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Abstracts concerning brown bears in Europe

TESTING THE PREDICTIONS OF THE FEASIBILITY STUDY FOR THE REINTRODUCTION OF THE BROWN BEAR IN THE ITALIAN ALPS: PRELIMINARY DATA OF COSTS OF THE PROGRAM, SPACE USE AND DAMAGE PATTERNS OF THE 7 RELEASED BEARS.

A. Mustoni, E. Carlini, B. Chiarenzi, S. Chiozzini, E. Dupré, P. Genovesi, E. Lattuada, L. Pedrotti, Italy.

The feasibility study for the translocation of bears in the Italian central Alps included predictions of space use (max and average distance; presence area), habitat suitability (preferred vs avoided habitats), level of damage caused by bears (max and average costs), general costs of the projects, population increase rate. It also assessed the attitude of the local residents toward the bears, and defined some guide lines for improving the public opinion on the translocation project. In the present paper we compare the predictions of the feasibility study with the preliminary data of space use, damage, general costs, attitude of the public.

The translocation project (co-funded by EU through a LIFE programme) started in 1999; in this period 7 bears (1 male, 1 female in 1999, 1 male, 2 females in 2000; 2 females in 2001) were captured in Slovenia in cooperation with the Slovenian forest service, fitted with radiotransmitters (1 radio-collar and 2 ear transmitters per bear), released and intensively monitored (2 locations per bear per day).

Most released bears (5/7) moved within the predicted study area and had home ranges not larger than expected. The translocated population (excluding one female) used an area of about 400,000 ha (predicted area ? 6,500,000 ha). One female moved further than expected in the first weeks after release (ca 88 km N-NE; total home range (MCP) ? 250,000 ha, mostly external to the study area). Damage caused by the bears (mostly bee-hives destruction, for a total cost of 21,800 Euro since 1999) were within the costs predicted by the feasibility study (max = 95,368, low-medium = 10,845). All damage have been compensated through a private insurance and/or funds provided by the Provincial administration. In regard to the risk of damages to human activities and of injuries to people, the feasibility study indicated the need of intense monitoring and of the creation of an "emergency team". Monitoring permitted to correctly identify damages caused by the bears; the "emergency team" effectively reduced conflicts with residents and limited the effects of a car accident on a bear (immediately assisted and re-released without long-term effects). The total cost of the program was underestimated by the feasibility study (over 1 million Euro excluding salaries vs a predicted cost of 585,600 Euro). The overall mortality recorded (1 female bear dead under an avalanche) was within the acceptable rate defined by the feasibility study. The released bears have not reproduced yet, while an increase rate of 5-10% was predicted by the feasibility study. The cooperative approach adopted (a "Bear Committee" bee-hive farmers, livestock breeders, NGOs, local administrations, etc., periodically meets to promote circulation of information and to raise comments), the cooperation with hunters (personnel of the local hunting association supports the monitoring work) and the involvement of a public relation office have been critical for reducing oppositions to the project. Contacts with media and the ability to rapidly face problems were crucial for limiting oppositions by the local residents.

The preliminary data of the translocation program highlight that the predictions of the feasibility study, although based on scarce information, were largely correct, permitted to identify the required resources, and to better define the operative phases.

LIVING WITH BEARS IN RUSSIA

M.A. Vaisfeld, Russia.

In Russia now live about 100 thousand brown bears and about 150 million persons. In most ancient times, people was less, and it is more than bears, but also then and now in the woods people and bears lived and live side by side. Their coexistence was difficult enough and varied in time.

Natives of the North and Siberia even from late Palaeolithic period had the ceremony of reverence, and somewhere a humanization of bear. In ancient Russia people sympathies to bear and their popularity were much greater, than any other animal. It is not casual that people "awarded" a bear almost with forty nicknames. Northern peoples had and still have the huge number of superstitions, connected with a bear. They were based on quivering respect for force of an animal and at the same time they fear of him.

On the other hand, the bear served as object of a craft from ancient time. The hunt in those times had extremely utilitarian character (extraction of meat and skins), but was frequently accompanied by especial rituals. Conflict situations between a bear and the person were always, but they were not mass, as now and were less intensive, though sometimes were dramatic. Eventually all of them became more aggravated, during the increase of the population and anthropogenic press on natural ecosystems (large-scale wood felling, recreational pressures, an intensification of a hunt, growth of a livestock of cattle, etc).

Bears rendered and damage the person, attacking on cattle, ruining apiaries, peasant's log hut, destroying wild ungulate animals. Rather frequent unprovoked attacks on people. In case of a total poor harvest of the basic forages, which frequently happens in Siberia, undened animals sometimes terrorize and literally hold in silage the whole villages. About 150 attacks per one year are observed such period.

The person damages a bear by hunt and indirectly by economic activities resulting in anthropogenic transformation of ecosystems.

The intensity and character of a hunt eventually varied. In old times hunting holes, timbered traps, wooden traps and large bear traps were widely used. Hunt with Russian bear-spear - two-edged long blade, haft on a strong staff was considered as the special boldness of the person. The hunt with fire-arms on a den, on trains, on oats fields, with husky is now widely used. In the past the hunt for a bear was not regulated, and up to middle of 70th of already last century, encouraged. Further restrictions of terms of a hunt during summer, autumn, and winter period were introduced and the hunt began to be carried out under licenses.

In the last decade of the past century the illegal hunt for a bear extremely because of unprecedented demand on the bear's gall was widely used. Now commercialization of hunts for a predator are put under real threat the well-being of the populations on the east countries, especially in Khabarovsk and Primorsk areas, and sometimes in another parts of the areal.

Reproductive senescence in the brown/grizzly bear

Charles C. Schwartz, Harry V. Reynolds, Victor G. Barnes, Jr., Richard Sellers, Jon E. Swenson, Sterling D. Miller, Bruce N. McLellan, Jeff Keay, Rob McCann, Mike Gibeau, Wayne Wakkinen, Rick D. Mace, Wayne Kasworm, Rodger Smith, Steven Herrero & Kim Keating

Little information exists on reproductive senescence in the brown bear (*Ursus arctos*). Although brown bears are long-lived, the number of observations of older females from any one study, are generally inadequate to draw meaningful conclusions, especially in areas where hunting reduces longevity. We combine data from 20 study areas from Sweden, Alaska, Canada, and the continental United States and these provide clear evidence of reproductive senescence in brown bears. We assessed reproductive performance of 4,275 radio-collared, free-ranging female brown bears (age > 3); 318 of these were ≥ 20 years of age. Fitting a double logistic model, we generated 2 curves, a pooled model treating each bear observation equally, regardless of study area, and a weighted model with each study area receiving equal weight. Results from both the pooled and weighted model were similar in shape, with only slight differences in parameter estimates. Jackknife confidence intervals generated from the weighted model were larger.

The reproductive senescence curves derived from our brown bear data were typical of mammalian productivity curves, in which reproduction increases after sexual maturity, stabilizes in prime-aged individuals, then decreases until death. Our model had major shifts in cub production early in life, and again with old age. The first major change occurred between ages 4 and 5, after which the rate of cub production accelerated as most females mature. Our model inflection points were 4.846 and 4.673 for the pooled and weighted models, respectively. The normal distribution for the early phase of reproduction was quite narrower, suggesting the reproductive onset is rapid and occurs over a short number of age classes (Figure will be presented). Early onset of reproduction (95% confidence interval) in our pooled model ranged from 2.8 to 6.9 years (i.e., ages 3-7), which did overlap age class 3. However, none of the 276 3-year old bears in our sample produced a litter. Schwartz et al. (2002) reviewed life history traits for brown bears in North America. They concluded litter production did not occur until at least age 4. However, there are a few records of 3-year-olds producing first litters.

The second major shift in litter production occurred between ages 26 and 27 (inflection = 26.2–26.7 years), after which the rate of senescence slowed. Peak reproductive performance spans ages 8 through 17 and then declined until death. The normal distribution for senescence (Figure will be presented) was broad relative to the early phase suggesting that senescence has a high degree of variation associated with it. Reproductive senescence (95% confidence interval) in our pooled model ranged from 16.6 to 36.7 years. Although we did not have any bears in our sample beyond age 28 with litters, there are records in the literature documenting reproduction in these older age classes.

The asymptotes of the models (0.357 and 0.345, pooled and weighted respectively) were not different from the expected reproductive cycle of 1 cub litter every 3 years ($1/3 = 0.333$). The lower and upper confidence intervals for the weighted model range from 0.234 to 0.490, which spans the empirically observed interbirth interval for most populations recorded in the literature (2–5 years).

Home range sizes of brown bear in a border area between Norway and Sweden with different livestock husbandry patterns.

Torgeir Nygård, Finn Berntsen, Even Bjørnnes, Henrik Brøseth, Tor Kvam, Paul Harald Pedersen, Ole Jakob Sørensen & Jon Swensson, Norway.

Seven female and six male brown bears were fitted with VHF radio-tags and tracked from the ground and by small aircrafts in the border areas between Central Norway and Sweden 1993-2001. The area is mountainous, with spruce forests interspersed with birch and pine dominating in the valleys. In contrast to Sweden, free-ranging sheep husbandry is common on the Norwegian side. From one to seven years of consecutive data for each bear were obtained. The males used much larger areas than the females. Using minimum convex polygons, the home-range size of females were on the average 440 km² per year (min 162, max 947), while the average for the males were 1550 (min 261, max 4047). The average home range over years, using all fixes for each animal, were 651 km² (min 328, max 1123) for females, for males 3562 (min 420, max 7373). Five females and five males yielded more than one full year of data. The mean coefficient of variation in home range size between years was 24 % (1-44) for females and 39 % (16-66) for males.

Based on one (the first) fix per week of individuals spending time in both countries, the females on the average spent less time in Norway than would be expected from a uniform distribution, while the males spent more. This may be explained by the males' propensity to hunt for sheep, while the difference in females is more difficult to explain.

THE BROWN BEAR'S (URSUS ARCTOS) SPATIAL EXPANSION IN SLOVENIA: SPEED OF EXPANSION AND SATURATION DEPENDENT DISPERSION.

Jerina K. & M. Adamic, Slovenia.

In the course of detailed study on brown bear's (*Ursus arctos*) spatial expansion out of the core protective area in Slovenia after the World War II, the data of seen or hunted bears were collected and analyzed.

According to the variation of the population densities - calculated for several time intervals within the research period, and for the different distance belts around the core protective area - the colonization of the external area was sex-biased. Due to bear's differential postnatal dispersion, new areas were first colonized mostly by the males, females followed only later. Males expanded soon after the establishment of the core protective area (in 1966) also into broader external space, while females gradually colonized external regions and settled at the beginning only the regions near the core protective area. The entire bear population was spreading radially out from the core protective area with an average speed of two kilometers per year.

Brown bear's spatial expansion dynamics was studied also by the multiple regression analyze of the distances between recorded external locations and the core protective area. The maximal distance between the furthest locations and the border of the core protective area correlated positively with the size of external population ($? < 0.001$) and negatively with the relative size of hunting quota ($? < 0.001$) of core area bear population. The significant correlation among those variables indicates:

- ? that emigrants from the core protective area (source population) strongly influenced the population dynamics of the external population (sink population) and its spatial expansion,
- ? that population's dispersal characteristics depend more on its saturation than on its absolute density.

This results are useful also for other wildlife managers. They suggest that the number of emigrants and the speed of bear's spatial expansion can be controlled by the adaptation of the relative size of the hunting quota in the saturated reproductive areas.

BROWN BEAR PREDATION ON MOOSE AND ITS CONSEQUENCES FOR MOOSE HUNTING IN CENTRAL SCANDINAVIA

Jon E. Swenson, Bjørn Dahle & Finn Sandegren

Since 1930, the population of brown bears (*Ursus arctos*) in Scandinavia has increased in size and expanded its distribution. Several North American studies have reported significant predation rates on moose (*Alces alces*), especially calves, by brown bears. For this reason we studied brown bear predation on moose in Sweden, using radiomarked moose and bears.

In our study area in south central Sweden, an area with a high bear density and a moderate moose density, bears killed 26% of the moose calves born. Ninety-two % of the predation took place when calves were less than one month old. Bear predation was probably additive and natural mortality, excluding bear predation, was 10% both in bear areas and areas without bears. From a comparison of predation rates from several study areas predation rates seemed to be inversely density dependent with relative moose density.

Predation rate by bears on radiocollared moose = 1 year old was 0.5-1.6% and about one third of the mortality caused by traffic, but hunting was the single most important mortality. Bears were tracked for 1306 km on snow during spring and a total of 23 attempts to hunt moose, of which 3 were successful, were recorded. Autopsy of moose older than calves reported to be killed by bears revealed that yearlings were most prone for predation. Bears were more successful predators on moose in areas where bears have recently arrived than centrally in the bear distribution area, probably because moose living in the absence of large predators have become a more naïve prey.

Scat analyses revealed that moose was a important food item during spring (moose > 1 year old) and during early summer (calves) and that moose was the second most important food item, based on obtained energy during the year in areas without domestic sheep (*Ovis aries*). The proportion of cervids in the diet increased along a south-north gradient.

Moose cows that lost their calves prior to the fall moose hunting season compensated for this by producing 52% more calves the following year compared to cows that kept their calves. In this way the net loss of moose calves due to bear predation was reduced to about 20%. Ignoring factors such as environmentally stochastic variation, the growth rate in the moose population in our study area was estimated to be reduced by 4.2% due to the presence of bears. From the hunters point of view this means hunting quotas reduced by 0.4 moose/ 1000 ha (almost only calves).

HISTORY OF BROWN BEAR POPULATIONS FROM ESTONIA, FINLAND AND RUSSIA.

Marju Metsalu, Ilpo Kojola, Harri Valdmann, Igor Tumanov, Alar Karis & Urmas Saarma

History of Eurasian animal populations has been always greatly influenced by climatic fluctuations. Last glaciations in Pleistocene restricted most of the animal populations to refuge areas on the other side of permafrost. Brown bear (*Ursus arctos* L.) has served as one of the models to reveal refuge areas and postglacial recolonisation routes of animal populations. However, current knowledge of brown bear population history in Eurasia has remained coarse due to restricted sampling, only few regions in Europe have been adequately analysed.

Our objective is to describe phylogenetic relationships among evolutionary lineages of brown bear populations in Eurasia and reconstruct patterns of refuge areas and migration after the last ice age.

In this study mitochondrial DNA control regions of 227 brown bear samples from Estonia, Finland and Russia have been analysed. As a result, a series of new mitotypes have been identified. A historic network of brown bear populations from Estonia, Finland and Russia will be presented and discussed in the context of other Eurasian brown bear populations.

The future of the Brown bear in Scandinavia based on today's management in Sweden and Norway

Jon E. Swenson, Anders Björvall, Henrik Brøseth, Sven Brunberg, Robert Franzén, Tor Kvam, Torgeir Nygård, Paul Harald Pedersen, Finn Sandegren, Peter Segerström, Arne Söderberg & Ole Jakob Sørensen

For several hundred years, the official policy in both Sweden and Norway was to exterminate brown bears. Norway succeeded and Sweden nearly did. Both countries have changed their policies to conserve a viable bear population. Sweden has ambitious goals; a minimum of 100 reproductions per year, which corresponds to about 1000 bears, to allow them to increase above that where appropriate, and to have bears distributed continuously over more than 50% of the country. Norway has very modest goals; to have reproducing populations in 5 small areas along the border to neighboring countries. Two of these areas should have "viable populations", defined as a minimum of 8 adult females. We have evaluated these goals based on the results of radiotelemetry-based research in three areas in the north, central, and southern parts of the species' range in Scandinavia. We conclude that Sweden should have few problems reaching its ambitious goals, except that more effort is needed to protect bears from illegal killing in areas where semidomestic reindeer are raised. If this is not done, the bear will likely disappear from many areas near and above the timberline in reindeer areas. We conclude that Norway will not be able to reach its very modest goals with today's management. Permits to kill depredating bears are issued quickly after an average of 13 sheep are killed. The human-caused mortality in Norway is above sustainable levels. Many free-ranging sheep occur in the areas designated for bear conservation, and it seems to be very difficult to initiate measures to protect these sheep from depredation. Thus, Norway will probably not reach its management goals but will continue to suffer high depredations on free-ranging sheep because of immigrating bears from Sweden. Although we lack data, we suspect that illegal killing of bears in reindeer-raising areas may be a problem also in Norway.

RECENT AND PLANNED STRATEGIES FOR BROWN BEAR MANAGEMENT IN SWEDEN

Anders Björvall, Robert Franzén & Sven Brunberg, Sweden.

In 1981 a new system for bear hunting was introduced in Sweden. Instead of an open hunting season within defined areas, a maximum quota was set for the areas where sustainable hunting was considered possible. The total quota was then divided into subquotas for different regions within the larger area. Since then the population is estimated to have doubled and the total legal harvest during these 21 years has been 831 bears. The area of distribution has

expanded southwards considerably. Several management tools are used or have been used over the years with different success. Such tools are a separate female quota, a zone without hunting along part of the Norwegian border to facilitate for bears to disperse into Norway, a ban on hunting over bait, compensation for cases where people have been injured or killed by bears, the decision by the Parliament of a minimum level of 100 annual reproductions (roughly corresponding to 1 000 bears) in Sweden, the report to and the subsequent reply from the European Commission that Swedish bear hunting is in agreement with the rules in the habitat directive, the transfer of some decisions on bear hunting from the national to the regional level, steps taken to reduce poaching, deficiencies related to the brown bear in the present system for compensation for the occurrence of carnivores in the reindeer management area, and efforts to develop special acute groups to take care of bears injured during hunting or by traffic.

STATUS OF BROWN BEARS IN TURKEY AND THE PRIORITIES FOR RESEARCH AND CONSERVATION

Öe. Emre Can, Turkey.

The brown bear (*Ursus arctos*) is the largest carnivore species in Turkey. The species prefers the forest and the rocky areas in Turkey. Today, its distribution is mainly confined to the intact natural habitats of Black Sea region and the Eastern Anatolian region. The forest fragmentation and the persecution by humans have resulted in the decline of the population in other regions during the last 50 years. The human-bear conflict is more easily observed in Eastern Black Sea region but the species does not pose a serious threat to humans in Turkey. The brown bear has a more positive image among the local people when it is compared with gray wolf (*Canis lupus*). Authorities have kept no records about the bear damage but the species mainly prefers cattle and sheep as the domestic prey in Turkey. The species has a partial protection status and its hunting requires permission from the local authorities. The protected areas fail to provide a safe shelter for the species since the size of the protected areas are too small to act as refuge areas for large carnivores in Turkey. Legislation development and implementation, research actions on population numbers and range, expansion of the current protected areas and identification of new ones are priority action points for the conservation of brown bears in Turkey. The public awareness and the capacity building of the local authorities will also play a critical role. This study presents the information gathered from the fieldwork that has been conducted since 1998 in different regions of Turkey.

LIVING WITH BEARS IN CENTRAL NORWAY; VIEWPOINT FROM THE LOCAL MANAGEMENT LEVEL.

Truls Eggen & Even Haugreid, Norway.

Is it really true that a scarce bear population causes more worry, fear and despair in central Norway than in any region in the world with much more dense bear populations? If this is true; what's the reason? And; is it really true that increased knowledge of bear biology is the only tool of handling the situation? Is this knowledge the only insight that is missing in the management of bear and nature in general in this region?

This speech intends to highlight some local viewpoints on the regional and national bear management and politics. In general one can say that nature conservation - from being an arena for objective common interest - has become an arena of struggle in which local inhabitants and the special interest of the professional nature conservationists collide. This also includes the County Governor and the Directorate for Nature Management.

The municipalities near the Swedish border in the region are affected to a large extent by protection under the Nature Protection Act, protection of the watercourses and protection of coniferous forests. In Snåsa and Lierne municipalities protection under the nature Conservation Act alone covers nearly 50 % of the area. The central habitat for bear protection was conducted in accordance with the Game Act and inspired by the Bern Convention, and covers 100 % of the same area. An area where sheepholders during the sixties and seventies were encouraged by the authorities to change from scattered grazing in nearby areas to more active use of mountain pastures with large herds of free grazing sheep.

None should be surprised by the fact that local inhabitants sympathize with the local sheepholders and reindeer keepers who have to face the consequences of a build up of bear population after several decades. Almost any one you ask - sheepholders and reindeer keepers included - accepts having bear in the surroundings. Many local inhabitants even consider bears being an interesting resource for business enterprise and a potential of tourism. The establishment of a central habitat for bear protection was introduced in order to provide the bears with adequate protection. It is, though, hard to accept that national and international demands are leaving sheepholders in the area with no protection at all and very little compensation.

Management of surplus killers and individuals with suspicious behaviour like the radio collared Arvassli bear - has nourished the scepticism to the Government's management authorities. It is hard to believe that handing over the management to local authorities - the municipalities - in such cases would be a real threat to the rebuild of a bear population.

All conservationists and all managers should bear in mind that nature management entails the management of people in nature. Formal knowledge of bear biology is an important and interesting tool to solve the problems, but alone this tool is quite insufficient to solve a complex problem.

FOREST FRAGMENTATION AS THE MAIN FACTOR OF BROWN BEAR RANGE DIMINISHING IN EASTERN EUROPE

Leonid M. Baskin, Russia.

Since the 17th century the southern border of brown bear range in Eastern European retreated from Ukrainian steppes to central Russian forests. To find out causes of this process a history of brown bear populations as well as forestation and human population density in 28 regions of Central Russia were studied. Partial correlation of bear density and forestation was found to be -0.46 ($p < 0.01$) while one of bear and human population density was -0.34 ($p < 0.05$). A history of brown bear in Eastern Europe proves that the species survived in areas with forestation more than 40%. Besides forest fragmentation was found to be very important. In severe fragmented forests bears become easily discovered by humans. An analysis of 26 bears fates went out of a southern border of the bear range in Kostroma oblast' proved that the animals were exterminated when occasionally met hunters. Near the southern border of the brown bear range a single animal can survive in a forest islet not less than 90 sq. km, three animals need 155 sq. km, and 5-8 need 300-350 sq. km. Shelter characteristics of the forest habitats are important for bear survival. We measured distances of detection a human by another human in southern taiga forests. In mature coniferous forests without undergrowth distances of detection were 107-113 m. The minimum distances (20-25 m) were found out in birch-willow young tickets in burnt and bogs, also in forests with dense undergrowth of young spruces. These distances correspond with the distances from that bears detect humans. Exchange of pristine forests by mosaics of mature and young forests could be an important factor of bear density. However, an analysis of bear number fluctuations during the 19-20th centuries in Karelia, Arkhangel'sk, and Kostroma oblast' did not proved significant correlations between intensity of logging and fluctuations of bear numbers.

THE EFFECTIVENESS OF GREEN BRIDGE DEDIN IN GORSKI KOTAR (CROATIA) FOR BROWN BEARS

Djuro Huber, Josip Kusak, Goran Gužvica, Tomislav Gomercic & Gabriel Schwaderer.

The new highway through the wildlife core area in Gorski kotar has a number of viaducts and tunnels and one specifically constructed (100 m wide) green bridge at Dedin near Delnice. We studied the impact of highway on brown bears (*Ursus arctos*) and other large and medium sized mammal movements to acquire data for future management of the population integrity and gene flow, and in practical situation, for designing the mitigation measures on the newly proposed highway from Karlovac to Split. Since May 1999 we used infrared (IR) sensors for recording crossings over Dedin green bridge. 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. Recorder holds in memory up to 1000 beam interruptions with noting the date and time of each record. A total of 6364 crossings have been recorded during 360 different days of active monitors operation. Recalculated to the yearly level (365 days) it gives an estimate of a total of 6442 bridge crossings, or 17.6 per day. Concurrently we noticed 324 animal tracks, 232 of which belonged to animals taller than 40 cm: roe deer 38.8%, red deer 25.0%, wild boar 21.6%, brown bear 7.7%, wolf 1.7, and man 5.2%. A total of 18 brown bear tracks belonged to different size (age) categories: single adult animals, single subadults, female with cubs and female with yearlings. The brown bear share of 7.7% in all recorded tracks permits a calculation that the share in IR recorded crossings is 499 bear bridge crossings per year, or 1.36 per night (24 hours). We conclude that this green bridge, a measure to mitigate the negative effects of the studied highway, served its purpose effectively. Only radio telemetry study of marked animals could reveal the share of individual animals that perhaps avoided the use 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 collected and presented results have already been used in the Environmental Impact Study as arguments to build the similar structures on the highway from Karlovac to Split.

NOTE: The data collection is still under way and the new set, which will likely double the total amount, will be available early next year. We propose considering this abstract for making decision on acceptance, but would like to ask the conference organizers to consider the replacement of text, as the additional data will be included.

PERCEPTION OF BROWN BEARS BY THE GENERAL PUBLIC AND HUNTERS IN LATVIA

Zanete Andersone & Janis Ozolins, Latvia.

Brown bear (*Ursus arctos*) is a Red Data Book species in Latvia and is protected by law, the total population accounting for some 10 animals, mainly in northern and North-Eastern part of the country. Only a few of these individuals are residential in Latvia, the rest periodically coming from the neighbouring countries of Estonia, Russia and Belarus.

In 2001, the first human dimension study was carried out in Latvia. Its aim was find out the attitude of people toward all three native species of large carnivores, including the bear. A questionnaire containing 36 questions was designed and distributed in four different geographic areas of Latvia (urban vs. rural areas) and in Riga as the capital. Questionnaires were distributed in the following ways:
1) through schools with the requirement to fill them out in families using the "next birthday rule";
2) through publishing a questionnaire in the hunters' magazine.
Therefore, the answers obtained were pooled into two categories – general public ($n = 401$) and outdoor audience, mainly hunters ($n = 157$). Such a design of the study allowed the comparison of attitudes and the level of knowledge in both samples.

There were eight questions in particular aimed to bears:

- assessment of the current number of bears in Latvia;
- explanations why (if) the number was assessed as being too low or too high;
- questions on the current distribution of bears in Latvia and their diet to find out the level of knowledge about the species;
- the estimation of how dangerous it is to meet a bear in the forest

- the question whether a respondent has seen a bear or its tracks in Latvian forests and whether would like to see
- assessment of what should be done with bears in Latvia

The results show that the majority of people are positive toward the bears. 75% general public (GP) and 57% hunters (H) think that the current bear number is too low, and 70% GP and 66% H think that bears should be protected in Latvia. Hunters more than the general public support the control of bears (40%). People from urban areas more often (79%) thought that bear numbers are too low. At the same time, bear conservation is slightly more supported by the rural inhabitants as compared to towns (72% versus 69%). Young people (12 – 20 yrs. old) more support conservation of large carnivores in general and bears in particular (80%). The lack of suitable habitats was the most often mentioned reason of estimating the current bear population as too big (57-67%). The level of knowledge on bear distribution and diet was relatively good in both samples, although hunters displayed a better knowledge of the diet of the species. 62% GP and 25% H were convinced that meeting a bear in the forest is dangerous, hunters most often mentioned that it can be dangerous under certain circumstances (57%), e.g., if a bear is with cubs (37%), injured (37%) diseased (21%) etc. Only 12% GP and 36% H have seen bear or its tracks while 50% and 83% accordingly would like to see it. There were the sexual differences in respondents' answers to certain questions.

The results of the study can be used for further management planning linked to the education campaign to improve the acceptance of bears and to increase the level of knowledge about the species.

MANAGERS AND FARMERS: DO THEY UNDERSTAND EACH OTHER?

Jørund Aasetre, Norway

Management of wildlife and especially large carnivores like bears often evoke strong conflicts. In Norway the conflict is around the management of large carnivores like bear, wolf, lynx and wolverine. The carnivore that is most debated changes over time. At present it is the wolf, but earlier the bear was the most focused species. This paper focuses on the relationship between sheep farmers and nature managers and how those groups view each other and the management of bears. The study was conducted in 1995, and it is earlier presented in a report by Sagør and Aasetre (1996). In the study both quantitative survey as well as qualitative interviews were used, but the emphasis was on the quantitative part of the study. In the study agricultural managers were also included in the qualitative part as a reference group.

The study focused on three different aspect of the relation between sheep farmers and managers. The first topic is about how the different groups perceive the "bear problem". In the other topic the study focuses on the group's perception of actors and interactions between actors, and finely their knowledge of each other's attitudes. The three groups have rather different perceptions of the size of the bear population as well as how to deal with the management of the bear problem. Interestingly, the sheep farmers perceived the size of the bear population in Norway as larger than the nature managers. The sheep farmer's perception of the size of the bear population was also larger than the scientific estimates of the bear population. The reason for this could be that they are not informed of the scientific estimates, but this is not the reason. They actually are aware of that their estimates differ from the scientific one, but they feel that they can't trust the scientific estimates. The study also shows another interesting difference. The sheep farmers want to manage the problem through managing the stock of bears (primarily shouting "killer bears"), while the wildlife managers primarily want to manage the problem by changing the way of sheep farming.

In addition there were clear differences in how the groups perceived each other. Two attitude scales were constructed called "the sheep farmers are neglected" and "objective managers against negative sheep farmers". None of the groups scored very high on any of the scales, but the sheep farmer scored highest on the "the sheep farmers are neglected" scale and lowest on the "objective managers against negative sheep farmers" scale. For the nature managers it was the other way around, and the mean difference on the two scales was lower among the nature managers than among the sheep farmers. In terms of to knowledge about each other, we asked the sheep farmers to answer some attitude questions as if they had been nature managers, and the other way around. The agricultural managers participated in those questions, as if they had been sheep farmers. This section of our study revealed that even if the groups have strikingly different attitudes, they have rather good knowledge about each other's attitudes. This was not a surprising given the contact that exists between the groups and the level of the public debate. At the same time it shows that a high level of interaction and knowledge about each other do not necessarily reduce the tension.

The study presented here focuses on the social side of the "bear management problem". In my view this is important because many people all to often seem to forget that defining a bear management problem is a social issue rather than something that can be done from a natural science position.

HUMAN – BEAR RELATIONSHIPS AMONG FOREST LIVING REINDEER-HERDERS IN EASTERN SIBERIA

Nils Røv & Yoshiko Abe.

The authors have lived among a family-group of indigenous hunters belonging to the Evenkian people in Transbaikal, East Siberia. The Evenks keep a small group (20 – 30 animals) of domesticated reindeer for transport and milking. They live by hunting and fishing. Important big games are Musk deer, Red deer, Moose and Wild reindeer, while Sobel and Tarbagan (Mormots) and Squirrels are common fur animals. Although there is a dense Brown bear population in the area, bears are usually not hunted for food, but the meat of bears is eaten when an animal is killed. The people are afraid of bear attacks, and take various precautions to prevent damage. There are many stories of bears that have attacked, and sometimes killed, people. Sometimes bears may enter their camps. We have observed that when the dogs indicate the presence of a bear close to the campsite during the night, the group-leader may go outside the tent and shout loudly into the darkness to scare the animal. There are many rituals connected to bears. They are considered equivalent to people. In earlier days, bears were entombed in the same way as people. Bear bones are always stores on special platforms. Evenks are often engaged in the meaning of their dreams. To dream about bears has the same meaning as to dream about men and vice versa. The soul of the bear is considered to be re-incarnated. Care is therefore taken to show respect to the bear's soul.

BEAR CULT IN THE SCANDINAVIAN PENINSULA

Elisabeth Iregren, Sweden.

In the circumpolar area bears as the polar bear (*Ursus maritimus*) and the brown bear (*Ursus arctos*) have often been involved in ritual ceremonies performed by different groups of people during long times. Well known are rituals among the Ainu in Japan but less known is the bear cult of Finns or Saamis (Lapps) in Northern Europe. This paper deals with the archaeological and osteological remains from bear rituals once performed in Scandinavia.

Expressions of a Norse bear cult

Among the Iron Age inhabitants in Sweden the bear was a vital species. Important individuals of the human society were buried with precious gifts and a bear skin. Images of bears can also be spotted on different objects. In settlements (meal refuse) bear bones are, though, rare. The most significant find of bears derives from the Viking period (AD 800-1050) in Middle Sweden. In connection with a birch stem, bones from a number of species, mainly wild mammals were found. They were excavated below the choir of a standing church of Medieval age (Frösö parish church in Jämtland). The assemblage is interpreted as expressions of the old Norse religion in connection with the tree of life. The rites were likely performed outdoors in a grove of deciduous trees.

The bear in the Saami religion

The Saamis nowadays live in the Northern parts of Norway, Sweden, Finland and Northwest Russia. Depictions of bears and artefacts of bears are ancient and related to groups of hunters and fishermen in the area. From historical and ethnographical records the bear cult of the Saamis is well understood.

The bear was honoured in different ways in the Saami culture and bear bones are found in sacrificial sites and in bear graves. Bear graves have been excavated in the Northern part of the Scandinavian peninsula in Norway from Trondheim and north wards.

A bear grave consists of all bones of one single animal, hunted, slaughtered, eaten and buried in a construction. The bones are arranged in an anatomical way, similar to a lying animal. The historical records are compared to the bear graves found. Some discrepancies are registered as e.g. the marrow spalted bones, which was forbidden according to the historical sources. The archaeological monuments definitely show what actually happened. They thus give us new possibilities to interpret human behavior and to discuss the human - animal relationship. The bear graves found so far in Scandinavia cover a period of 1000 years but we judge their roots to be ancient.

The bear rituals of the Finns and the "cult" of the cave bear (*Ursus spelaeus*) in the European continent are shortly mentioned upon. Today few researchers believe in a cave bear cult.

BROWN BEAR (*URSUS ARCTOS* L.) INTERACTIONS WITH LARGE MAMMALS: IMPLICATIONS FOR ITS CONSERVATION IN THE CANTABRIAN MOUNTAINS

Guillermo Palomero, Juan Herrero, Alicia García-Serrano & Juan Carlos Blanco, Spain.

Approximately 80 Brown bears inhabit today the Cantabrian Mountains and occupy humanized landscapes, living closely to men, and interacting with them, their livestock and other wild mammals. Large scale changes in human activities have occurred in last decades, leading to the increase of large herbivores, the decrease of human population and its livestock, a recovery of shrubs and forests and a swift in landuse activities, from agriculture, mining and livestock raising to touristic development. All these changes represent a transformation of bears' habitat and consequently of their food resources, shelter, predators, preys and disturbances so they should be part of bears' monitoring program.

Since 1986 onwards, females with cubs are monitored in the Cantabrian Mountains in order to know the trend of the bear population. As part of this survey, between 1998 and 2000, we registered 159 interactions of bears with other large mammals, including man. 88 (55%) were with other animals and 71 (45%) with man, which was the most interacted species. Regarding interactions with large mammals other than man, 11 (12%) were with other bears; 20 (23%) with domestic animals (dogs, cows, and horses); 57 (65%) wild mammals (foxes, *Vulpes vulpes*; wild boar, *Sus scrofa*; Cantabrian chamois, *Rupicapra pyrenaica parva*, and roe deer, *Capreolus capreolus*).

Bears' response to these interactions were classified in 4 categories: no change in their activity; minimal alert; median alert and maximum alert (attack or escape). Man, male adult bears, adult wild boar and dogs (mastif, shepherd and hunting dogs) produce the escape of females with cubs and lonely cubs. Lonely cubs also escape from Cantabrian chamois and roe deers.

There is a wide range of responses of bears towards each large mammal involved in the interactions. The cubs' age and the size and the sex of the other bears seem to be the relevant variables to explain their behaviour during these encounters. Young cubs are frequently killed by adult male bears, which provoke their escape. Though subadults are displaced by family groups. Wild boar disturb family groups, even if both species can be displaced by the other. Foxes, cows and horses, normally coexist with bears without provoking alarm or attack responses by bears. Fox cubs can make "play proposals" to bear cubs and bear females can chase foxes in some occasions.

We observed one case of predation of a female bear with three cubs on a roe deer fawn. The same family group was attacked by an adult male brown bear who killed and eat ate all the cubs after a dramatic fight with their mother.

Unkept dogs are a frequent disturbance for females and cubs so enforcement of regulations against them should be more strict.

Systematic direct observation offers an interesting complement to the monitoring of females with cubs, producing a quantified sample of interactions with other mammals than can help to focus conservation efforts on certain aspects of management, as hunting, livestock keeping or other disturbances.

DENSITY OF EUROPEAN BROWN BEARS AND THE EXTENT OF REPORTED BEAR DAMAGES IN SLOVENIA: DO THEY HAVE ANYTHING IN COMMON?

Marko Jonozovic & Miha Adamic, Slovenia.

The backgrounds for the conservation management of European brown bear in Slovenia have been intensively studied in post-1997 period. One of yet unresolved questions was how to improve the zonation of core conservation area for the species in Slovenia. First, legally established conservation area for brown bears, with the surface of about 3500 km² was designed in southcentral Slovenia in 1966. Since then the bears expanded their range, which currently extends over about 6000 km². A great part of today's bear range is either settled, or used for human economies. The stock of sheep in Slovenia increased from about 50.000 in 1995 to about 100.000 in 2001. Sheep farming is widely supported by the State agencies, and the plans for further expansion of pasture areas have been prepared. In the period 1994-2000 about 2000 sheep have been killed by the bears and the reimbursement of the damage exceeded 450.000 EUROS. Large predators damages in Slovenia are to be covered by the State budget and therefore their yearly extents are transparent to sheep-farmers and general public, too.

In newly occupied areas where, according to crude estimations less than 20% of bear population is to be found, the compensations for brown bear damage in 1994-2000 period represented 71,3% of total reimbursement on State level. Slovenian Alps, with only 5-6% of bears, but with about 67% of reported damages, represent a very particular problem. Previous studies of bear habitat suitability in western half of Slovenia (Kobler, Adamic 2000, Ecol.Modelling 135: 291-300) proved that Slovenian Alps have poor characteristics of optimal, reproductive habitat. According to the results of yearlong monitoring of bear population in Slovenia, carried since 1993 on, females with cubs of the year have been seldom registered in wider alpine area until now. Local communities in prealpine and alpine parts of Slovenia are vigorously opposing the expansion of the bears over their territories. Consequently, the expansion of bears in Slovenia became a political problem. But despite it, the area where traditional pasturing of livestock is still in practice, will have to be carefully analysed, before final decisions about (non)suitability of the area for the bears will have to be adopted.

Southcentral Slovenia with about 80% share of bear population, but with only 26% of reported damage, faced another problems, triggered by the presence of bears. Yearlong supplemental feeding is believed to affect the behavior of the there bears. Many of them lost their shyness, when approaching the villages and houses and posing threats to local people. Although few cases of direct conflicts took place since the protection of bears in 1993, local communities expressed their negative attitudes towards the increasing densities of bears and their management at any official occasion.

Due to increasing negative attitudes toward brown bears in Slovenia, the Government of Slovenia in 1999 authorized the Slovenia Forest Service and Nature Protection Board to prepare the conservation strategy for brown bears on the level of the State. It is believed that only such a document with wider consensus of local communities, will help to resolve existing problems and ensure the conservation of the species in future, too.

Key words: brown bear, livestock, compensation of damages, conservation strategy, Slovenia

PREVENTIVE MEASURES TOWARD PREDATOR DAMAGES ON SHEEP; HERDING AND THE USE OF LIVESTOCK GUARDING DOGS IN LIERNE COMMUNITY

Frank Christiansen, Norway.

A three-years project (1997-99) was carried out in a mountain pasture by the Swedish border of Lierne community, Norway. A herd of 160 Dala sheep was trained to move as a group using herding dogs (Border collies) and two predator-proof night enclosures. Each was about 20.000 m² and consisted of electrically charged wire at about 6000 volts. The sheep grazed early in the season in the lower-lying area, and later the sheep were moved up to the high mountain pasture. During the day the herd was under the direction of shepherds using herding dogs, and placed inside the enclosures each evening. In 1998 4 livestock guardian dogs (LGD) were imported, 2 from Poland (Polish Owczarek Phodalanski also called Polish Tatra dogs) and 2 from Italy (Mastino Abruzzese also called Maremma). The LGD were used for nighttime protection of the herd throughout the grazing season, therefore, there was no need use the fences. The research herd was expanded to about 270 sheep, including both Dala and Spæl breeds, which were placed into a night corral (composed of lightweight portable fencing) together with the LGD. Three shepherds, each with at least 2 herding dogs, were used on 2-week rotations throughout the season. In 1999 a herd of 500 sheep was herded, and during nights the sheep and dogs (LGD) were in a light, portable corral. Production data for 1997-99 were collected from numerous places throughout the community for use in comparing the growth rates of lambs from the research herd with other free-ranging lambs.

To pass along knowledge from other relevant areas where herding and the use of LGD is standard, several people from the countries USA, Poland and Italy visited the project. Based on the project goal of building up local competence in herding and the use of LGD, the LGD were kenneled during the off-season with local sheep farmers. Litters from these dogs were distributed with local farmers, which were given information regarding the process for bonding dogs and sheep. A trainee program was established to train new shepherds, which was followed up by a 10-day study trip to the Abruzzo Region in Italy.

The LGD proved to be effective in protection against predator attacks by several documented incidents where LGD deterred bears from attacking their herd. The LGD's effectiveness was not based solely on direct confrontations or fighting with the bears. Rather the predatory sequence was disturbed because of the mere presence of the dogs with the sheep. Younger LGD had to learn to accept the use of herding dogs (perceived by them as a threat to the sheep), and had to be handled correctly by all personnel in order to perpetuate the correct working behavior. During the project's 3 years only 1 lamb and 1 ewe were killed by bears (0.4%). For comparison, the average loss of free-ranging sheep in the area was over 18%. The first year growth rates for Dala lambs in the herded flock were 27% lower than the free ranging, control lambs, the second year this difference was reduced to 24 %, and the third year to 17%. However, much of this difference relates to pre-existing differences between farms in Lierne, independent of the experiment.. Flocking behavior may be improved through additional training with herding dogs, shifting to open-housing systems during the winter and active breeding

selection for those sheep with the best characteristics. It is also possible to change other elements of the management system that may improve production performance (shifting breeds, timing of births, feed quality, etc.).

Economic analysis show that herding and the use of LGD is an expensive management system (largely due to shepherd salaries), making it unrealistic for farmers to shift to this type of management, if they have to bear all of the expenses themselves. However, the reductions in predator confrontations make the project very interesting from an economic perspective. The compensation for predator loss made to farmers each year indicate that the increasing bear population leads to extra expenses for society in general. It is, therefore, desirable to analyze the expense of herding and use of LGD as an alternative to the management costs and payment of compensation for predation losses.