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Symposium: Conserving Large Carnivores in European Landscapes: the challenge and opportunity of coexistence

**Abstracts from all oral presentations – plus for the opening and closing remarks
by John Linnell and Luigi Boitani**

Opening remarks

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

LINNELL , JOHN D. C.

Norwegian Institute for Nature Research, Tungasletta-2, N-7485 Trondheim, Norway
(john.linnell@nina.no)

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

WOLVERINES: THE FORGOTTEN CARNIVORE OF NORTHERN EUROPE

MAY, ROEL, VAN DIJK, JISKA & LANDA, ARILD.

Norwegian Institute for Nature Research (roel.may@nina.no)

IS HUNTING LARGE CARNIVORES COMPATIBLE WITH THEIR CONSERVATION?

LINNELL , JOHN D. C & ODDEN, JOHN

Norwegian Institute for Nature Research, Tungasletta-2, N-7485 Trondheim, Norway
(john.linnell@nina.no)

The lethal control and hunting of large carnivores is highly controversial in Europe today. On one hand it is advocated as a way of reducing conflicts and empowering local people, as well as being regarded as a source of income due to the sale of

trophies and the continuation of a long time tradition. Opponents on the other hand claim that it is not sustainable or compatible with their conservation. We examine a number of case studies from Europe – the case of lynx hunting in Norway, bear hunting in Croatia and Sweden, and wolf hunting in Latvia. Our results indicate that carnivore hunting can be compatible with maintaining or increasing population density, and that it can probably reduce, or at least limit, some conflicts. However, it is also clear that unregulated, or excessive hunting can rapidly reduce population size. There is also some concern about more indirect effects of harvest on population structure, demographics and life history traits that are worthy of greater attention.

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

FALCUCCI, ALESSANDRA, LUIGI MAIORANO, LUIGI BOITANI

Addresses: Department of Animal and Human Biology, University of Rome "La Sapienza", viale dell'Università 32, 00185 Rome, Italy (a.falcucci@ieaitaly.org);

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

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

MERTZANIS , YORGOS & CONSTANTINOS GODES

NGO "Callisto", 5. Nik. Foka st., GR- 54621 Thessaloniki – Greece.
(mertzanis@callisto.gr)

Abstract:

The SE Balkan region remains the only region of Southern Europe where brown bear and wolf populations still maintain a continuous distribution range, extending over a

large area shared by as many as eight different contiguous countries. Maintaining transboundary connectivity between shared populations of the two species is among the key issues for a long term overall conservation policy in this region. From the legal aspect, although “umbrella” systems, such as the Bern Convention and the EU directives, allow a generalized approach, the to develop common management strategies and practices which would take into account local conditions is a growing challenge.

Over the Dinaric – Pindos bear and wolf ranges, this challenge becomes a necessity given the mosaic of the existing differences in; current status (ranging from protection to harvest) and practices, priorities set by national policies, social & cultural values regarding wildlife and conservation issues, socio-economic context, accessibility to funding tools, existing methodologies and scientific capacity levels, bureaucratic procedures and political will. Until now, several steps to meet local conditions under the overall objective have been made, with the establishment of a Balkan network of cooperation and the refinement of the CoE Action Plans as milestones.

Regarding EU policy, special emphasis should be given on conflicting funding tools which compromise biodiversity and therefore bear and wolf survival in cases such as the construction/extension of transport networks related to habitat fragmentation. This situation is illustrated by the case of the Egnatia highway in the Pindos mountain range (Greece).

IN SITU AND EX SITU APPROACHES TO IBERIAN LYNX RECOVERY

VARGAS , ASTRID¹, MIGUEL ANGEL SIMÓN², MIGUEL AYMERICH³,
RAFAEL CADENAS², MIGUEL DELIBES⁴, JAVIER CALZADA⁵ AND URS
BREITENMOSER⁶

¹ Centro de Cría de Lince Ibérico El Acebuche, Parque Nacional de Doñana, Matalascañas, 21760 Huelva, Spain. (centrolinceav@oapn.mma.es)

² Consejería de Medio Ambiente, Junta de Andalucía Proyecto LIFE, Fuente del Serbo 3, Jaén 23071, Spain

³ Dirección General para la Biodiversidad, Ministerio de Medio Ambiente, Gran Vía de San Francisco 4, 28005 Madrid, Spain³

⁴ Estación Biológica de Doñana, Avda. de Maria Luisa s/n, Pabellón del Perú, 41071 Sevilla, Spain

⁵ Universidad de Huelva, Dpt. de Biología Ambiental, Grupo Lince SECHEM, 89894 Huelva, Spain

⁶ IUCN Cat Specialist Group, Institute of Veterinary Virology, University of Bern, Laenggassstrasse 122, CH-3012 Bern, Switzerland

The Iberian lynx (*Lynx pardinus*) is the only species of wild cat considered to be critically endangered according to IUCN criteria. The wild populations have declined at an alarming rate during the past century, mostly due to human encroachment and the introduction of two viral diseases that affect wild rabbits – the lynx’s main prey. By 2002, two remnant populations were known to exist, Doñana

and Sierra Morena, both located in the Spanish province of Andalusia, totalling no more than 200 individuals. Presently, a coordinated regional, national, and international crisis-management approach has helped stop the species' decline in its last two strongholds. Besides ensuring local, national, and international support for the species, these efforts, financially supported by a LIFE-Nature program, have helped stabilize the Doñana population and expand the Sierra Morena nuclei with the establishment of three new breeding territories in 2005. In addition, a formal captive-breeding program was initiated in the winter of 2003, which yielded its first results in the spring of 2005.

Current recovery goals include: (1) Maintaining and expanding the two existing populations; (2) Aiming conservation breeding efforts towards maintaining genetic diversity and providing lynx for future reintroduction programs; (3) Preparing habitat –following IUCN criteria— to host future reintroductions from captive-bred stock; (4) Preventing potential inbreeding depression by “genetically connecting” the two existing populations via translocation of selected individuals; (5) Continuing to promote local, national, and international support to ensure the recovery of this highly endangered carnivore.

Besides its value as a conservation flagship for Europe, the Iberian lynx can be considered an umbrella species whose recovery will help preserve vast areas of Mediterranean forests and scrublands. An effective recovery of the Iberian lynx will help protect a wide diversity of species that also depend on this rich and endangered Mediterranean ecosystem for survival.

POACHING OF LARGE CARNIVORES – THE SWEDISH PERSPECTIVE

KORSELL, LARS & SAMUELSON, LOTTA

¹WWF Sweden, Ulriksdals Slott, 170 81 Solna, Sweden. (lotta.samuelson@wwf.se)

²Swedish Council for Crime Prevention, Box 1386, 111 93 Stockholm Sweden

Poaching is the major cause of death for adult lynx, wolf and wolverine in Sweden. Wildlife scientists estimate that 10-25% of the annual mortality can be derived from poaching. Poaching limits the population increase in Swedish large carnivore populations, most of all for the wolf population that also suffers from severe genetic depredation. If poaching is not dealt with, it risks expanding both in proportion and range.

A pre-study made by the Swedish Council for Crime Prevention (SCCP) concludes that several motivations underly poaching. Some are economic incentives related to lifestyle, e.g. to prevent depredation on domestic animals, hunting dogs or due to competition for game species. Direct economic incentives like selling skins or trophies also exist. Some offences are clearly based on hatred. Incorrect interpretations of the legal paragraphs on how and when it is allowed to protect domestic animals represent a small proportion of the total. The largest threat to large carnivores is the crimes conducted in silence, often without any other indicators than a lost research animal – a silenced radio transmitter. The police work that follows is difficult, as there is no crime screen, no witnesses and no animal body.

WWF and researchers from SCCP conclude that to stop poaching, the following measures need to be taken in Sweden:

1. Better state support of mitigation measures to prevent depredation of large carnivores on domestic animal.
2. Hunter's organisations need to work against the acceptance of poaching within hunters' societies.
3. Better co-operation between national agencies responsible for detecting and investigating poaching and prosecuting poachers.

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

BLANCO, JUAN CARLOS & YOLANDA CORTÉS

WOLF PROJECT-CBC, C/ Manuela Malasaña 24, 28004 Madrid, Spain
(jc.blanco@ya.com)

Since 1970 wolves have been increasing in Spain and expanding into areas with highly modified agricultural landscapes. From 1997 to 2005 we have radio-collared 16 wolves in a population established in an agricultural habitat where wild ungulates are almost absent. Wolf density, assessed by radio-tracking and simulated howling to detect different packs, was 2.4-3.0 wolves/100 km². Wolves expanded their range during the study period. Seventy five percent of the diet biomass, studied by the analysis of 603 scats, was made up of livestock carrion, very abundant during most of the study period. Wolves lived in packs, which averaged 9-10 individuals during the autumn but the percentage of solitary wolves was higher than in most other studies. The average home range of radio-collared wolves ranged between 150 and 200 km². Both resident and transient wolves crossed 4-lane, fenced highways using bridges built for vehicles, but were deterred by a barrier formed by the river Duero and a transport corridor. We conclude that these carrion-eating, adaptable wolves keep the same social and ecological behaviour as other wolves studied in natural and semi-natural areas of North-America and Europe.

CAN LARGE CARNIVORES PAY THEIR WAY? RURAL DEVELOPMENT AND ECOTOURISM

EDNARSON, MARCUS & PROMBERGER, CHRISTOPH
University of Karlstad, Karlstad, Sweden (marcus.ednarsson@kau.se)
507210 Sinca Noua, jud. Brasov, Romania (christoph@deltanet.ro)

Wolves or bears are species which attract the attention of many people, both in a positive and a negative way. Associations and societies for wolf or bear protection are amongst the most numerous organisations, when it comes to wildlife or animal protection and conservation. Many people think that this interest could be used to generate income through paying visitors and thus support conservation of these species. Indeed, several examples have shown that large carnivores can create

substantial income for regions where wolves or bears are present. Yellowstone National Park, for example, has observed an increase of tourism revenues due to the reintroduction of wolves, of over 20 million USD per year. Another example is provided by the Carpathian Large Carnivore Project in the Romanian Carpathian Mountains. Due to an eco-tourism programme based on wolves and bears, over 100 jobs were created within a few years in an area of high unemployment and where natural resources were coming under increasing pressure. Although these positive examples are encouraging and the use of carnivores for eco-tourism must play an increasing important part for their conservation, it cannot be the only way to support the conservation of carnivores, and in some cases carnivore tourism can be very controversial.

BEARS IN AN INDUSTRIAL FOREST: MANAGING THE EXPANDING BROWN BEAR POPULATION IN SWEDEN

ZEDROSSER, ANDREAS & SWENSON, JON E.
Department of Ecology and Natural Resources Management
Norwegian University of Life Sciences
Box 5003
NO-1432 Ås, Norway
&
Norwegian Institute for Nature Research
Tungasletta 2
NO-7485 Trondheim, Norway
jon.swenson@umb.no

The brown bear (*Ursus arctos*) was almost exterminated in Sweden. Around 1930, there may have been as few as 130 bears in four isolated populations. Effective protective measures allowed numbers to increase, and in 1943 there were about 300 bears, and a controlled hunting season was initiated. Since then the population has increased to about 2200 bears found over almost 75% of Sweden's area. This increase has occurred in spite of the fact that Sweden has one of the most intensively managed boreal forests in the world. The factors allowing the increase have been the generally positive attitude among the public towards bears, relatively low levels of depredation on domestic livestock, low human population densities in bear areas, conservative hunting quotas, and some positive aspects of the intensive industrial forest management. This management has provided excellent habitat for two important bear foods: moose (*Alces alces*) and ants (especially *Comptonotus* spp.). The bear population is now expanding into areas with higher human densities. This, in addition to the increasing numbers of other predators, notably the wolf (*Canis lupus*), is leading to increased conflicts with people. Bear predation on moose, mostly calves, seems to be offset to a large degree by the bear's value as a game animal itself. However, many people are afraid of bears, especially near houses, and the number of bear injuries seems to be increasing. In addition, the bear may be an important predator on the calves of semi-domestic reindeer (*Rangifer tarandus*) in some areas. Management has changed from conservation of a vulnerable species, to reducing

conflicts and managing the number and distribution of bears in relation to human tolerance.

DO LARGE CARNIVORES COMPETE WITH HUNTERS FOR GAME?

ANDRÉN, HENRIK, HÅKAN SAND & OLOF LIBERG

Grimso Wildlife Research Station, Department of Conservation Biology, Swedish University of Agricultural Sciences (SLU), SE-730 91 Riddarhyttan, Sweden (henrik.andren@nvb.slu.se)

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

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

MAJIĆ SKRBINŠEK, ALEKSANDRA.¹, BATH, A.J.¹ AND HUBER, D.²

¹ Memorial University of Newfoundland, St. John's, Canada (almajic@gmail.com, abath@mun.ca)

² Veterinary Faculty, University of Zagreb, Croatia (huber@vef.hr)

Wildlife managers increasingly recognize the importance of direct involvement of the public in the processes of planning and decision-making in wildlife management and conservation. However, when it comes to the actual implementation of public involvement, there are countless approaches that range from simply sharing information with the public, to the complete transfer of the decision-making power to the public. In Croatia, two different approaches from this “continuum” of public involvement were used in the processes of developing the management plans for the 3 large carnivore species (*Ursus arctos*, *Lynx lynx* and *Canis lupus*). The bear management plan was developed by a delegated group of eight experts in the fields of carnivore ecology, wildlife management, forestry and hunting. A baseline study of public attitudes toward brown bear management options was carried out in order to provide the experts with data that were recognized as essential. The method of choice

for the development of wolf and lynx management plans was joint planning where representatives of all interested governmental and nongovernmental organizations were involved. It was carried out through a series of facilitated workshops and focus group meetings. Quantitative studies of attitudes were carried out in order to check the support of the wider public for the proposed management measures. The purpose of this paper is to present and compare the two approaches in terms of their effectiveness in reaching agreement on a final management plan, and their implications to financial resources.

LESSONS FROM JJ1: THE FIRST BEAT TO ENTER AND BE KILLED IN GERMANY FOR 170 YEARS.

KACZENSKY, P, STRIEBL, BEATE & RAEUR, GORG.

GIS MODELS: A TOOL FOR LARGE CARNIVORES CONSERVATION PLANNING OR JUST GARBAGE IN AND GARBAGE OUT?

SALVATORI , VALERIA ¹ & FRIDOLIN ZIMMERMANN²

¹Institute of Applied Ecology, Via Cremona 71, IT 00161 Rome, Italy
(v.salvatori@ieaitaly.org)

²KORA, Thunstrasse 31, CH-3074 Muri, Switzerland

The applications of GIS modelling to large carnivore conservation during the last two decades are reviewed, focussing on different aspects, from technical to applied management. The published papers were categorised according to species, purpose, methodology, spatial scale, type of response variables and environmental predictors used, validation, as well as conservation and management measures driven from the modelling approach. Follow-up investigation on how measures suggested from modelling results were implemented in conservation planning was conducted in order to estimate the impact of GIS applications for the practice of management and conservation. Questions such as: what should specifically be looked at, which problems can be encountered and which pitfalls should be avoided when conducting habitat modelling analyses are furthermore discussed and solutions are proposed. Finally, a general framework on how habitat modelling can successfully be used to develop a recovery strategy for large carnivores is elaborated and illustrated by means of a few examples taken from the literature.

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

HUBER , DJURO & JOSIP KUSAK

Biology Department, Veterinary Faculty, University of Zagreb, Heinzelova 55, 10000 Zagreb, Croatia, 385-1-2390141, fax 385-1-2441390, e-mail: huber@vef.hr

New highways through the wildlife rich areas of Croatia have been constructed in the period from 1997 through 2005. Out of a total of 325 kilometers, 224 km are in the

habitat of three large carnivore (LC) species: brown bear (*Ursus arctos*), gray wolf (*Canis lupus*), and Eurasian lynx (*Lynx lynx*), and the remaining 101 km are in wolf habitat. There are a number of viaducts, tunnels and six specifically constructed (100-200 m wide) green bridges where big mammals can cross the highway route. All green bridges, two tunnels and 8 viaducts have been added on a specific requirement to mitigate the permeability for animals. We considered only structures with >80 m in width for animal crossing as fully useable for all large carnivores. Such calculation revealed 69 structures where all 3 LC species live and 22 in areas where only wolves occur.

We studied the use of the green bridge at Dedin (100m wide) using infrared (IR) sensors. The height of IR beams was set at 40 cm above the ground to permit the smaller animals (up to the size of fox, hare and badger) to cross the bridge unrecorded. A total of 9471 crossings have been recorded during 563 different days of active monitors operation. Recalculated to the yearly level (365 days) it gives an estimate of a total of 6096 bridge crossings, or 16.7 per day. Concurrently we noticed 402 animal tracks, 284 of which belonged to animals taller than 40 cm: roe deer 37.0%, red deer 28.2%, wild boar 29.0%, brown bear 9.1%, wolf 1.4, and man 5.3%. A total of 26 brown bear tracks were detected. The brown bear share of 9.1% in all recorded tracks permits a calculation that the share in IR recorded crossings is 548 bear bridge crossings per year, or 1.5 per night (24 hours). We conclude that this green bridge served its purpose effectively. Only radio telemetry study of marked animals could reveal the share of individual animals that perhaps avoided the use of this bridge to cross the highway. However, as different reproductive categories of bears did cross the bridge we hope that the barrier effect will not have long-term negative effect on bear population.

THE TRANSBOUNDARY NATURE OF EUROPEAN LARGE CARNIVORE CONSERVATION

OLSZANSKA, AGNIESZKA

Institute of Nature Conservation, Mickiewicza 33, PL 31-120 Krakow, Poland
(olszanska@iop.krakow.pl)

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

objective is to illustrate the need for international cooperation in the management of transboundary populations.

Closing remarks

THE FUTURE OF LARGE CARNIVORES IN 21ST CENTURY EUROPE - HOW FAR CAN WE PUSH THEIR REINTEGRATION INTO OUR LANDSCAPES ?

BOITANI, LUIGI

Dipartimento di Biologia Animale e dell'Uomo, Viale Università 32, 00185 Roma, Italy. luigi.boitani@uniroma1.it

Although large carnivores are protected by a complex array of national and international legislation across Europe, it is obvious that current legislation is insufficient to guarantee their optimal conservation. These species are loaded with high emotional values and cause a variety of conflicts with human interests. Predation on livestock affects farmers' economies, predation of wild prey affects hunters' activities and their potential predation on humans causes negative reactions across vast portions of the general public. To reconcile the needs to conserve viable populations of large carnivores with those of humans has been almost impossible throughout most of human history and it appears a formidable task in the European human dominated landscapes.

The goal of the Large Carnivore Initiative for Europe (LCIE) is to have more large carnivores in wider ranges where carnivores and humans are integrated through active management. A science based approach focused on populations as management units. The meta-population concept and the need to include human dimensions issues in every management plan are considered to be essential to ensure human-carnivores coexistence. Culling is acceptable to maintain coexistence as well as hunting within compensatory mortality. Populations should be self-sustaining on wild prey. Protected areas are one of the tools for broader conservation strategies. Management will require systems of temporal and spatial zoning to apply a variety of conservation rules. Land use and rural development policies should move away from direct production subsidies and towards environmental payments and these should include payments tied to the presence of large carnivores.