTELA NIVALIS*) IN AGRICULTURAL FRAGMENTED LANDSCAPE

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We present a study on the spacing pattern of a population of weasels in Central Italy. This pattern is described both at a level of generic space and at a level of habitat, meant as a set of vegetational and environmental features. The study area is a typical agricultural landscape, supporting highly fragmented natural habitat modified by thousands of years of human presence and work. The results indicate that individual home ranges varied from non-breeding to breeding season, and show strong preference for habitats formed by the edges between fields and meadows. The shapes of the individual home ranges follow these edges, producing a typical linear form. In particular, home range areas of both sexes are similar during winter, but during the warm season males increase their movements and the extension of the tracts they cross, which results in home range areas up to ten times larger. Our results confirm the hypothesis of an intra-sexual spacing pattern in solitary and small mustelids; moreover, they indicate high specialization in spacing pattern with a strong selection for residual high covered habitat.

FOOD HABITS OF BADGERS (M*ELES MELES*) IN THE SAMAROVSKY CHUGAS NATIONAL PARK, NORTHWESTERN SIBERIA

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We aimed to study the range of food resources consumed by badgers, and its' seasonal dynamics in the Samarovsky Chugas National Park (Tyumenskaya oblast', Khanty-Mansiysky okrug, about 61° n. l. and 69° e. altitude). The study areas consists of two islands in the riparian zone of the river Ob' - Bolshoy (Big) Tchukhtinsky Island and Maliy (Small) Tchukhtinsky Island with areas 865 ha and 325 ha, respectively. Cedar pine (*Pinus sibirica*) and fir (*Picea abies*) dominate forest stands on Bolshoy Tchukhtinsky Island. Maliy Tchukhtinsky Island is covered mainly with deciduous forest consisting of aspen (*Populus sp*.) and birch (*Betula sp*.), due to the forest fire that took place in 1998.

The main method for the food habitats study was analysis of remains of animal and plant species in scats (N=114). We defined the food items found most frequently in the combined data sets to be the most important food resources. Remains of plants in badger scats were presented by seeds of bilberry (*Vaccinium myrttillus*), but not cluster berry (*Vaccinium vitisidaea*), though the latter was very abundant in the study area in the end of summer. We also found seeds of a number of tree species and herbs, representing main plant communities over the study area (deciduous forest, coniferous forest, bottomland meadows). Average frequency of occurrence of earworms' chaetae was 82%, but they never were abundant in scats. A total of 66 insect species was found in the combined samples of scats, however, in all seasons the bulk of diets contained not more than 10 species with frequency of occurrence not less that 10%. Cedar pine nuts, berries and invertebrates appeared to be the main food types of badger in the study area, as they had the highest frequency of occurrence in all seasons. The highest diversity of food types per sample was observed in spring, when the abundance and availability of food was low. Diversity markedly decreased in the beginning of summer, when larvae and imago of insects became available, and increased again in the middle of summer when the spectrum of available food items reached its maximum.

According to our data, the feeding activity of badgers does not negatively affect the abundance of game birds, particularly, hazel hen. The trophic niche of badgers in the study area appeared to be similar to that in the southern part of the species range (Moldova, Spain, Portugal, Italy), where the main types of food are fruits and acorns.

MOLECULAR DETECTION OF HYBRIDS BETWEEN EUROPEAN MINK AND POLECATS

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Hybridization is rather common, and has been well documented among species within genera of Mustelidae. In particular, potential hybrids between the European mink (*Mustela lutreola*) and the polecat (*Mustela putorius*) have been identified based on morphological characters. The control region of the mitochondrial DNA and a nuclear locus on the Y chromosome were sequenced to confirm the presence of these potential hybrids, and to infer their paternal-maternal origin. Moreover, a group of ten microsatellites was used to genotype several endangered populations of European mink and test the role of hybridization in population dynamics of this species.

Four species-specific nucleotides were found in the control region of the mtDNA and another three species-specific nucleotides were detected in the nuclear Y chromosome locus. Concerning microsatellite data, two discriminating markers with species-specific alleles were found, and were used for hybrid identification.

Combination of different molecular techniques was crucial in estimating genetic introgression in the endangered European mink populations as well as in clarifying the preferential mating between both sympatric species. Moreover, a karyological test was performed on one potential hybrid. The number of chromosomes (2n=39) in the genome of this potential hybrid is between that characteristic of *Mustela lutreola* (2n=38) and that of *Mustela putorius* (2n=40). A study on few sperm parameters of this animal evidenced no particular abnormalities supporting its fertility even if the method of collection could have modified in particular sperm concentration. The genetic information here reported is particularly important for the conservation of the European mink in regions where it lives in sympatry with the polecat.

DEFINITION AND CHARACTERIZATION OF BROWN BEAR (*URSUS ARCTOS*) DENS IN TRENTINO (ITALY)

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Today, the only brown bear (*Ursus arctos* L.) population of Italian Central Alps is present in Adamello Brenta Natural Park and bordering territories, thanks to the success of the *Life Ursus* reintroduction project. In a framework aimed at the assessment of conservation strategies, the Park underwent a study to characterise brown bear denning sites, important components of brown bear habitat. Study area includes Brenta and Gazza-Paganella massifs, which represent the bear core area where, in the last eighteen years, several field campaigns were conducted, which led to the location of 51 brown bear winter dens, characterised by den and nest dimensions. Using a Geographic Information System (GIS), slope and aspect, vegetational and geological features, average distance from forestry roads, main roads, villages, skiing plants, mountain huts and refuges were also determined. All dens were classified as "historical" or "recent ", based on their use by bears before or after 1999, the year when reintroduction project started.
Results show that almost all bear hibernation sites are natural caves: just in one case the site was excavated. Winter dens have a wide variability: entrances are typically small (0.76 m average height and 2.02 m average width), while depth ranges from 1.1 m to 35 m. A "nest form" was identified in 37 caves (66%), but also vegetable material spread out on the ground (22%) and holes dug in the earth (16%) were present. In the remaining 14 dens only residual bedding material was found. Den elevations range from 520 to 1960 m a.s.l. (average: 1420 m). Slope and aspect analysis showed that 33% of dens are on south-east facing slopes, 27% on east and 16% on south. Slopes are rather high: mean value is 42.48° and maximum 55°. From the geological point of view, dens are located on successions with limestone and dolomite (92%) or detritus (8%). Also in winter brown bears prefer woodlands: 84% of den sites are located in woods and only 16% of them are situated in open areas. Characterization in relation to different sources of human disturbance showed high distances from villages, main roads and mountain huts (2341 m, 1867m and 1676m, respectively); while forestry roads seem not to have any effect. No significant differences between old and recent hibernation sites were present: this could mean that winter den choice is not different between former autochthonous and recently introduced bears. Finally, a comparison between the 51 "den points" and 100 random points selected inside a 5 km buffer zone was conducted using logistic regression analysis. In particular, bears seem to prefer for hibernation a territory characterized by elevated slopes, mild climate conditions, carbonatic substrate and young and diversified wood structure. Based on this results, a provisional model and a map of potential denning areas in Trentino region were realized.

AN EFFECT OF POLYANDROUS MATING ON LYNX REPRODUCTIVE SUCCESS: WHAT ARE THE COSTS AND THE BENEFITS?

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Cats are very secretive species and the study of their behaviour in the wild is extremely difficult. Most of the cats live solitarily and Eurasian lynx is one of the most typical felines. The search for the mating is costly. Home range of a male usually covers home ranges of two-three females. Males mate these females but also do far excursions outside their usual home range to find other mating partners. Some traits of lynx behaviour help them to find each other: increase of activity during the mating season, stability of routes, spatial distribution of urine marks and recognition of sex, age and familiarity of the partners by chemical cues. Vocal activity increases to the mating season in lynxes of both sexes. Probably females are able to recognize the physiological status of males because the main frequency of acoustic signals correlates negatively with males' testosterone level. However, males and females may copulate with few mates that may give some benefits. Usually lynx females accept the second male for the copulation (in 83% of cases). Mating with two males results in to increase of females reproductive success (average litter size is 1,95 (with one male; N=43) and 2,6 (with two males; N=20)). Higher copulation rate correlates in females with higher ovulation rate in lynx females (r=+0.87; N=8). Mating with two males decreases significantly embryonic losses in lynx females. In this case about 84% of ovulated eggs successfully develop to newborn kittens. In case of single mate embryonic losses were as high as 57%. These embryonic losses may be related to high level of teratospermia in lynx ejaculate. Males have only about 20% of morphologically normal sperms. It may be related with the low genetic variability of Eurasian lynx across the whole range. The level of teratospermia as well as time interval between males in opposite to other sperm parameters, order and number of mating, genetic relations affect male's reproductive success when they mate with polyandrous females. Multiple paternity and increase of offspring genetic diversity do not affect the frequency of sibling aggression in lynx litters. This study was supported by WTZ RUS 02/035, DAAD and RFBR 07-04-00899.

COMPARING ALTERNATIVE SAC NETWORKS FOR OTTERS IN IRELAND - AN SEPM APPROACH

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Ireland must designate a Special Areas of Conservation (SAC) network for otters (*Lutra lutra*) (92/43/EEC). One of the criteria for SAC site designation is knowledge of the size and density of the local and national population. The aim of the current study was to satisfy this criterion for SAC network designation and to rank subpopulations in terms of their importance for overall population stability. We estimated population size and density for mesotrophic systems based on the spatial structure we observed from radio-tracking 23 otters. We used published data from several Scottish radio-tracking studies to estimate population size and density on oligotrophic systems and on the coast. We estimated age-specific mortality and fecundity from 70 found-dead otter cadavers. Finally, using the spatial, social, and demographic patterns we had identified, we simulated the Irish otter population as a network of subcatchments. We used several simple rules derived from the literature to define the dispersal potential for individuals in the landscape. The population size and the degree of connectivity of sub-catchments contributed to their relative vulnerability and importance for overall population stability. Using this spatially explicit population model we make recommendations for the best SAC network and suggest where various management actions should be prioritised.

PRESENT STATUS OF MONGOOSE (*HERPESTES JAVANICUS*) POPULATION IN THE YANBARU FOREST REGION ON OKINAWA ISLAND, SOUTH-EAST JAPAN, AND MONGOOSE ERADICATION TECHNIQUES

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The mongoose was introduced to Okinawa Island in 1910. The Okinawa Prefectural Government has set 1000 live traps in the Yanbaru and caught about 7000 mongooses. However, complete eradication has not be achieved, and the mongoose population has been maintained at a low density. We analyzed the present status of the mongoose population in the Yanbaru, from post-mortems and long-term trapping data. In addition to this we have been developing mongoose eradication techniques. Mongoose capture indices were higher in the buffer region in the south of Yanbaru. This suggests that individuals are constantly invading from southern areas to this buffer region. When trapping was not carried out for periods of one month or more, capture rates increased significantly, indicating that the mongoose population had the potential to recover rapidly through immigration from untrapped regions. The proportion of females caught that were pregnant in 2005 (10.6%) was lower than the proportion in 2004 (12.8%) and 2003 (16.5%). But litter size in 2005 (2.64) was progressively higher over this period (2.55 and 2.28 respectively). Pregnant females were mainly captured from May to August; mainly juveniles were captured from August to October. Therefore capture-indices from August to November were higher than other months. Head and body length, body weight and sex ratio in the northern regions of Yanbaru were higher than that of southern habitat, suggesting that the most of the pioneer population dispersing into new habitats were bigger males.

The work suggests that we need to develop eradication techniques geared towards low density and trap shy mongoose populations rather than high density populations. One solution is the development of a low cost mongoose proof fence in the southern boundary of the Yanbaru to prevent re-invasion once areas have been trapped. A new metal fence consisting of 1200 mm metal mesh with a 135-degree plastic/fiberglass mesh has been tested and erected. In captive trials this fence proved to be 90% effective against mongoose incursion, with the design of the outrigger being most important in this. In addition, we have been training mongoose search-dogs and mongoose proof grating for roads crossing the Yanbaru, poison baits for mongoose and a suite of methods aimed at gaining a greater understanding of the mongoose population in the region. This research was supported by Environmental Technology Development Fund from Ministry of the Environment.

SPECIES IDENTIFICATION USING A SIMPLE SSCP ANALYSIS OF A NUCLEAR GENE: APPLICATION TO CARNIVORES FROM SOUTHWEST EUROPE

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Species identification is important for detecting illegal trade of wildlife species and for non-invasive monitoring of elusive and/or rare species in the wild. Most existing molecular testes are based in mitochondrial DNA. However, these tests often can identify only a limited number of species and cannot always detect hybrids. Here, we present a simple, rapid and inexpensive test requiring a single PCR and SSCP gel electrophoresis (single-strand conformational polymorphism) of a nuclear gene (IRBP) exon of 230 bp in length. The test successfully differentiated all 16 carnivore species (canids, felids, mustelids, viverids, herpestids) from southwest Europe. Sequencing and SSCP profiles were consistent in identifying 167 individuals from all species. This methodology also works on DNA from faeces and hairs, making it a useful tool for non-invasive molecular studies in carnivores. In addition, this approach shows great promise to facilitate forensics and enforcement of laws against illegal trade (e.g. CITES).

ASSESSING BROWN BEAR HABITAT SUITABILITY IN PUTNA-VRANCEA NATURAL PARK

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"Putna-Vrancea" Natural Park is situated in the western mountainous part of Vrancea County (Vrancea Mountains). This is the second area in Romania regarding brown bear (*Ursus arctos*) density and hosts approximately 6.5% of this species population. Using a number of 354 locations (obtained with the help of VHF and GPS radiotelemetry, during a LIFE NATURE project, LIFE 02/NAT/RO/8576 - "In-situ conservation of large carnivores in Vrancea County") along with topographic and Corine Land Cover vegetation data, we applied a model for assessing habitat's suitability for brown bear in the park area. A grid system, numbering 1671 cells, was superimposed over our study area; each cell was 25 ha (500x500 m) in size. We use the locations to classify the cells either as "suitable" (1 - suitable/presence) or "unsuitable" (0 - unsuitable/absence). For each suitable cell (121 – 7.2%), 19 variables were measured; for comparison, an equally number of unsuitable cells was randomly selected where we measured the same 19 variables, too. A logistic regression analysis was then applied to see which of these variables influence the presence/absence of the brown bear. The resulted model can be used for accurate identification of suitable brown bear habitats, enlarging the system of protected areas and adding the brown bear management plan in "Putna-Vrancea" Natural Park and Vrancea County.

NEW DATA ON C*YNOTHERIUM SARDOUS* STUDIATI 1857 (MAMMALIA, CARNIVORA) FROM THE PLEISTOCENE OF SARDINIA (ITALY)

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Cynotherium sardous Studiati, 1857, the best-known species from the Middle and Late Pleistocene of Sardinia and Corsica, is a medium-sized canid with a peculiar dentition, a depressed, elongated skull and short limb bones. The richest sample comes from the post Tyrrhenian deposits cropping out at Dragonara Cave (Alghero). Some interesting remains, including a smaller skull, have been found in the late Glacial deposits of Corbeddu Cave (Nuoro), some others, exceeding the dimensional variability range of the Dragonara sample, have been recorded at Capo Figari (Olbia) and Monte Tuttavista (Orosei). Although the Sardinian canid is currently considered linked to Villafranchian dogs (such as *Canis etruscus*, *Canis arnensis*, *Lycaon falconeri*), phyletic relationships with Plio-Pleistocene continental representatives of the Canidae family have not yet been established. The peculiar features shown by *Cynotherium*'s skull and dentition make the identification of its continental ancestor questionable. A possible affinity with hypercarnivorous canids such as *Lycaon*/*Xenocyon* was already suggested by some authors, though a possible origin from *C. arnensis* or *Canis mosbachensis* cannot be excluded. Actually, to recognize whether the peculiar cranial morphology is due to allometric factors linked reduction in size or to morphofunctional modifications related to a new feeding behaviour is not a simple task. To contribute to the debate, cranial, dental and endocranial anatomy, insertion area of the main muscles involved in the mastication process, muscle forces resultant of the masticatory muscles, bite force, lower molar grinding area, structure of tooth enamel (Hunter Schreger Band, HBS) and microscopic defects (microwears) produced during mastication of *Cynotherium sardous* from Dragonara cave have been analysed. Results obtained underline the hypocarnivorous features of skull, the absence of a marked paedomorphosis (due to the proportion between brain volume and body size) whereas enamel structure and microwear enable us to hypothesize that *C. sardous* fed on the large ochotonid *Prolagus*, and possibly on young *Praemegaceros cazioti* calves, as well as, occasionally on invertebrate or vegetable. The actual phylogenetic significance of the presence of both "hypercarnivorous" dental (trenchant heel on the lower carnassial) and hypocarnivorous (cranial) features has been further discussed.

AN EFFECT OF SOCIAL CONTACTS ON THE HORMONAL STATUS OF INDIVIDUALS IN MALES OF FAR-EAST WILDCATS (*PRIONAILURUS BENGALENSIS EUPTILURA*)

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The wildcat of Russian Far East is a rare subspecies of a Bengal cat which lives in severe environmental conditions. It is an extremely secretive animal and to observe social interactions and to estimate their effect is very difficult. The severe social contacts in theory may affect as negative environmental factor increasing the level of gluckocorticoids and to arise stress reaction in animals. Measuring the metabolites of gluckocorticoids in faeces we may obtain some additional information on the effect of partner relations. The aim of this study was to describe social relations of adult males of this wildcats and their hormonal response to such contacts. The study was conducted in captivity at the experimental station "Tchernogolovka". Sexually matured males were divided to yearlings (Y) and adults (A). All contacts were video-recorded and video was analyzed using data continuous recording method. The experiments were conducted in autumn when the reproductive activity of this cats is close to zero. Playful contacts registered mainly for Y (siblings). The frequency of social interactions was lower when they were paired with A males and differed significantly (Pearson Chi-square: N1=94, N2=72; $P<0.05$). Identifying contacts and non-contact aggression (like demonstrations) predominated in these pairs. When A animals were combined in one enclosure we observed an extremely low frequency of social contacts. The ratio of different contacts to the partner was significantly different from these with the Y males Pearson Chi-square: N1=22, N2=72; $P<0.001$). Animals tried to avoid the contacts with the partners. Feces glucocorticoids level increased in A males both after the contacts with A and Y males (Wilcoxon-test: N=6, $P<0.05$), but in younger males it increased only after the pairing with the A males (Wilcoxon-test: N=5; $P<0.05$). Finally, in these wildcat males relation may increase the level of glucocorticoids in faeces. Meeting of former siblings in young animals did not result to the stress-response. This study was supported by DAAD and RFBR 07-04-00899.

RED SWAMP CRAWFISH AND PUMPKINSEED SUNFISH AS IMPORTANT PREY ITEMS IN THE OTTER DIET IN A PORTUGUESE WETLAND

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The otter *Lutra lutra* (Carnivora: Mustelidae), presents wide and abundant distribution in Portugal, making this country a major stronghold for its conservation. Presently, this mustelid is classified as least concern in the Portuguese Vertebrate Red Data Book. Otters generally include a higher amount of the most abundant species in their diets, rather than scarce species. This ability to change diet according to prey availability is very important given the introduction of non-native prey species into natural ecosystems. Therefore, in this study we proceeded to the spatial and temporal evaluation of otter feeding ecology in a Portuguese Nature Reserve (Reserva Natural do Paúl de Arzila - RNPA) comparing its diet before and after the introduction of the red swamp crawfish (*Procambarus clarkii*) and pumpkinseed sunfish (*Lepomis gibbosus*). Spraints were collected weekly during 13 months (December of 2003 to December of 2004), preserved and analysed afterwards. The identification and quantification of food items, provided the following data regarding prey Frequency of Occurrence (FO): crustaceans 92%, fish 40% and 1% of amphibians, small mammals and Passeriformes. Principal Component Analysis (PCA) suggested otter preference for fish, particularly, the European eel (*Anguilla anguilla*) and the pumpkinseed sunfish (*Lepomis gibbosus*), the two most representative species with 7% and 6% of FO, respectively. Consumption of crayfish and fish do not significantly change throughout the year. However, when fish species are considered separately, seasonal differences in consumption rate are significant ($P<0.05$). These results demonstrate that the two introduced species (one crustacean and one bony fish) became the most important prey items in the otter diet. In fact they are both very abundant in this wetland practising a negative impact on the presence of the amphibians and other native species, such as, the three-spine stickleback (*Gasterosteus gymnurus*), an endangered species in Portugal. The strong presence of the non-native species leads to a remarkable decrease of native species as shown by data from the comparison of otter diet before and after the exotic species introduction, corroborating other ongoing studies.
This information can be used as basis to the management plan of the otter population in the RNPA, the Portuguese protected area with more attributed international conservation statutes.

SELECTION AND CHARACTERISTIC OF RESTING AND KILL SITES BY EURASIAN LYNX (*LYNX LYNX*) IN BIALOWIEZA PRIMEVAL FOREST, POLAND

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The lynx is a protected species in Poland, however, its passive protection have not brought satisfactory effects. The range of lynx has decreased in NE Poland during recent 20 years. As the lynx biology is strictly related to the forest habitat we attempted at describing the habitat selectivity of this species and determining, which parameters of the environment are crucial for their basic biological functions - hunting and resting. For that we analyzed data on habitat characteristics in hunting and resting sites of lynx in Bialowieza Primeval Forest obtained during telemetry research. In total 98 hunting and 80 resting sites of 3 male and 3 female lynx were found and compared with 81 random sites. The presence of high number of structures suitable for stalking (uprooted trees, fallen logs, bushes) was particularly important for hunting. In the winter, low visibility and high undergrowth played a significant role too. Small forest glades were also selected by lynx for their function as foraging sites of herbivores and good stalking opportunities. The actual killing sites had higher visibility than the sites where the prey was hidden. The lynx resting sites had lower visibility and denser undergrowth and tree stands than random sites. Young thickets were chosen by lynx more often than at random. The results show the detailed habitat characteristics that ensure the effectiveness of hunting and the safety when resting for the lynx. We propose some active conservation measures for the lynx in Poland corresponding to their biological requirements through relevant restructuring of the forest habitat. Such attempts are particularly urgent in the forests with simplified structure that occur in the potential range of the lynx in Poland. The restructuring of the forests in accordance with lynx requirements may contribute to increasing their numbers as well as to expand the range of the species.

HABITAT SELECTION OF THE EURASIAN BADGER (*MELES MELES*) IN AN AGRICULTURAL AREA OF NORTHERN ITALY

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A low-density badger (*Meles meles*) population was studied by radiotelemetry from June 2000 to December 2003, with the aim of evaluating habitat selection. The study area is included in the River Po Park (northern Italy, about 45°N, 8°30'E) and covers about 10 km2 of the left riverside of the River Po. About 80% of the whole territory is a cultivated land where rice (38%), maize (22%) and poplars (16%) prevail. About 200 ha forms a natural reserve (Natural Reserve "Garzaia di Valenza") with marshes and some oxbow lakes and reservoirs bordered by willows, poplars, alder and oak. Small villages and rural farms are scattered throughout the study area. In the study area badger sett mean density is 0.21 setts/km2 (min-max = 0.17-0.26). Wooded slopes of alluvial terraces or artificial embankments covered with black locust and elder scrubs are strongly preferred by badgers for digging their setts.

Three adult badgers (two females and one male), belonging to the same social group, were captured, marked with a radio-collar, released at the site of capture and radio tracked for 8-12 months. Marked females did not show any evidence of reproductive activity. The independent nocturnal fixes of badgers (F1:124, F2:133, M1:100) were assigned to the habitat type in which they occurred. Six habitats were considered: woods, including riparian woodlands and scrublands, poplar plantations, maize-fields, rice-fields, urban areas and "others", which grouped some habitats scarcely represented in the study area such as pastures, orchards, wheat-fields or riverbanks. The χ^2 test and the Bonferroni confidence intervals for the proportion of use were used to compare the proportion of use of each habitat type to the expected frequencies, calculated by referring the number of fixes of each badger to the percent cover of each habitat type in the badger home range (M.C.P. with 100% of fixes).

The use of the different habitat types significantly differed from their relative availability (F1: χ^2=371, P<0.001; F2: χ^2=133, P<0.001; M1: χ^2=391, P<0.001): during their night activity all badgers selected woods and avoided cultivated fields, particularly rice fields. The selection for woods, recorded in many other European areas either with high-density or low-density of badgers, is probably related to the need for cover and protection at sett-sites and to the higher abundance of earthworms in the woods with respect to maize and rice fields of our study area.

STUDY OF THE REPRODUCTIVE BEHAVIOUR IN EUROPEAN PINE MARTEN USING FAECAL SEXUAL HORMONES AND FAECAL MARKS

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The aim of this study was to quantify sexual steroid hormone levels in a wild population of European pine marten (*Martes martes*) along all year and to correlate its variations with the reproductive and faecal marking behaviour. The sexual steroid hormone levels were quantified using a non-invasive faecal samples analysis. The study was conducted in a protected area of Northwest Spain. A total of 76 faecal samples were collected from August 2005 to June 2006. Enzyme immunoassay validated for this species was used for quantifying sexual steroid hormone concentrations (androgens, progestins and oestrogens). Results showed that faecal sexual hormone levels varied seasonally. The highest faecal concentrations of Testosterone, Progesterone and Estrone Sulphate were obtained in spring, whereas Estradiol mean level was higher in summer. The lowest Estradiol and Estrone Sulphate concentrations were obtained in winter, whereas Testosterone and Progesterone mean levels were lower in autumn and summer respectively. The highest sexual hormone levels were obtained in spring and summer, during the pregnant and oestrous periods of the species. The faecal marking frequency was higher in spring and its annual variation was correlated with the seasonal mean concentrations of Estrone Sulphate, Estradiol and Testosterone. The quantification of faecal sexual hormones could be a suitable non-invasive method for monitoring reproductive behaviour and status of European pine marten wild populations.

MONITORING THE PRESENCE AND DISTRIBUTION OF SYMPATRIC MARTEN SPECIES: PINE MARTEN (*MARTES MARTES*) AND STONE MARTEN (*MARTES FOINA*) BY THE USE OF NON-INVASIVE GENETIC SAMPLING

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The closely related mustelids European pine marten (*Martes martes*) and stone marten (*Martes foina*) sympatrically inhabit a large area of Europe. However, given our limited knowledge of their bioecological relationships, their extremely elusive behaviour and the fact that their faeces, or scats, cannot be distinguished on the basis of morphology alone, it is very difficult to identify and monitor existing populations of these species. Here we describe a reliable non-invasive PCR-RFLP method for distinguishing between *Martes martes* and *Martes foina* based on the analysis of DNA extracted from faeces samples. The method was specifically designed to avoid possible interference from potential prey mammals or other carnivores since the risk of misidentifying scats in field surveys is relatively high. The procedure consists of PCR amplifying a mitochondrial D-loop region followed by digesting the resulting 276 bp amplicons with the restriction enzymes HaeIII and RsaI. The combined restriction patterns rendered by these two enzymes were able to detect species-specific sequence variation. To assess the efficiency of this laboratory technique on field samples, we conducted a preliminary field study across the potential sympatric distribution areas of both marten species in the northern Iberian Peninsula. Out of 359 faeces samples collected, we effectively identified 80 as specimens from the stone marten and 235 from the pine marten. Unequivocal species identification was thus possible in 88% of the faeces samples collected. These findings reveal the combined use of non-invasive genetic sampling and GIS technology to be a reliable, efficient, timely and cost-effective procedure for improving our knowledge of the spatial distributions of sympatric marten species. This protocol could be used to assess the effects of human activities on distribution changes, identify and improve information gaps and develop effective research and management programmes for these mustelids.

RISK INDUCED BY A NATIVE TOP PREDATOR REDUCES ALIEN MINK MOVEMENTS IN THE FINNISH ARCHIPELAGO

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The nonlethal consequences of intraguild predation become especially important if invasive, and potentially destructive alien predators would constitute an intra-guild prey. We studied the predation risk impacts of a native top-predator, the white-tailed sea eagle (*Haliaeetus albicilla*), on the movements of the American mink (*Mustela vison*), an alien mustelid predator. American mink have invaded northern and western Europe, including archipelagos, during the recent decades. This invasion may have been aided by the low population densities of sea eagles which are now rapidly returning to breed in the archipelagos of the Baltic Sea.

We radio-collared 18 mink (13 females and 5 males) in two study areas in the outer archipelago of SW Finland in 2004 and 2005. Observed swimming distances were compared to distances expected at random, and deviations from random swimming were explained by mink distance from eagle nest, abundance estimates of eagles near mink location, and mink home range characteristics. We found that mink reduced their swimming distances with increasing abundance estimates of eagles. When the abundance estimate of eagles in a home range triples, mink swimming distances are reduced by 20%. Mink seem to modify their behaviour according to eagle predation risk. This may reduce mink population growth and have long-term cascading effects on lower trophic levels including bird, mammal and amphibian populations in the archipelago.

THE ENERGY COSTS OF HUNTING IN A SUPER-PREDATOR, THE CHEETAH *ACINONYX JUBATUS*

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The Cheetah is the world's fastest land mammal. Though this predator was formerly widespread over much of non-forested Africa, the Middle East and southern Asia, their distributional range is now much reduced and they are currently considered globally vulnerable.

High-speed hunting enables Cheetahs to potentially utilise a wide variety of prey. Yet they appear to be highly selective towards prey species. This can be for three main reasons. First, they are presumed to have high energetic demands to fuel their large bodies and high-speed hunting techniques and therefore need to choose 'energetically worthwhile' prey that has a potentially favourable (successful) outcome. Second, prey should pose little risk of injury so as to not negatively influence inherently costly future hunting events. Third, because they have evolved for speed and not strength, Cheetahs are inferior competitors to other large carnivores and thus highly susceptible to kleptoparasitism. As a consequence they need to choose relatively small prey which can be consumed rapidly, before other predators arrive.

In combination, these effects suggest that Cheetahs are in effect likely to be under severe energetic constraints. While many studies consider the food and prey requirements of Cheetahs, no study has yet quantified the energetic constraints associated with hunting and competition in this super-predator. Here we present preliminary data on daily energy expenditure of free-living cheetah. We combine these with observations of Cheetah movement patterns and ranging behaviour. The information will also be used to predict how Cheetahs interact with other predators and prey. Our results contribute to knowledge on how the needs of Cheetahs can be best met for maintaining viable populations

THE MATING SYSTEM OF THE EUROPEAN BADGER: A NON-INVASIVE GENETIC ANALYSIS

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Throughout its geographic range, the European badger (*Meles meles*) displays a high plasticity in its social organisation, with social group sizes ranging from 2 up to 32 individuals. This plasticity is thought to be reflected in its mating system in which a reproductive dominant breeding pair forms the basic unit, and the suppression of reproduction of additional subordinates diminishes with increasing group size. Although assessing the mating system of badgers is challenging for several reasons, the biggest problem is to obtain DNA from a high proportion of the group members, consequently limiting the number of studies able to address this question. Therefore, we developed a new trapping technique to remotely pluck hair samples suitable for DNA-extraction and reliable genotyping. We applied this non-invasive DNA sampling to a number of social groups in a low- and medium density population in Belgium and Luxembourg respectively, in order to assess the badgers mating system. The results suggests that despite the difference in population density, the social organisation is quite comparable. Extra-group mating and multiple breeding females in a single group were observed at both study sites. In addition, each population was characterised by limited dispersal and a large variation in group size. As the mating system of these low- and medium-density populations is comparable to that observed in a high-density population in the UK, we believe the badgers mating system to be density-independent.

PRELIMINARY RESULTS OF A FIELD STUDY ON *MUSTELA NIVALIS* AND *MUSTELA ERMINEA*: SPACE AND HABITAT USE

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Small predators like least weasels and stoats are substantial elements of natural landscapes in Western Europe. Specialized in preying on small rodents, particularly the least weasel functions as natural pest control in agricultural landscapes.
During a post-doc study in eastern Luxemburg, which is being conducted from March 2006 to February 2008, least weasels and stoats were live-trapped and tagged. We could show that especially least weasels enlarged the size of their home ranges when density of prey was low. In addition to this, site fidelity decreased and animals became transient. In this study least weasels made use of areas of more than 50 ha in size.
Population density and home ranges of weasels are not only influenced by the density of prey but also by habitat structure. As "habitat generalists" they are able to populate almost every kind of habitat as long as richness in habitat structure exists and availability of prey is given. Weasels particularly make use of linear structures like overgrown ditches, fences, marginal strips or grassy borders in order to travel safely and to search for prey.

MEASUREMENT THE HORIZONTAL JUMP DISTANCES OF THE MONGOOSE

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A mongoose (*Herpestes javanicus*) proof fence was constructed on the southern boundary of the highly diverse Yanbaru forest in Northern Okinawa as part of an ongoing predator management project. However, the integrity of the fence is compromised at points where bridges and roads cross the fence line. At the same time, grating needs to be designed so that access by vehicles is not compromised. Thus we have been developing a mongoose proof grating on road surfaces that cross the fence line to prevent the mongoose immigration into the Yanbaru forest. The study is divided into three main sections as follows:

Experiment 1: Measurement of the horizontal jumping ability of the mongoose: Five male and five female captive mongooses were used in this experiment. An experimental cage (2 m width, 4.5 m long) with a central pond of adjustable width was set up. The pond (2 m width, 1-2 m long and 0.3 m depth) divided the cage. The mongoose was released into one side of the cage, and food was placed in the other half. The distance mongooses would jump length wise to reach food was measured and behaviour was monitored through a CCTV system. The longest jump distance was 1.50 m in male and 1.25 m in female. Mongooses didn't try to jump when distances exceeded this. This suggested that the width of the grating and the distance between bars needed to be greater than this distance in order to prevent mongooses jumping across.

Experiment 2: Decision of grid size of the grating: The mongooses from experiment 1 were used in experiment 2 which looked at the ability of mongooses to walk across grating systems. Two kinds of commercial gratings (W: 10 mm and L: 40 mm, W: 20 mm and L: 30 mm) and four kinds of wire mesh (W: 30 mm and L: 90 mm, W: 90 mm and L: 30 mm, 50 mm square, W: 40 mm and L: 100 mm) were tested. These materials were set in the middle of the cage used in experiment- 1. Mongooses were released into one side of the cage, and animals had to cross grating made of the different materials described above in order to reach a food source on the other side. Mongooses were able to walk on all grating designs and wire mesh.

The results of these experiments and the implications for the design of mongoose proof grating systems on roads have been discussed. This research and development were partially supported by Environmental Technology Development Fund from Ministry of the Environment.

ECOMORPHOLOGY OF TWO CARNIVORE COMMUNITIES OF MEDITERRANEAN REGION

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Ecomorphology deals with the covariation of morphology and ecology; its primarily concerned with analyses of the adaptiveness of morphological features and all dependent, correlated topics such as the comparisons of adaptations in different organism, modifications of adaptive features due to competition and other causes, structure of ecological communities and diversity within taxa. Differences in external morphology among species can reliably predict differences in feeding habits and foraging behaviour. That this is true is the premise of ecomorphological analyses of carnivore communities.
The study sample consists of all the members of the two carnivore guilds (Italian Peninsula and Iberian Peninsula), as well as species or populations (n = 14) whose geographic ranges are outside these communities. Excluded is L*utra lutra* for is trophic habits and locomotor adaptations. Nineteen measurements were taken on 439 skulls of each species and three measurements of 126 femurs of teen species. Fourteen morphometric ratios are derived (eleven for skull and three for femur) that reflect aspects of prey killing behaviour, diet and locomotor adaptations. Dietary, habitat use and activity patterns are derived from literature. Carnivore species were divided into three dietary classes: vertebrate, vertebrate/nonvertebrate (invertebrate and plant material), nonvertebrate.
The results of the multivariate analyses (DA, PCA, MS) suggest that differences among predators in diet content are best indicated by dental indices; all two guilds include carnivores from several diet category in the some proportions. A significant association exists between carnivore thigh-bone length and method of prey pursuit/capture. A direct relationship between carnivore body weight and prey size is observed in two community (Italian Peninsula $r = 0.967$; $P < 0.01$; $N = 8$ Iberian Peninsula $r = 0.964$; $P < 0.01$; $N = 12$). We find that the number of prey size classes in the diet increases with body weight ($r = 0.872$; $P < 0.01$; $N = 9$). Differences in the average weights of mammalian prey corroborating the hypothesis that differing prey weight distribution can facilitate separation between sympatric predator (prey-body size predator hypothesis). Partial data from radio-telemetry studies and field observation suggested that ecological separation among two carnivore communities was not necessarily limited to the food resource dimension; ecological separation was further facilitated by some segregation along the spatial (habitat) and temporal (activity) niche dimension.

THE LEOPARD CAT (*PRIONAILURUS BENGALENSIS EUPTILURA*) AND PALLAS CAT (*OTOCOLOBUS MANUL*) RESEARCH AND CONSERVATION PROJECTS IN RUSSIA

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The Far Eastern forest cat, the northern-most subspecies of leopard cat, *Prionailurus bengalensis euptilura*, has never been studied in Russia. Due to lack of any scientifically based information the species has been excluded from new revised Russian Red Data Book. Meanwhile the cat population is threatened by regional rapid economic development, forest conversion, repeated fires and direct human-cat conflicts. We have started the forest cat project the main goals of which are to get scientifically-based estimation of the leopard cat population size within its Russian geographic range; to assess the species general biology, ecology and habitat preferences; to evaluate health status and to estimate genetic diversity within the population. Based on the obtained information conservation measures for the species will be further proposed for the appropriate protection agencies. During the first trapping season in fall 2006 two forest cats were caught and radio collared; another trapping season in underway. The project is important not only for the cat conservation but also for understanding carnivore relationships and epidemiological situation within the remaining habitat area of the critically endangered Far Eastern leopard.

The similar ecological and conservation project on Pallas' cat (*Otocolobus manul*), the endangered wild cat of Central Asia, has been started in the Daursky nature reserve, Chinitnsky region, Russia. Two individuals were radio-collared in 2006 and currently send signals about their personal life. Another from two to four individuals will get radio collars in spring 2007. The cat blood will be collected and investigated to assess Pallas' cat health and genetic status as well as to clarify presence of toxoplasmosis in Russian wild population; it is known that toxoplasmosis causes reproductive problems in Pallas' cat; world zoo population.

RELATIVE INDIVIDUAL CONTRIBUTION TO POPULATION GROWTH IN TWO BROWN BEAR POPULATIONS IN SWEDEN

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Individual performances may have a large impact on population dynamics and on adaptation. We studied the individual performances in two different brown bear populations in Sweden. These two populations have different characteristics according to environment, life history strategies, and human pressure. The southern population is legally harvested, has a high density, and occupies an area with moderate human pressure. The northern population experiences lower harvest, has a low density, and occupies an area with lower human pressure. These two populations have been monitored for 20 years, and the pedigrees are known for a large proportion of the individuals. For this reason, this is a unique case for the analysis of individual contributions to population growth in carnivores. Temporal trends of individual contributions in each population are analysed, with the goal of understanding how it has been influenced by environment and human pressure changes over the years. These trends seem to be influenced by the contribution of dominant males in the northern population and by an increase in harvesting pressure in the southern population. Females, on average, are better contributors than males for both populations in almost every year. The individuals in both populations start to contribute positively to population growth at the age of four years, but in the northern population individual's senescence starts earlier.

INTRA GUILD DYNAMICS OF LARGE CARNIVORES - THE RETURN OF THE WOLF TO SOUTHERN NORWAY AND ITS CONSEQUENCES FOR WOLVERINES

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Among carnivores, complex systems of interactions, such as intra-guild competition as well as co-existence exist. For example, in the northern large carnivore community, wolverine has evolved as a generalist predator and a facultative scavenger utilising remains left by other, more efficient predators such as the wolf *Canis lupus* and lynx *Lynx lynx.* Following the re-colonisation of the wolf to the boreal forests in eastern parts of South-central Norway during the 1990's, the wolverine extended its distribution eastwards into these wolf areas. Using 459 scats samples (DNA tested for species and individual identification) collected during winter-spring 2001-2004 for dietary content analysis, we tested the hypothesis that wolverine diet shifted towards larger prey (moose) in the presence of wolves, by comparing diet inside and outside wolf territories while controlling for potential confounding factors (e.g., prey density). As predicted, wolverine diet contained more moose and less small prey (i.e., hare *Lepus timidus*, bird species and rodent species) in the presence of wolves. The main food item for wolverines living in tundra habitat was reindeer *Rangifer tarandus* (40.2%), before moose (38.6%) and rodents (9.4%). In forest habitat with wolf, the wolverine diet shifted to 76.3% moose and only 18.4% reindeer, and 5.3% rodents. This switch could not be explained by higher moose density in wolf territories. Furthermore, analysis of GPS- and VHF-tracking data revealed that sympatry of the wolverine with the three forest-dwelling large carnivore species, the wolf, lynx, and brown bear *Ursus arctos*, appears to depend on the availability of mountain ranges as a spatial refuge as well as the presence of wolves to provide scavenging opportunities. Whereas the presence of brown bears, wolves and lynx was generally associated with rugged, forested areas at lower elevations, did wolverines select open, rugged terrain at higher elevations. Although the wolverine is often perceived as a carnivore of remote alpine regions, the re-colonisation of the wolf seems to have contributed to the establishment of wolverines into this boreal ecosystem.

SPATIAL DISTRIBUTION OF BROWN BEAR AND ASIATIC BLACK BEAR AS A RESULT OF LONG-TERM INVESTIGATIONS

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The monitoring program on brown bear (*Ursus arctos*) and Asiatic black bear (*Selenarctos thibetanus*) are conducted in the Lazovsky Reserve (43° 05'; N, 134° 55'; E) since 1964. Both species are common on this area of the South Sikhote-Alin Mountains but thr brown bear has a lower density. A total area of the Reserve's territory is 121 000 ha. Broadleaved and mixed coniferous-deciduous forests cover 96% of this area. The highest peak within the Lazovsky Reserve is 1,379 m a.s.l. Collected information about visual sighting and tracks during 47 years was transferred into database (Asiatic black bear: 1481 records; brown bear: 101 records). The coordinates of each observation was mapped by Arc GIS. The main goal of our study was the analysis of range structure of both bear species. The maps of spatial bear distribution for each decade were created. It was defined that distribution of the Asiatic black bear are strips along the river valleys and sea coast. Dens of this species are placed into hollow trees and caves under rocks. Such suitable trees are only in the valleys. Asiatic black bear was widely distributed throughout the Reserve's territory and was registered more often in broadleaved and pine-broadleaved forests. It occupies habitats on lower elevations than brown bear and 60% of visual sightings were in the valleys. Strip structure of Asiatic black bear distribution is correlated mainly with denning places. Brown bear preferred western macro-slope covered coniferous forest and rarely visited broadleaved forest on the coast. Maps of bear distributions demonstrate the habitat and spatial differences of ecological niches between the Asiatic black bear and the brown bear in the South Sikhote-Alin Mountains. Long-term information is very important for conservation planning for bears.

DEVELOPMENT OF MONGOOSE SEARCHING DOG FOR COMPLETE MONGOOSE ERADICATION IN YANBARU FOREST REGION ON OKINAWA ISLAND, SW JAPAN

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A mongoose eradication project has been conducted in the Yanbaru forest region in the northern part of Okinawa island since 2005. The density of invasive mongooses in the Yanbaru is lower as a result, but mongooses are still spreading into the northern part of Yanbaru. Using conventional techniques such as trapping and poisoning alone, the species cannot be completely eradicated due to the size and topological complexity of the region. In order to apply control techniques effectively in the right habitat types over large areas, dogs are used to seek out mongooses. Dogs have a well-developed sense of smell and respond to the presence and absence of mongooses, which communicate through scent marking. They have already been used successfully in stoat control programmes in New Zealand.
The first dog trained is a two-year old a mongrel bitch and a five-month old female German shepherd in the autumn of 2006. Professional dog trainers train both dogs and a handler. General steps of training are basic training, obedience-training and advanced scent training. During basic training; dogs become accustomed to new environments and handlers. Obedience training allows the handler to gain a dog's confidence. The final stage of training is directly geared to searching for mongooses. Initial studies show that the mongrel successfully found 100% of the hidden mongooses (live mongooses in cage traps) hidden in rubble and vegetation. The German Shephard is still undergoing training. This research and development were partially supported by Environmental Technology Development Fund from Ministry of the Environment.

IS THE BROWN BEAR REALLY A NON-SOCIAL, NON-TERRITORIAL SPECIES?

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Brown bears are generally considered to be a non-social species that does not defend territories. A long-term study with radio-collared and shot individuals in Scandinavia revealed that the spatial distribution of brown bears was determined by population density and relatedness among adjacent individuals. Natal dispersal and home range size were inversely density dependent, suggesting a form of territorial behaviour. The amount of home-range overlap among adult females was determined by relatedness, and most related females formed matrilinear assemblages from which unrelated females were excluded. Almost all males and 40% of the females dispersed from their natal area.. Among subadult females we found evidence for competition for philopatry, because the larger individual of female siblings had a lower probability for natal dispersal. Female philopatry seemed to entail reproductive suppression, because age of primiparity was higher in philopatric than dispersing females. This was possibly due to behavioural reproductive suppression by the mother and/or other related females. The competition for philopatry among female siblings suggests an evolutionary advantage of not dispersing, however in this study dispersing females reproduced earlier. The initial advantage of philopatry may be upset by human impact, because after former extirpation efforts the population is now again growing and expanding into former habitat, thereby offering space for dispersing females to settle, which may not be as readily available in stable populations.