19th International Conference on Bear Research and Management

May 16-22, 2010
Radisson SAS Iveria Hotel
Tbilisi, Georgia

Program, Abstracts and Information

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NACRES – Centre for Biodiversity conservation and Research

European Union

Fauna and Flora International

Alertis – Fund for Bear and Nature Conservation (the Netherlands)

Tbilisi Zoo (Georgia)

Ilia State University (Georgia)

Conference Program

SUNDAY, MAY 16		
	Time	**Activity**
	All day	Airport Shuttle
	All day	Vendor Setup
	8:30am-5:00pm	**IBA Council Meeting**
	9:00am-8:00pm	Early Check-In
	10:00am-8:00pm	Presentation downloads
	2:00pm-8:00pm	Poster setup
	6:00pm-9:00pm	Icebreaker

MONDAY, MAY 17			
	Time	**Activity**	
	All day	Airport Shuttle	
	All day	Registration and Assistance Desk	
	All day	Poster setup	
	All day	Presentation downloads	
	All day	Coordinator's workroom, storage room	
	9:00 - 9:30 am	**WELCOME - Mr. George Khachidze, Minister of Environmental Protection and Natural Resources of Georgia and Dr. Gigi Tevzadze, Rector, Ilia State University; OPENING REMARKS - Dr. Frank van Manen, IBA President and Levan Butkhuzi, NACRES**	
	Time	**Authors/Activity**	**Title**
	9:30 - 12:10 am	**SESSION 1. CONSERVATION OF BROWN BEAR. Chair: Frank Van Manen**	
1	9:30 - 9:50 am	Alberto Fernández-Gil, Javier Naves, Mario Quevedo, Eloy Revilla, and Miguel Delibes	How many bears in the Cantabrian mountains? An index of population density for brown bears in NW Spain
2	9:50 - 10:10 am	Georg Rauer, Petra Kaczensky, and Felix Knauer	What went wrong with the brown bears in central Austria? Lessons of an unsuccessful reintroduction effort
3	10:10 - 10:30 am	Ivan Seryodkin and John Paczkowski	An update on the status, management and conservation of Kamchatka brown bears
		Coffee Break	
4	10:50 - 11:10 am	Jonas Kindberg, Jon E Swenson, Göran Ericsson, Eva Bellemain and, Pierre Taberlet	Estimating population size and trend for the Swedish brown bear population
5	11:10 - 11:30 am	Paolo Ciucci, V. Gervasi, E. Tosoni, and L. Boitani	Assessing demography of small bear populations for practical conservation: the Apennine brown bear in Italy
6	11:30 - 11:50 am	Katherine C. Kendall, Jeffrey B. Stetz, John Boulanger, Amy C. Macleod, David Paetkau, and Gary C. White	Demography and genetic structure of a recovering grizzly bear population
7	11:50 - 12:10 pm	Alexander Kopatz, Hans Geir Eiken, Siv Grete Aarnes, Camilla Tobiassen, Minna Ruokonen, Rodrigo Esparza-Salas, Martin E. Smith, Leif Ollila, Ingvild Wartiainen, Olga Makarova, Natalia Polikarpova, Konstantin F. Tirronen, Nikolay L. Rendakov, Pjotr I. Danilov, Alexandr Rykov, Julia Schregel, Ilpo Kojola and Jouni Aspi	Population structure of the brown bear in four different areas in north eastern Europe
		Lunch	

(Cont. Monday, May 17)

	1:30 - 2:50 pm	**SESSION 2. ENGAGING PEOPLE IN SUCCESSFUL BEAR CONSERVATION. Chair: Mike Gibeau**	
8	1:30 - 1:50 pm	Felicity Edwards and Mike Gibeau	Resolving wicked conservation challenges--it's about the people
9	1:50 - 2:10 pm	Muhammad Ali Nawaz	Involving communities in conservation of large carnivores in Pakistan
10	2:10 - 2:30 pm	Seth M. Wilson	Building human communities of coexistence for bears: the importance of prototypes for transferring innovations
11	2:30 - 2:50 pm	Invited Speech: Alistair Bath	Building a national brown bear management plan using a human dimension facilitated workshop approach
		Coffee Break	
	3:10 -6:30 pm	**SESSION 3. HUMAN - BEAR INTERACTION/CONFLICTS. Chair: John Beecham**	
12	3:10 - 3:30 pm	Ozgun Emre CAN, Eray Caglayan, John Beecham, Taner Hatipoglu, Hasan Emir, and Fehmi Arikan	Human-bear conflict in turkey: a model project for resolving the conflict
13	3:30 - 3:50 pm	Klemen Jerina, Uroš Videmšek, Marko Jonozovič, and Miha Krofel	Using GPS telemetry to study human-bear conflicts in Slovenia
14	3:50 - 4:10 pm	Oguz Kurdoglu, Ozgun Emre Can, Alistair Bath, Yildiray Lise	Where rural residents don't like brown bears: understanding attitudes toward brown bears in Artvin, Turkey
15	4:10 - 4:30 pm	Huseyin Ambarli	Students' perception of brown bear and other wildlife in turkey: comparing a rural public school in Artvin and a private one in Ankara
		Dinner - on your own	
	6:00 - 6:30 pm	Side Event: Documentary prepared by the World Society for the Protection of Animals (WSPA) and the Wildlife Trust of India (WTI)	Protecting India's sloth bears: Conservation and welfare through community-based change.
	6:30 - 9:00 pm	Workshop #1 Captive Bear Issue and Its Management – The Bear Sanctuaries	
	6:30 - 9:00 pm	Workshop #2 Human Bear Conflict in the Caucasus	

TUESDAY, MAY 18			
	Time	**Activity**	
	All day	Airport Shuttle	
	All day	Presentation downloads	
	All day	Coordinator's workroom, storage room	
	Time	**Authors/Activity**	**Title**
	9:00 - 9:10 am	Announcements	
	9:10 am -3:50 pm	**SESSION 4. BEAR MANAGEMENT. Chair: Djuro Huber**	
16	9:10 - 9:30 am	Miha Krofel, Hubert Potočnik, Marko Jonozovič, and Klemen Jerina	Brown bear demography in Slovenia: managing a part of a population
17	9:30 - 9:50 am	Ilpo Kojola, Samuli Heikkinen, and Sanna Kokko	Wildlife tourism and bears: biological effects and human safety
18	9:50 - 10:10 am	Shyamala Ratnayeke and Frank T. Van Manen	Can sloth bears serve as an umbrella species for carnivore conservation in Sri Lanka?
19	10:10 - 10:30 am	Harry V. Reynolds, Derek Craighead, Luvsamjamba Amgalan, Mijiddorj Batmunkh, Tuya Tserenbataa, and Michael Proctor	Mongolia: Conserving the last bears of the Gobi Desert
Coffee Break			
20	10:50 - 11:10 am	Invited Speech: Jon Swenson	Making the best of a bad situation: European brown bears coping with human-dominated landscapes
21	11:10 - 11:30 am	Michael Proctor, John Boulanger, Scott Nielsen, Wayne Kasworm, Chris Servheen, Tom Radandt, and David Paetkau	Understanding causes for depressed grizzly bear populations in southern Canada using ecological modeling
22	11:30 - 11:50 am	Richard Bischof and Jon Swenson	Estimating the annual number of reproducing females in a transborder population. Whose bears are they?
23	11:50 - 12:10 pm	Jack B. Hopkins and Paul L. Koch	Use of stable isotopes to evaluate human-bear management success in Yosemite national park, ca, USA
Lunch			
	1:30 - 3:30 pm	IBA MEMBERS MEETING	
	1:30 - 3:30 pm	Workshop # 3: Large Carnivores in the Caucasus (under auspices of the Council of Europe/Bern Convention)	
Coffee Break			

(Cont. Tuesday, May 18)

	3:50 -5:10 pm	**SESSION 5. BEAR GENETICS. Chair: Michael Proctor**	
24	3:50 - 4:10 pm	Marju Corsten, Simon Y. Ho, John Davison, Egle Vulla, and Urmas Saarma	Brown bear phylogeography in northern continental Eurasia: comparative analysis of partial and complete mitochondrial genomes.
25	4:10 - 4:30 pm	Egle Vulla, Marju Korsten, John Davison, Jaanus Remm, Alexei V. Abramov, Igor Tumanov, Alexander P. Saveljev, Ilpo Kojola, Peep Männil, and Urmas Saarma	Genetic structure of the brown bear population in north-eastern Europe based on analysis of microsatellite data
26	4:30 - 4:50 pm	Marta De Barba, Lisette Waits, Piero Genovesi, Ettore Randi, and Claudio Groff	The power of genetic monitoring for studying demography, ecology, and genetics of a reintroduced brown bear population
27	4:50 - 5:10 pm	John Davison, Maarju Korsten, Egle Vulla, Maris Hindrikson, Simon Ho, and Urmas Saarma	Timing estimates enhance our understanding of brown bear phylogeography.
Dinner - on your own			
	7:00 - 9:00 pm	Poster Session	
	8:00 - 9:00 pm	Side Event: Documentary presented by the World Society for the Protection of Animals (WSPA) and prepared by TRT - Turkish Radio and TV Corporation	Bear vs. Man: the Endless Conflict

WEDNESDAY, MAY 19
7:00 am - 6:00 pm - FIELD TRIPS

THURSDAY, MAY 20			
	Time	**Authors/Activity**	**Title**
	9:00 - 9:10 am	Announcements	
	9:10 am - 12:10 pm	**SESSION 6. BEAR BEHAVIOR AND BEHAVIORAL ECOLOGY. Chair: Jon Swenson**	
28	9:10 - 9:30 am	Andreas Zedrosser, Fanie Pelletier, Marco Festa-Bianchet, and Jon E. Swenson	Female fitness in relation to sexually selected infanticide in a hunted population of brown bears
29	9:30 - 9:50 am	Jeff Stetz, Kate Kendall and Chris Servheen	Evaluation of bear rub surveys to monitor grizzly bear population trends
30	9:50 - 10:10 am	Melanie Clapham, Nevin, O. T., Rosell, F., and Ramsey, A. D	Preliminary findings assessing the olfactory communication strategies of brown bears
31	10:10 - 10:30 pm	Ole-Gunnar Støen, Gro Kvelprud Moen, Veronica Sahlén, and Jon E. Swenson	The behavior of Scandinavian brown bears when meeting humans
Coffee Break			
32	10:50 - 11:10 pm	Ami Nakajima, Shinsuke Koike, Takashi Masaki, Koji Yamazaki, Chinatsu Kozakai, Koichi Kaji	Foraging behavior of Asiatic black bear in relation with the temporal change of fruit abundance of various species in cool temperate forest, Japan

33	11:10 - 11:30 am	Kyoko Kobayashi, Sato Y., and Kaji K.	Brown bears predation on sika deer fawns following its population growth in eastern Hokkaido, Japan
34	11:30 - 11:50 am	Ole Fröbert, Christensen K ., Fahlman Å., Brunberg S., Josefsson J., Särndahl E., Swenson J. E., and Arnemo J. M	Platelet function in the Scandinavian brown bear compared to man
35	11:50 am - 12:10 pm	Sam Steyaert, Klaus Hackländer, Jon E. Swenson and Andreas Zedrosser	Intersexual brown bear associations during the breeding season in central Sweden
Lunch			
	1:30 - 4:30 pm	**SESSION 7. BEAR MOVEMENT AND HABITAT USE. Chair: Andreas Zedrosser**	
36	1:30 - 1:50 pm	Bejan Lortkipanidze, Irakli Shavgulidze and Giorgi Mikeladze	Brown bear habitat modeling in the Georgia
37	1:50 - 2:10 pm	Shinsuke Koike, Koji Yamazaki, Takashi Masaki, Chinatsu Kozakai, Yui Nemoto, Ami Nakajima, Yoshihiro Umemura, and Koichi Kaji	Relationships between Asiatic black bear behavior, autumn food habits, and hard mast production in Japan
38	2:10 - 2:30 pm	Leonardo Bereczky, Silviu Chiriac, and Ramon Jurj	A comparison of home range size, movements, habitat use and activity patterns of released orphan brown bears and wild captured brown bears in the Carpathian Mountains of Romania
39	2:30 - 2:50 pm	Sgardelis ST., Mazaris Ant., Mertzanis G., Giannakopoulos Al., and Aravidis El.	Dispersal ability, habitat suitability and distribution patterns of brown bears as affected by the newly constructed Egnatia highway – n. Pindos - Greece.
Coffee Break			
40	3:10 - 3:30 pm	Tabitha Graves, Katherine C. Kendall, J. Andrew Royle, Paul Beier, Jeffrey B. Stetz, and Amy Macleod	Landscape characteristics influence local grizzly bear abundance
41	3:30 - 3:50 pm	Robert Steinmetz, David L. Garshelis, and Wanlop Chutipong	The shared preference niche of sympatric Asiatic black bears and sun bears in a tropical forest mosaic
42	3:50 - 4:10 pm	Patricia E. Reynolds, Harry V. Reynolds, and Richard T. Shideler	Movement Rates And Denning Chronology Of Grizzly Bears In Northeastern Alaska Using Global Positioning System Satellite Collars
43	4:10 - 4:30 pm	Isao Arimoto, Yusuke Goto, Chika Nagai, and Kengo Furubayashi	Autumn Food Habits and Movements of Asiatic Black Bears on Toyama Prefecture, Japan: Regarding Hard Mast Production of Beech Family
Dinner - on your own			
	6:30 - 9:00 pm	Special Event/Training: Human Dimensions – Working with people toward effective conservation (by Alistair Bath)	
	6:30 - 9:00 pm	Workshop #4 Common Guidelines for Genetic Study of Brown Bears (Ursus arctos) in Europe	

FRIDAY, MAY 21			
	Time	**Authors/Activity**	**Title**
	9:00 - 9:10 am	Announcements	
	9:10 am - 12:30 pm	**SESSION 8. STATUS & CONSERVATION OF EURASIAN BEARS (Coordinated by IUCN/BSG). Chair: Dave Garshelis**	
44	9:10 - 10:30 am	Dave Garshelis	Introduction to session
45		Jon Swenson and Djuro Huber	Status & conservation of European brown bears
46		Pierre-Yves Quenette	Case study report on conservation of brown bears in the Pyrenees
47		Dave Garshelis	Past and present distribution of the black and brown bears of Asia
48		Tsutomu Mano	Status & conservation of North Asian brown bears
49		Ozgun Emre CAN and Sathyakumar Sambandam	Status & conservation of South Asian brown bears
50		Dave Garshelis and Mei-Hsiu Hwang	Status & conservation of Asiatic black bears
		Coffee Break	
51	10:50 am - 12:30 pm	Mei-Hsiu Hwang	Distribution and conservation status assessment of Asiatic black bears in Taiwan
52		Gabriella Fredriksson and Rob Steinmetz	Status & conservation of Sun bears
53		Gabriella Fredriksson	Case study report on habitat loss and poaching of sun bears in Indonesia
54		Matt Hunt	Case study report on the SE Asian bear farms & trade in bear parts
55		Harendra Singh Bargali	Status & conservation of Sloth bears
56		Neil D'Cruze	Case study report on the status of dancing sears in India
57		Dajun Wang	Status & conservation of giant pandas
58		Jose Kok	Conservation implications for captive bears in Eurasia
59		Brij Kishore Gupta	Case study report on captive bears in India
	12:30 - 1:00 pm	**Closure of the Conference: IBA President's Closing Remarks**	
		Lunch	
	2:30 - 5:30 pm	Students Meeting *(4:20-4:40 Coffee Break)*	
	2:30 - 5:30 pm	IUCN Bear Specialist Group Meeting *(4:20-4:40 Coffee Break)*	
	7:00 PM	Conference Busses Depart for Gala Dinner	
	7:30 - 10:30 pm	Gala Dinner	

Side Events

1. Documentary presented by the World Society for the Protection of Animals (WSPA) and prepared by TRT - Turkish Radio and TV Corporation

Title of the Documentary: "BEAR VS MAN: THE ENDLESS CONFLICT"

Synopsis: The overlapping habitats of bears and humans in Turkey arecreating more and more conflict between the two species. Bears harm people's orchards, farms and beehives, all of which are of great importance to the low-income local people. But what can the bears do when their natural food sources are destroyed? The problem is no joke, but the stories from the Black Sea region are colorful and humorous. The documentary aims to reveal these stories from the point of view of both bears and people, to introduce the species and to show the efforts of conservationists to find solutions.

Director-Producer: Ece Soydam TRT - Turkish Radio and TV Corporation

Scientific Advisor: Dr. Özgün Emre Can (Nature Society for Turkey & WSPA / Co-chair of South Asia Brown Bear Expert Team, IUCN Bear Specialist Group)

Duration: 55 minutes

2. Documentary prepared by the World Society for the Protection of Animals (WSPA) and the Wildlife Trust of India (WTI)

Title of the Documentary: Protecting India's sloth bears: Conservation and welfare through community-based change.

Synopsis: The sloth bears of India are under threat. Decreasing in number to under 20,000, poaching of cubs destroys entire family units. One aspect of this threat is the continued use of the sloth bear in bear dancing. Thanks to good work done by a number of NGO's, bear dancing has gradually receded to the remote rural hinterland of India, and many former dancing bears are now in lifetime sanctuary. The World Society for the Protection of Animals (WSPA) and the Wildlife Trust of India (WTI) have worked tirelessly to ensure that bear dancing becomes a thing of the past. Working with the forest state department and India's rural communities, enforcement and awareness campaigns have seen the extraction of bears cubs from the wild dramatically reduced. WSPA and WTI have also worked face to face with the bear dancing community, and challenged them to change and renew their lives, for their sake and for the protection of the sloth bear species.

Director-Producer: Rita Banerji – Andrew Davies and Aniruddha Mookerjee
Dusty Foot Productions, WSPA and WTI

Duration: 20 minutes

Special Event/Training

(By Alistair Bath)

Human Dimensions – Working with people toward effective conservation

Human Dimensions Wildlife Research (HDWR**)** can offer the following specific study objectives for managers:

Baseline assessment to begin attitudinal and belief monitoring

- Understanding attitudes and beliefs toward species,
- Monitoring how these attitudes and beliefs may change as the biological populations change (e.g., biological populations may increase possibly causing more conflicts, or decrease having them become more endangered and possibly valued more by the public), as various policy decisions are made, and as education efforts are implemented,
- Can help identify wildlife acceptance capacity (i.e., how many animals or how much livestock/crop losses will be tolerated from a species) by various interest groups.

Understanding public attitudes toward possible management approaches

- Testing public support or opposition in a representative way toward proposed management options before implementing them to gauge public interest and understanding,
- Traditional means may be through public meetings or listening to complaints written into the government, but unfortunately such data collected through these mechanisms is not representative of the entire resource constituency.

Targeting educational programs on key beliefs affecting attitudes and behavior

- Often educational messages are targeted too high, too low, or on information that is not terribly important in influencing attitudes,
- In addition, most educational material is created without any assessment of what the target audience already knows and doesn't know and using mechanisms and messengers that may not be most effective,
- Assess beliefs, link key beliefs to attitudes, understand the other components of communication (e.g., credibility of messenger, mechanism to reach various target audiences, and how this may vary over space even within the same interest group).

Identifying the nature of conflict in wildlife management issues

- Conflict resolution is only possible once the type of conflict is identified and understood,
- There are four types of conflict: cognitive conflict based on beliefs, value conflict, costs/benefits conflict, and behavioral conflict based on trust and credibility issues.

Building partnerships by bringing diverse interest groups together around a common data set

- Known as a human dimension applied research facilitated workshop approach, which brings diverse interests into the same room to build toward consensus, obtain a common vision, and a common set of objectives, and eventually a common understanding of the problem and the solution.

Join Dr. Alistair Bath (Human Dimensions in Wildlife Management, Department of Geography, Memorial University, St. John's, NL, Canada, A1B 3X9 E-mail contact: abath@mun.ca) for a 2.5 hour training session on human dimensions. Alistair will focus on techniques to engage the various publics (i.e. how to build partnerships by bringing diverse interest groups together) sharing the nature of such public involvement tools, and offering at the same time some facilitation training.

SESSION 1. CONSERVATION OF BROWN BEAR

Chair: Frank Van Manen

Paper 1

HOW MANY BEARS IN THE CANTABRIAN MOUNTAINS? AN INDEX OF POPULATION DENSITY FOR BROWN BEARS IN N-W SPAIN

ALBERTO FERNÁNDEZ-GIL[1,2], JAVIER NAVES[1,2], MARIO QUEVEDO[2,3], ELOY REVILLA[1], MIGUEL DELIBES[1]
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(2) Instituto Cantábrico de Biodiversidad (Principado de Asturias / CSIC/ Universidad de Oviedo), E-33006 Oviedo, España
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Estimating density, size and trends of populations in large carnivores usually involve huge logistic efforts and constraints, due to their elusiveness and low densities. Nevertheless, the goal is especially critical in endangered or threatened populations because of their conservation importance.

Brown bears (*Ursus arctos*) in the Cantabrian Mountains (northwest Spain) are an endangered population because of low numbers and limited habitat availability. That said, no systematic method has been used yet to estimate population size, although population trends have been monitored using the counts of females with cubs of the year (*Fcub*) as a surrogate index. The Cantabrian bear population size was indirectly estimated as 70-90 bears in the early 1990's (50-65 bears in the western subpopulation and 20-25 in the eastern one).

We performed a systematic survey via direct observation of bear suitable habitats during three consecutive springs (2005-2007). We looked for bears from vantage points that allowed us to survey drainages and slopes of terrain in bear habitat. Our goal was to explore the detection probability of bears, accounting for factors such as the size of the area that was surveyed, search time, observer, time of the day (AM *vs.* PM) attempts, and the distance from the observer to the bear or the observed drainage.

Surveys were conducted in the western Cantabrian subpopulation, covering the whole altitudinal range of the bear area (400-2,000 m. a.s.l.). Observation attempts were made from 69 fixed points, surveyed 5 times (visits) each spring. We obtained 84 direct observations of bears from 768 attempts, and observed 0-18 bears (all ages) in each round of surveys. Distance from the observer ranged from 343 m. to 4,968 m. We estimated a density of 2.4-3.1 bears / 100 km2. Proportion of Fcub in the observed number of bears, pooling the data from the three years, was 9% (all ages) and 14% (considering only independent individuals, excluding cubs).

Extrapolating densities to the whole area within bear range, we obtained a population size estimation coinciding with that coming from the proportion of *Fcub* by considering the known annual count of *Fcub*, i.e., around 110 bears of all ages in the western Cantabrian subpopulation.

This study is included in the Brown Bear Research Projects 2004-2007 and 2008-2010 carried out by Principado de Asturias and the Estación Biológica de Doñana (Spanish Council of Research, CSIC).

Paper 2

WHAT WENT WRONG WITH THE BROWN BEARS IN CENTRAL AUSTRIA? LESSONS OF AN UNSUCCESSFUL REINTRODUCTION EFFORT

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In the years 1989 – 1993 WWF Austria released three brown bears (1M, 2F) in central Austria within the home range of a single male. This resident bear was an exceptional long distance disperser from the Slovenian bear population that has settled in the area already in 1972. The development of the population was closely followed by collecting bear sings and reports of observations, radio-tracking (until 1999), and genetic monitoring (since 2000). The small population nucleus was fairly productive: 31 cubs were born from 1992 – 2006, three females reached sexual maturity at the age of 2 years, and >50% of the litters contained 3 cubs. These findings can be taken as a proof that the habitat in the Alps of central Austria was suitable for the development of a bear population. Nevertheless, population size did not surmount the maximum of 12 individuals reached in 1999 and has constantly declined since then. Today there are only two male bears left, the released male and one of its offspring, with practically no chance to be reached by a dispersing female from one of the bear populations in neighbouring countries. The reason for the failure of the bear population in central Austria was the high mortality rate, especially in yearling cubs. There is no evidence for disease, infanticide or inbreeding depression to explain the high mortality rate. Illegal killings are suspected to be a major cause but apart from rumours and indications this could be proved in only one case. Together with the very low number of bears at the beginning making the population vulnerable to stochastic effects even a low but sustained number of illegal killings may explain the unsuccessful development of the bears in central Austria.
Not only success but also failure has many fathers. We will discuss the legal and political background of brown bear conservation in Austria at provincial, state and EU level, try to explain the passive role of responsible administrations, examine the obstacles to involve landowners, farmers and hunters into bear conservation programs, and highlight the problematic dominance of WWF Austria in the bear topic in Austria and the difficulties of WWF Austria to cooperate effectively with stakeholders and administrations in the bear project. Ensuring a bear population in Austria will require active augmentation. The public has a positive attitude towards bears and the majority even favours restocking measurements. What is missing most for an active bear management in Austria is the political will. So far the brown bear conservation lobby in Austria did not succeed in translating the positive attitude of the public into public pressure on politicians to support brown bear conservation actively.

Paper 3

AN UPDATE ON THE STATUS, MANAGEMENT AND CONSERVATION OF KAMCHATKA BROWN BEARS

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Brown bears are distributed throughout 95% of the Kamchatka Peninsula in a wide variety of habitats. Bear densities are highly correlated to available food sources, most importantly Pacific salmon. Other important food sources include Siberian dwarf pine nuts, assorted berries, coastal plains and marine mammals and vegetation. In 2008, the official published bear population estimate from the Central-Hunting-Control agency for Kamchatka was 17,900 bears, including the Koryak region. The population estimation methods were not specified. In 1996, an aerial survey estimated that their were 10,268 brown bears in the Kamchatka Region, excluding the Kronotsky Zapovednik and Koryak region. No formal survey has been completed for the Koryak Region. Expert opinion suggests that the bear population is stable or increasing. Hunting pressure has remained relatively stable for the past decade. The spring hunt was closed for 2005 and 2006, while the fall hunt continued. Demand for trophy hunting remains stable as hunting brown bears in Kamchatka remains affordable and highly successful. The official harvest of brown bears was 569 bears in 2007 and 646 bears in 2008 for all of Kamchatka including the Koryak region. Poaching surveys conducted in 1996 and 2002 revealed that both the quantity and nature of poaching has changed in Kamchatka. The 2002 survey revealed that there are approximately 250-500 bears killed by poacher annually. Poaching for bear parts has decreased while poaching for meat and sport has increased. Between 2000 and 2009 the cost of helicopters have increased by more than 500% resulting in reduced incidents of poaching bears from helicopters. The price for a gram of bear gall bladder has fallen from a high of $5-8 USD in the mid-1990s to between $1-2 and in 2008. Enforcement of poaching violations remains low with an average of two poaching prosecutions annually, while fines remain minimal. Limited data from radio-collars and GPS-collars have shown that adult male home range sizes vary between 90 and 1500 km^2, while female home ranges can vary between 20 and 1100 km^2. Social dynamics varied amongst bears in different areas, specifically in relation to the abundance of food resources. Brown bears in Kamchatka are more socially tolerant in during periods of high food abundance, specifically high salmon runs. During low salmon runs male bears tend to dominate salmon streams and instances of intraspecific aggression increase. There were at least 345 records of human bear conflicts recorded by the Kamchatka Hunting Department between 1981 and 2004, and 85 reports recorded in protected area annual reports between 1999 and 2004. Conflict reports were associated with the killing of a bear, livestock loss, property damage, human injury and human death. There was an average of one bear caused human mortality per year between 1981 and 2009. At least 308 bears were reported killed in conflict situations during this period. Types of conflicts included: encounters (36%), livestock and sea otter depredation (32%), material loss (18%), bear attacks (11%) and garbage (3%). Efforts to increase awareness and knowledge of bear behaviour and safety are gradually increasing. Various agencies have produced and distributed bear safety information through a variety of media, but the public awareness of bear safety remains minimal and education efforts need to be increased.

Paper 4

ESTIMATING POPULATION SIZE AND TREND FOR THE SWEDISH BROWN BEAR POPULATION

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Population monitoring is a key issue in conservation and managing of large carnivores. The rebounding brown bear population (*Ursus arctos)* in Sweden is monitored by two different systems, both relying on voluntary resources. For population estimations a DNA-based scat survey has been employed since 2001 in 5 out of 6 counties (17,500 – 78,800 km^2) with established bear populations, and estimates calculated with Capture-Mark-Recapture methods. A total of 1358 genotypes have been identified using DNA extracted from collected scats. An independent ongoing program, the large carnivore observation index (LCOI), was started in 1998. The LCOI uses effort-corrected observations of bears during the moose (*Alces alces*) hunt (> 2 million observations hours /year) and has shown a good correlation with density of bears using the DNA-based estimations. From the observations made by hunters, we have calculated population trends as well as distribution in different counties during the period 1998-2007. We estimated the yearly increase in the bear population to be 4.5 % at the national level, varying between 0 and 10.2 % in different counties, using an exponential model. We used the regional population estimates and the trends from the LCOI, taking the variation from both systems into account with a Monte Carlo approach, to calculate the regional, as well as national population size in Sweden. In one case (the northernmost county, Norrbotten) a DNA-scat survey was lacking, so assumptions based on data from the neighbouring county had to be used for calculations of the population size. We estimated the Swedish brown bear population to be 3221 (2950-3492) individuals in 2008. Our results suggest that reliable information, using standardized methods, about the brown bear population can be obtained from volunteers at relatively low cost.

Paper 5

ASSESSING DEMOGRAPHY OF SMALL BEAR POPULAITONS FOR PRACTICAL CONSERVATION: THE APENNINE BROWN BEAR IN ITALY

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The Apennine brown bear survives in a small and isolated population in the Abruzzo National Park and adjacent areas (ca. 1,300 km^2) in central Italy, but only recently it gained formal scientific attention to support conservation actions. However, in small, remnant populations such as this rigorous estimation of key demographic parameters is inherently challenged by theoretical and methodological limitations, and costly population assessments may result in imprecise and poorly meaningful estimates. By using a capture-mark-recapture (CMR) closed population Huggins-Pledger models framework (Program MARK), we faced this problem by adopting a multiple data-source approach, mostly based on non-invasive genetic sampling integrated with other data sources (visual observations, live-trapping). We started in 2004 with a naïve hair-snag sampling for a preliminary DNA-based CMR application, and then followed in 2007 with a pilot study to assess the feasibility of an improved hair-snag field protocol aimed to increase capture probability. From 2006, we also (*i*) annually estimated (bias-corrected Chao estimator) minimum reproductive rates from unduplicated counts (systematic and casual observations) of females with cubs, and (*ii*) live-trapped, marked (GPS-collars, ear-tags) and genotyped 18 bears for individual recognition. This composite dataset allowed us to adopt in 2008 an integrated CMR modeling approach to better address sources of heterogeneity and low capture probability, as well as to accommodate for broad age-class (cubs of the year, males and females > 1 year) contribution to population size. We additionally compiled known bear mortalities since the 1980.

Estimates of population size ranged from 43 (95% CI: 35-67) bears in 2004, to 40 (95% CI: 37-52) bears in 2008, the latter corresponding to a closure corrected density of 33 bears/1,000 km^2 and including 18 females >1 year of age (95% CI: 16-24) and 11 cubs of the year (95% CI: 10-15). Each year, from May to September, we made systematic observations from 94 (±11SD) vantage points, resulting in an annual average of 97±8 bear sightings, 15±5 of which involved females with cubs of the year at a sighting rate of 1.8±0.9 sightings of females with cubs of the year/100 hrs of observation effort. Including casual observations, and applying telemetry-based criteria for unduplicated counts, we $Chao_2$-estimated 3–6 females with cubs in the population each year, although with limited precision due to the small sample size (mean 95% CI coverage = 84.4±37%). Mean litter size at first sight in summer (May-September, n=18) was 1.8±0.6 cubs/female (range: 1–3 cubs/female), and the interval between successful litters measured for two marked females was 3 years. Known bear fatalities from 1980-2009 (n=80) averaged 2.7±2.8 bears/year or 0.97 adult females/year, and peaked from 1980 to 1985 (5.7±4.4 bears/year, or 2.4±0.8 adult females/year). Out of 47 verified bear deaths, 80.8% accounted for human-related mortality 71% of which due to illegal killing. To further investigate the potential effect of mortality on population dynamics, we applied a Cormack-Jolly-Seber model (program M-SURGE) to estimate age-specific apparent survival probabilities, based on a composite dataset of CMR data collected from 2003 to 2008, and then used survival rates to run an age-structured model (program ULM) and estimate population growth rate. Survival probabilities for females ≥2 years of age (0.977; 95% CI: 0.931–0.998) were higher than those of males, yearlings and cubs, but the projected growth rate (λ=1.050; 95% CI: 0.936–1.142) was negatively affected by slight increases in adult female mortality more than any other demographic variation, including productivity and cub/yearling survival. It follows from our results that effectively reducing human-related mortality risk and allowing for the natural expansion of the range are by far the two most important goals for the conservation of this small and unique brown bear population.

Paper 6

DEMOGRAPHY AND GENETIC STRUCTURE OF A RECOVERING GRIZZLY BEAR POPULATION

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Grizzly bears (brown bears; *Ursus arctos*) are imperiled in the southern extent of their range worldwide. The threatened population in northwestern Montana has been managed for recovery since 1975, yet no rigorous data were available to monitor program success. We used data from a large noninvasive genetic sampling effort conducted in 2004 and 33 years of physical captures to assess the abundance, distribution, and genetic health of this population. We combined data from our 3 sampling methods (hair trap, bear rub, and physical capture) to construct individual bear encounter histories for use in Huggins–Pledger closed mark–recapture models. Our population estimate, $\hat{N}$ = 765, was very precise (CV = 3.8%) and more than double the existing estimate derived from sightings of females with young. Based on our results, the estimated known, human–caused mortality rate in 2004 was a 4.6% (95% CI: 4.2–4.9%), slightly above the 4% considered sustainable; however, the high proportion of female mortalities raises concern. We used location data from telemetry, confirmed sightings, and genetic sampling to estimate occupied habitat. We found that grizzly bears occupied 33,480 km^2 in the NCDE during 1994–2007, including 10,340 km^2 outside the area thought to be occupied in 1993. We used factorial correspondence analysis to identify potential barriers to gene flow within this population. Our results suggested that genetic interchange recently increased in areas with low gene flow; however, we also detected evidence of incipient fragmentation across the major transportation corridor in this ecosystem. Our results suggest that the NCDE population is faring better than previously thought, and highlight the need for a more rigorous monitoring program.

Paper 7

POPULATION STRUCTURE OF THE BROWN BEAR IN FOUR DIFFERENT AREAS IN NORTH EASTERN EUROPE

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Fennoscandia and North western Russia possess one of the largest brown bear (*Ursus arctos*) populations in Europe. North western Russia is assumed to be a reservoir for large carnivores immigrating towards the west. Finland (FI) and Norway (NO) share a border with Russia (RU) and border crossings of brown bears are observed regularly. Studies on the movement of bears equipped with GPS devices have shown movement of the bears in both directions. In this study we have used population genetic methods to investigate if the brown bears of Finland, Norway and North western Russia are connected and test if the population is continuous. We applied genetic methods to study population structures, the genetic diversity and the effective population sizes of brown bears in four different geographical areas; Pasvik-Inari-Pechenga (NO, FI and RU), Kainuu (FI), Karelia (RU) and Pinega (RU). All Samples were from the time period from 2005 until 2008, and consisted mainly of scats and hairs collected non-invasively, while some tissue samples were collected from legal harvest. Molecular genetic analyses were performed using 13 different microsatellite markers which identified 159 individuals. The following analysis of genetic variation showed an overall heterozygosity for the four different areas of an average of 0.75. We found that the number of alleles (9.3 - 8.2) decreases from east towards west whereas the F_{IS} numbers (0.04 - 0.07) increase. The AMOVA-analysis revealed that most variation can be found within the populations and little differentiation between them. Nevertheless, different analyses on population differentiation including bayesian approaches, suggested the subdivision of the brown bears into four or three subpopulations (depending on analysis method). A significant negative relationship between geographic distance and genetic relatedness was found and pointed to isolation by distance. Analyses of migration between the sampled areas resulted in low numbers for migration. These results were supported by an assignment analysis, which detected only a few migrants per generation. Our findings hint towards beginning separation of subpopulations especially in connection with low migration numbers. These results represent the start of the long-term genetic monitoring of the brown bears in Finland, Norway and North western Russia and more detailed results are expected soon.

SESSION 2. ENGAGING PEOPLE IN SUCCESSFUL BEAR CONSERVATION

Chair: Mike Gibeau

Paper 8

RESOLVING WICKED CONSERVATION CHALLENGES--IT'S ABOUT THE PEOPLE

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Addressing resource management problems successfully is a complex task that involves knowledge both of the problem itself and its context. This paper focuses its discussion on the ways in which to involve people who both have an interest in and value the resource in different ways.
In recent years, efforts to manage grizzly bears (Ursus arctos) in Banff National Park have been hindered by acrimonious disputes about the production and use of scientific knowledge in the management This paper describes the range of involvement practices used - moving along a spectrum - from the typical methods used such as informing to the use of more collaborative methodologies such as organizing frameworks for more innovative solutions.
We describe the differences in process and outcomes to the wicked problems of grizzly bear conservation. In this presentation we discuss the design and outcomes of the discussions, the reality on the ground and the implications for both organizational change and learning.

Topics discussed in this paper are organized around FIVE main questions:

- What does it take to get people to the table?
- What does it take to get people to see themselves and others in value terms?
- What are the working assumptions of a group discussing a “wicked” issue such as this?
- What is needed inside the participating organizations to enable this integrative approach to be successful?
- What is the role of leadership in these situations?

Paper 9

INVOLVING COMMUNITIES IN CONSERVATION OF LARGE CARNIVORES IN PAKISTAN

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In the Himalayan region of the South Asia, rangelands and livestock are dominant sources of subsistence and are the major cause of conflicts with the conservation of mammals. Consequently all large mammals are threatened with extinction in Himalaya. Carnivores are particularly vulnerable, because they are poorly accepted by the public, as they pose a threat to livestock. Therefore any conservation program is unlikely to succeed without addressing community concerns and introducing means to engage them in conservation. I present cases of successful conservation of two large carnivore species (the brown bear, and snow leopard) from Pakistan, where community participation has been a strong element.
The brown bear conservation program was initiated in Deosai National Park, and community participation was achieved by recognizing traditional community rights in the park, sharing park revenues with communities and also involving them in the management. The population of the Himalayan brown bear was monitored from 1993 through 2006, in order to assess impact of the conservation program. Nineteen brown bears were counted at the beginning of the program in 1993, which increased to 43 in 2006. Population growth rate was estimated at 5% annually (95%CI: 1.03, 1.07), by regressing population size (ln N) on year. The key factors behind the population recovery appear to be the reduction of human-caused mortalities and community participation.

The snow leopard conservation program was initiated in Chitral District of the NWFP. The community support towards the cat conservation was built through two innovative programs; Snow Leopard Friendly Vaccination Program (SLFVP), and Snow Leopard Enterprise (SLE).
The SLFVP reduces disease cased mortalities of the community owned livestock, with the understanding that community would tolerate snow leopard predations. SLE offers opportunities to livestock owners and general community members specially women folk to increase their household income in return for a commitment to protect the snow leopard and its natural prey. Recent community survey find enhanced public tolerance, because 92% people from the program sites are willing to increase population of snow leopard despite of high depredation rates. Besides admiring beauty and ecological role of the cat, majority people link presence of snow leopards to the community support programs. An annual eight percent increase in signs of the snow leopard, captured in sign surveys conducted between 2001-2007, also suggest that the human acceptance has been well translated into population growth of the cat.

Paper 10

BUILDING HUMAN COMMUNITIES OF COEXISTENCE FOR BEARS: THE IMPORTANCE OF PROTOTYPES FOR TRANSFERRING INNOVATIONS

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The long term conservation of bear species worldwide depends on adequate habitat quantity and quality. In environments where bears and people overlap, conflicts and human caused mortality result, reducing the quality of habitat by increasing the risk death to bears. Since many bear species can use a variety of habitats, it is arguable that population persistence is largely governed by the choices people make, their behaviors and practices, and ultimately where people choose to allow bears to live. This applied research and conservation effort seeks to build a prototype for human-brown bear (*Ursus arctos*) coexistence using long term work in the US Northern Rockies (Montana). This prototype relies on a systematic approach that emphasizes understanding the social and ecological context and involves local people and communities in research, planning, and conservation. We used an integrative, multi-method approach relying on GIS field-based mapping and analysis, one-on-one meetings, workshops, field tours, and group meetings to actively engage the local community in data collection, community-based monitoring, and participatory projects focused on containing, removing, and or protecting attractants. Preliminary results from Montana where this framework was used, demonstrate that reported and verified human-bear conflicts have been reduced by 84% from 2003-2008 and that there is a downward trend in grizzly bear mortality for this same period. Important lessons learned from this effort are the following: 1) develop community-supported goals; 2) focus on changing practices and behaviors not values; 3) create inclusive decision-making forums that emphasis common not special interests; 4) recognize livelihood interests; 5) provide economic incentives; 6) work across jurisdictional boundaries at the correct biological scale; 7) practice adaptive management with community, and 8) cultivate the trust and support of key project partners. We discuss the transfer and adoption of innovations from our prototype to other communities in the Northern Rockies and Canada and the importance of moving from an expert dependency model of conservation to one of peer education.

Paper 11

Invited Paper

BUILDING A NATIONAL BROWN BEAR MANAGEMENT PLAN USING A HUMAN DIMENSION FACILITATED WORKSHOP APPROACH

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Traditionally, creating a bear management plan remained with a few individuals, often biological experts or government officials, and sometimes the task was assigned to an environmental NGO. Under such circumstances the experts and NGOs would do their best, design a management plan, but it would receive little to no support from other interest groups and became simply a paper document on a shelf with no relevant consequences. Conservation on the ground did not occur. Upon being asked by the Bulgarian government to write a national brown bear management plan, an environmental NGO decided instead to use a human dimensions (HD) facilitated workshop approach as an alternative to gain complete consensus between all interest groups. Nine facilitated workshops, several of which lasted for two days, including an open house format used to engage the broader public, were needed to reach an agreed plan on the ninth workshop. The Minister responsible for brown bear management approved the plan in January 2009 without any changes. Since 2009 illegal killing of brown bears has been minimized and the plan has remained accepted by all parties. The HD facilitated workshop approach has increased tolerance, built better trust and credibility, and allowed a diverse group of interests to effectively work toward a common agreed upon vision. The success of this brown bear planning process also initiated a similar process toward a wolf management plan. Working with different interest groups and perspectives rather than against them, will enable experts to achieve effective conservation and not be in the position of just defending their own ideas. For successful bear management, wildlife managers need to better engage all interest groups and begin integrating human dimension research and applied work within their decision-making.

SESSION 3. HUMAN - BEAR INTERACTION/CONFLICTS

Chair: John Beecham

Paper 12

HUMAN-BEAR CONFLICT IN TURKEY: A MODEL PROJECT FOR RESOLVING THE CONFLICT

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Brown bear (*Ursus arctos*) is a protected species however, human-bear conflict (HBC) is still the major reason for the illegal killing of brown bears in Turkey. Resolving the conflict is critical because HBC also reduces the social tolerance of local communities for other carnivores which in turn negatively affects conservation initiatives in Turkey. To address this issue, the Brown Bear Research and Conservation Project was initiated throughout the major conflict regions in Turkey. This is the first comprehensive project to focus on brown bears in Turkey and is directed by the Turkish Nature Association with support from the Turkish Ministry of the Environment. The project utilizes a holistic approach that focuses on five key areas that can be summarized as follows: research, damage prevention; capacity building; public awareness related activity; and habitat restoration. Specifically, we monitored the number of official HBC reports produced by local ministry units and relevant press articles released during the period 2000-2009. We also made regular field visits to the major conflict regions during this time to ascertain whether these reports actually reflect the true level of conflict occurring on the ground. We successfully captured 5 brown bears (2 bears in Artvin in 2008 and 3 bears in Kastamonu in 2009) by using Aldrich foot snares and fitted them with GPS collars. The primary objectives of the GPS collaring effort were to collect hard data regarding habitat use, movement, activity patterns, and to investigate the dynamics of HBC for the first time in 2 geographically distinct areas within Turkey. We also conducted a survey in Yusufeli, Artvin in 2006 to test whether camera-traps can be used to rapidly assess conflict bear activity. By working with local communities, we implemented and tested damage prevention techniques such as elevated platforms and electric fences to protect apiaries and orchards in Rize, Erzurum and Artvin. In addition to localised public awareness related activities, press releases were made and key articles were published in the Turkish press to positively influence public opinion on HBC. The project also featured on all major Turkish TV channels in addition to some international channels such as the BBC. Lastly in 2008, by Minister's declaration, the Turkish Ministry of Environment and Forestry started preparations for habitat restoration at a national scale. We found that 60% of the HBC events in Turkey (n=438) occur in May, July, August. 11.4% (46 events) of conflict events resulted in human injury and death, although the most prominent type of conflict appears to be damage to gardens (47.2% of reported cases). We revealed that Artvin and Kastamonu are the top HBC provinces. However, some other major conflict provinces were under represented in the current records. This indicates need for the proper monitoring of conflict events in Turkey. Camera-trapping proved to be highly successful. A capture rate of 24.7 bears/100 camera-trap nights was achieved in a conflict site in Yusufeli, Artvin. This was almost ten times higher than the maximum capture rate of bears that we observe in other natural areas throughout Turkey. The elevated platforms and electric fences also proved very effective in preventing bear damage since 2006. As a result, their use has gained popularity among the local communities. We conclude that: (1) the general lack of awareness and knowledge regarding brown bears; (2) the decrease in the quality of the suitable brown bear habitat and associated food supply; and (3) unprotected human property are the main causes of HBC in Turkey. Conflict resolution is possible by implementing government supported damage prevention techniques, increasing public awareness and habitat restoration in the major conflict areas throughout Turkey.

Paper 13

USING GPS TELEMETRY TO STUDY HUMAN-BEAR CONFLICTS IN SLOVENIA

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The brown bear (*Ursus arctos*) is in general regarded as an endangered species; however, its distribution and numbers have recently increased in several parts of Europe. This has also happened in Slovenia, but was paralleled with a substantial increase in human-bear conflicts during the last decade. The later was often considered a direct consequence of the former, but the number of conflicts increased much faster than what could be explained by the changes in bear numbers alone. Also, there does not seem to be much correlation between the distribution of conflicts and local bear densities. This makes questionable both the efficiency of bear culling as the main tool for conflict management, as well as the importance of absolute bear numbers, which received a lot of public attention and were often the main focus of bear management discussions. A better understanding of factors associated with human-bear conflicts is needed, especially since frequent conflicts often result in high culling rates, as was the case in recent years. This can be a serious obstacle to achieving long-term conservation goals, e.g. a future natural re-colonization of Eastern Alps. To gain a better understanding of the factors associated with the frequency of human-bear conflicts, we started an intensive bear telemetry study. In 2008 and 2009, we captured 26 bears, and collared 21 adults with GPS-GSM-VHF collars. To cover a wide gradient of regions with both different bear densities as well as different frequency of human-bear conflicts, the bears were captured evenly throughout the brown bear core area in Slovenia (approx. 3500 km^2). Collars were scheduled to obtain one GPS fix per hour over a one year period. All locations are continuously analyzed in GIS, with a special attention to the proximity of human settlements, available cover, and feeding stations. A fraction of all bear locations (about 1 %) are visited in the field to acquire additional data that can not be obtained from GIS, such as presence of natural or anthropogenic food, visibility, micro-relief structures etc. Locations are selected randomly, but weighted so that the locations where the bears are more likely to come into conflict with people, i.e. closer to human settlements or major roads, and located in the open terrain, have a higher probability of being selected. Using the same predefined rules, we select and field-check the same number of random control locations within or next to the individual bear home range. In total about 1000 of bear and control locations will be visited in the field by the end of the project in spring 2010. Preliminary results show that the bears are attracted into proximity of humans mainly because of availability of anthropogenic food (e.g. garbage, animal remains, composts, orchards, corn fields). We also noticed substantial differences in behaviour of individual bears, with a large proportion of all conflicts being caused by a relatively small number of bears. The extreme case was the notorious habituated male bear “Rožnik”, which was later illegally killed in Austria. All the bears were more or less regularly visiting feeding stations, but this did not deter them from approaching human settlements. Also, so far we did not observe that visiting feeding stations would lead to bear habituation to humans. While the availability of feeding places may decrease bear visits of human settlements to a certain degree, we feel that appropriate garbage and especially animal remains disposal, as well as protection of other anthropogenic food near villages, are the most important management measures that could decrease the danger of bear habituation to people and consequently reduce the number of human-bear conflicts in the human-dominated landscape of Slovenia.

Paper 14

WHERE RURAL RESIDENTS DON'T LIKE BROWN BEARS: UNDERSTANDING ATTITUDES TOWARD BROWN BEARS IN ARTVIN, TURKEY

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Understanding public attitudes especially of rural residents toward brown bears can help guide educational programs, public involvement strategies, preventative measures to minimize damage efforts and a better understanding of the nature of bear-human conflicts. Limited human dimensions research has been done in Turkey so little is known about how rural people feel about brown bears. Data were collected from residents living in 114 villages within the province of Artvin, Turkey through a quantitative questionnaire administered to a random sample of 1641 individuals using mainly personal interviews. In some cases, questionnaires were self-administered while the interviewer waited. The questionnaire focused on understanding attitudes toward existence and future generation values of bears, perceptions of damage, fear, beliefs about trends, experiences with bears and socio-demographic characteristics. Most rural residents held negative attitudes toward brown bears even lacking values of brown bears for existence and future generations. In Europe even where attitudes may be negative toward wolves and bears and toward protection management options, the public has still felt it was important the animal exists in the country and be there for future generations. Most rural Artvin residents did not support the current full protection of the brown bear in Turkey suggesting the need for a hunting season. On a small positive note, slightly more than half of the rural respondents did oppose year round hunting on brown bears. For successful brown bear conservation, there is a need to increase brown bear acceptance capacity within the rural landscape.

Paper 15

STUDENTS' PERCEPTION OF BROWN BEAR AND OTHER WILDLIFE IN TURKEY: COMPARING A RURAL PUBLIC SCHOOL IN ARTVIN AND A PRIVATE ONE IN ANKARA

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Numerous studies concerning the perception of large carnivores revealed attitudes of locals, hunters, tribes etc. On the other hand, there are few studies concerning the attitudes of students. However, one disregarded fact is that students' perception of wildlife now will determine the attitudes and perception of future adults, who are the main interest group of management and conservation strategies. Therefore, conservation biologists should more carefully analyze the education system and try to incorporate wildlife issues into the curriculum. For the first time in Turkey, this study aimed to reveal students' perceptions on brown bear (*Ursus arctos*) and other large wildlife and their attitudes towards conservation of brown bears, and develop recommendations for bringing up a young generation more sensitive to issues of wildlife conservation. Multiple choice questions were directed to students at two study sites in 2006 and 2007. A total of 313 students range 10 to 15 years old (mean age:12,89) participated: 215 of them were from a public school in a rural area and 98 of them were from an urban private school. Sex ratio was 1:0,95 (male : female**).** The rural study area is Yusufeli, Artvin, in the northeastern part of Turkey, and known to have a healthy population of brown bears and other large mammals in a forested landscape. Rural life in Yusufeli is based on small farm plots and orchards, and animal husbandry is declining due to immigration. The second study area is Ankara, the capital of Turkey, and the selected school is within a university campus with semi natural habitat. Mostly an urbanized life style exists even though there is significant wildlife presence only at an hour's drive in wooded areas and national parks. The education system there is more participatory and with better science education compared to the rural one. 50% of the urban students spend their time in natural settings once a month or once a year. Sources of information about wildlife are quite similar for both groups, except for watching TV documentaries, which is more common in urban schools whereas fairy tales or given talks have similar weight in both (20%). The questionnaire had 18 questions and the SPSS 15 statistical package was used in analysis at $p < 0.05$ significance level. General opinion about bears is positive (81 %) and only 16.5 % is negative. Most of the students (78.7 %) are afraid of bears with a higher percentage in rural students (88.7 %) than urban (57.1 %). The reason could be that there is a higher probability of bear encounter for the former group. Surveys implied that rural students are more familiar with bears than urban students. Rural students (70 %) claimed that bears are being illegally killed while 66.7% of urban students were not aware about illegal bear hunting. Only 15 percent of them have encountered bears in the nature. 90 % of rural students wished to learn more about bears than urban ones (89 % and 45 % respectively). There is no bear damage in Ankara but 39.3 % of rural students claimed to have observed damage. The perception of bear as a "cute" species is 73.8 %. Students were divided on whether living with bears is good or bad (53.1% and 46.3 % respectively). The idea of living with bears in the future is supported by 25.7 % and resisted by 24.4 %. Most of the students (69.6 %) accepted the idea that bear presence in nature is an indication of healthy natural processes. The results show that although students like the bears they are also afraid of them and not sure about living with them in the future. Rural students are afraid of wild boars more than any other animal whereas urban students were most afraid of wolves, followed by the wild boar. Brown bear is the third species the rural subjects were afraid of whereas the leopard was the third most fearsome in the urban school. Although rural students have experienced conflict with them, their most popular animal is still the brown bear. Urban ones admired the leopard more than other animals probably due to being more exposed to big cat documentaries. It would be important to implement wildlife issues in the education system, especially in rural areas, and that could help bear and other wildlife conservation in the future.

SESSION 4. BEAR MANAGEMENT

Chair: Djuro Huber

Paper 16

BROWN BEAR DEMOGRAPHY IN SLOVENIA: MANAGING A PART OF A POPULATION

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Because of large home ranges, low population densities, and long dispersal distances, brown bear and other large carnivore populations often extend over several administrative borders, and are consequently subject to sometimes very different management regimes. Since many populations are transboundary in nature, it is vital that their conservation and management are done in a coordinated and cooperative manner between all administrative units sharing such population. This is also recommended by the Guidelines for population level management plans for large carnivores in Europe. However, very little is known about the effects of harvesting on demography of a population that has different management regimes and harvesting strategies employed in different parts of its range. Brown bears (*Ursus arctos*) in Slovenia are a perfect study case for this problem: 1.) Slovenia represents only a part of the larger brown bear population, 2.) structure and the number of bears removed from population in Slovenia differs considerably from the neighbouring countries, 3.) bears in Slovenia are intensely managed and human-caused mortality represents the majority of all recorded mortality, and 4.) good long-term monitoring data about the removed bears are available. Bears in Slovenia are the north-western part of the Dinaric-Pindos population. The landscape continues without any physical barriers towards south-east into neighbouring Croatia, and the bears readily cross the national border. We have observed significant changes in demographic structure at the periphery of the bear population in Slovenia, with a steep decline of both bear densities and proportion of females towards the population edge in the north. The behaviour and space use of bears at the periphery also differs considerably from those of the bears in the core area (e.g. males at the periphery have larger home range sizes and appear to perform directional movements during the mating season). We analyzed demographic structure of the recorded brown bears that were removed from population in Slovenia in the 1998-2008 period (n = 927). Most bears were removed through hunting (78 %) or in traffic accidents (18 %). Most of the bears removed from population in Slovenia are young (the average age of all removed bears is 2.3 years), which is in strong contrast with neighbouring Croatia, where mainly adult males with high trophy values are harvested. According to the data from a mark-recapture study using noninvasive genetics performed in 2007, approximately 25 % of the bears living in Slovenia were removed each year, which is much higher than in other brown bear populations. Using virtual population analysis and stochastic age- and sex- structured models we have shown that such high removal rates were only possible because of a steady influx of immigrating bears from neighbouring Croatia, where removal rates during the study period were much lower. Slovenia thus represents a sink for the Dinaric-Pindos brown bear population. However, even with the high removal rate, the bear numbers in Slovenia were generally increasing during the study period. This justified the high removal rates in order to reach stabilization of the population growth, which was set as the national bear management goal. In our case, the adaptive management based on monitoring of population trends through systematic observations at constant feeding places and previous harvesting quotas enabled the managers to achieve this goal, which could be missed if only absolute data on reproductive potential and survival rates were considered with no regard to the immigration from Croatia, which apparently influences the population dynamics in Slovenia. Whether neighbouring countries should strive to equalize the number and structure of the harvested animals is disputable. But as our study shows, it is crucial that situation in neighbouring countries that share the population is monitored, and that management is coordinated. For example, recent increase in bear hunting quotas in Croatia will probably decrease the immigration rate to Slovenia. This will have to be adequately taken into consideration when planning the future harvest in Slovenia.

Paper 17

WILDLIFE TOURISM AND BEARS: BIOLOGICAL EFFECTS AND HUMAN SAFETY

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Bear watching and photographing is profitable wildlife tourism in easternmost Finland. Presently 15 private enterprises run such business, and in 2009 they offered bear nights in 94 blinds. Baits are usually leftovers of salmon, dog food and carcasses of domestic pigs. Roughly 100-120 brown bears (*Ursus arctos*), mostly males, nearly 10% of Finland's bear population, visit these sites each year. The primary concern in public debate is about feeding making bears less wary of humans which might increase the risk of bear attacks. Furthermore, some bears are believed to hang around the feeding sites whole summer which can make them abnormal fat. We investigated summer diet from fecal material, movements and home ranges by monitoring GPS-collared animals, and we compared back fat depths of bears shot near feeding sites to bears shot elsewhere at same latitudes. Furthermore, we evaluated whether cases where bears had been killed for human safety were linked to feeding, by investigating geographic distance of kill sites to photographic baiting places. Diet study was performed near such baiting sites where domestic pig was the primary food item delivered to bears, being the most important food item in scats collected around carcasses. By taking account the time bears spent in the vicinity of the baiting site, we could roughly estimate how much bears used food delivered by humans. Individual differences were pronounced but some male bears seemed to use such food extensively. Bears shot near baiting sites were fat compared to other harvested bears. Size of the annual home ranges were not linked with the number of visits at the baiting sites, neither was the seasonal (mating, summer, autumn) home range. In 1995 – 2009 only one bear that was not wary of people was met in the area where bear tourism was carried on. Shooting a bear for self defense or because the bear had been moving in urban areas or yards of countryside houses has taken place elsewhere in Finland. In eastern Finland bears are actively hunted with dogs which may keep them adequately wary of humans.

Paper 18

CAN SLOTH BEARS SERVE AS AN UMBRELLA SPECIES FOR CARNIVORE CONSERVATION IN SRI LANKA?

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Bears are large, mobile mammals with ecological requirements that necessitate the use of large, contiguous areas of intact habitat. Consequently, bears are often regarded as an umbrella species whose conservation also benefits numerous co-occurring species, including other mammalian carnivores. However, this assumption has not been tested. We used remote camera data from Wasgomuwa National Park (33,765 ha) in Sri Lanka in combination with single season occupancy models to test the hypothesis that site occupancy by sloth bears (*Melursus ursinus*) is associated with species richness of Carnivora. We focused on mammalian carnivores because they generally exist at low densities, play a pivotal role in the stability of ecological communities, and are among Sri Lanka's most endangered species. We used remote cameras equipped with active infrared sensors to document presence of sloth bears and other mammalian carnivores. We sampled 79 different sites during 2002–2003 and each camera was set for 4 consecutive sampling nights. We modeled detection probabilities as a function of different combinations of sampling night and sampling year. We then developed a priori models based on 9 different habitat variables and used information-theoretic procedures for model selection. To assess the relationship between bear occupancy and the presence of other carnivore species, we included carnivore species richness at camera sites as an additional covariate of sloth bear occupancy. We detected sloth bears at 39 camera sites for a total of 61 of 379 sample nights. Detection probability was a function of sample year but not sample night. Bear occupancy increased with proximity to rock outcrops and grassland patches and for areas that were farther from the national park boundary. We detected 13 species of Sri Lanka's 14 species of Carnivora. Carnivore species richness at cameras sites varied from 0 to 6 species (excluding bears). Including carnivore species richness as a site covariate significantly improved model fit, suggesting that sloth bear occupancy and carnivore species richness were closely linked. At least 5 of Sri Lanka's carnivores, including sloth bears, are listed as threatened and little empirical information exists on their status and distribution. Our results support the hypothesis that sloth bears may serve as an umbrella species whose habitat conservation would also protect a high richness of mammalian carnivores.

Paper 19

MONGOLIA: CONSERVING THE LAST BEARS OF THE GOBI DESERT

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Abstract: Although included in the brown bear subspecies, *Ursus arctos isabellinus*, the Gobi bear likely represents a unique ecotype, evolved to live in the harsh environmental conditions of the Gobi Desert. Once present in mountains of northwestern China, from Hami to the Chinese border, available information indicates its distribution and range has contracted, and it is unlikely that bears are present in China where appropriate habitat is 160-1000 km west and separated by human habitation and desert from presently occupied Gobi bear range. There are no reliable records of its presence very far beyond the confines of the 45,784-km^2 Great Gobi Strictly Protected Area (GGSPA) of southwestern Mongolia since the early 1970's. Mongolians view the Gobi bear as a national treasure, and we found no evidence that any were hunted or killed illegally. In 2004, the Mongolian government, in concert with Mongolian and international scientific and environmental organizations, hosted a workshop to assess the present status of the Gobi bear and to suggest informational needs and programs to best achieve its recovery and conservation. Only an estimated 20-50 individuals were thought to survive, centered around 3 oasis complexes within the GGSPA. These oasis complexes are separated by 70-100 km from the nearest adjacent complex, and each contains from 7-11 springs, ranging in size from approximately 0.1 to <40 m^2. Annual precipitation in the area was approximately 100 mm, but was reduced to about 50 mm annually during 1993-2007. Food habits include *Rheum* roots, several species of berries, insects, and occasional rodents, but no evidence was observed that bears scavenged carcasses of large mammals present in the area. They were not attracted to bait of livestock meat that we provided; however, they utilize supplemental pelletized livestock feed provided to improve bear nutrition at a total of 16 sites among the 3 oasis complexes. We captured 10 bears, including 2 sub-adult males, 4 adult males and 4 adult females, and fitted all but one 2-year-old male with GPS satellite collars. After May, 2006, frequency interference of uplink satellite signals resulted in inability to recover GPS collars across a wide region in central Asia, so we were unable to locate three dropped collars. However, data from recovered collars indicated that adult males travel up to 75 km straight-line distance within or between adjacent oasis complexes. Data indicated that the single female whose collar was recovered stayed within the complex in which she was captured; a collar from a second female may be recovered during spring, 2010. Using camera traps at sites where supplemental feed was available, we were able to identify at least 18 individual bears; however, during 2008-2009, we set up 13 hair snag sites within the area and collected over 900 samples for genetic analysis that will provide a more reliable population size estimate by spring, 2010. We trained GGSPA rangers to use radio tracking equipment, collect hair samples for genetic analysis, and set up vegetation transects to assess production of vegetation used by bears. Using data collected during this study, we plan to support 3 graduate projects in Mongolian universities and 2 in North American universities. During spring, 2010, veterinarian examination of captured bears will provide insight into physical health and disease. Thirty laptop computers were donated for use at schools in 3 villages at the edges of the reserve, technology that is not presently available. The strategic plan for recovery of Gobi bears will include exploring potential for enhancing water sources, increasing presence and availability of favored bear foods, and livestock management to allow occupation of former Gobi bear range adjacent to the GGSPA.

Paper 20

Invited Paper

MAKING THE BEST OF A BAD SITUATION: EUROPEAN BROWN BEARS COPING WITH HUMAN-DOMINATED LANDSCAPES

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It is well known that brown bears (*Ursus arctos*) avoid humans and human infrastructures and often are disturbed by human presence. Yet large and increasing populations of brown bears occur in many densely populated European countries. We in the Scandinavian Brown Bear Research Project are working to understand how these bears cope with human-dominated landscapes. We have confirmed that, at the landscape scale, European brown bears also avoid towns, tourist developments, open habitats, and roads both during the active and winter seasons. Studies at smaller scales show that bears select daybeds in areas with so dense cover that humans usually avoid them and that they avoid meeting the humans that do enter these areas. They react to these meetings by changing their behavior for the next 12 hours. They select daybeds with more cover the closer they are to human habitation and more cover in the fall, when more people are in the forest. Within a home range, bears with more human habitation use rugged terrain more, particularly during midday, when humans are most active. It is apparent that bears avoid humans within their home ranges by small-scale habitat selection and changing diurnal activity patterns. This will hopefully help us determine the limits of human presence that European brown bears can tolerate.

Paper 21

UNDERSTANDING CAUSES FOR DEPRESSED GRIZZLY BEAR POPULATIONS IN SOUTHERN CANADA USING ECOLOGICAL MODELING

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Beyond documenting densities of bear populations, it is useful to be able to infer reasons why some populations may be depressed and inform management designed to increase numbers of bears if socially desirable. We used broad scale DNA surveys to estimate densities of grizzly bears (*Ursus arctos*) across 2 adjacent mountain ranges in southern British Columbia, Canada and found considerable variation in densities and wanted to understand why some areas had fewer bears than were expected based on habitat observations. DNA surveys yield data suitable for multi-scaled ecological modeling that provides insight into associations of a variety of potential variables that may influence bear densities. We tested how a suite of habitat, terrain, ecological, and human-use variables predicted bear densities at 3 spatial scales. Those scales ranged from small, within the range of a bear's daily movement, through medium, the average size of a female home range, to the largest scale, the average size of a male home range. To estimate the probability of bear occurrence across our study area we used logistic regression within a GIS environment to compare sites that captured bears (DNA hair-snagged) against sites that did not. To investigate relative bear density between management units we used linear regression. We captured 188 different bears in 452 capture events from a suite of 717 sites that were within 6 bear management units across two mountain ranges. When we analyzed the entire region, we found that road densities and human densities were the best predictors of bear occurrence at fine and large scales at the univariate and multivariate level suggesting that bears are avoiding roads at all scales. When we analyzed individual areas - roads, parks, and human densities were top predictors of bear occurrence at all scales at the univariate level. At the multivariate level, our best predictive models contained roads, parks and human densities combined with habitat variables. When we explored these variables directly with bear densities (by linear regression), we found that habitat, roads, and human densities were associated with bear densities. In areas where bear densities were depressed, we found that roads, human densities, and habitat variables provided the best explanation. While this analysis is coorelative in nature, the weight of evidence suggests that when habitat quality is accounted for, road and human densities are related to bear densities and provide the best explanation of why certain areas have depressed bear numbers. In most of our area, reported mortalities are not sufficient to depress the populations we studied, therefore, populations that are depressed have likely suffered from excessive unreported mortalities. While we cannot determine the exact mechanism associated with this unreported mortality, our results are consistent with the hypothesis that backcountry unreported mortalities may be responsible for low bear densities due to the strong association with high road and human densities. Excessive backcountry mortalities are often managed through reductions of human access to forestry roads. This technique was introduced in 2004 as an analytical tool to accompany DNA abundance surveys as a way to increase inference in understanding bear distribution and relative densities for management purposes. Our work provides a real world test of its usefulness and limitations in a complex study area where bears and humans overlap significantly while providing informed management direction to increase numbers of bears in depressed populations. This technique may be applicable for populations of bears around the world where DNA abundance and density surveys are appropriate as it profitably extends the inference beyond descriptive work (how many bears) towards explanation (why that many bears).

Paper 22

Estimating the annual number of reproducing females in a transborder population. Whose bears are they?

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Norway's brown bear management uses the annual number of female brown bears with cubs-of-the-year for setting population goals and evaluating population status. Because the current goal is a specific number of annual reproductions, rather than lower or upper thresholds, and because the goal is small even on a country-wide level (15 reproducing females per year), accurate estimation is crucial. To accomplish this, we developed a simulation model, parameterized using information from a well-studied bear population in neighboring Sweden. The model's purpose is to calculate the number of annual reproductions based on the number and location of individual female brown bears detected in Norway during genetic mark-recapture monitoring (mainly scat collection in the field). Swedish and Norwegian bears (at least in southern and central Norway) are parts of the same population, and home ranges of bears near the Norwegian borders (almost all of the female bears), can and do extend beyond Norway. Adjusting for home range extension beyond Norway is an essential component of the model, as it reduces the likelihood of double-counting bears and reproductions over multiple jurisdictions. The model-predicted estimates of the number of reproductions in Norway (including their upper 95% CI limits) fall short of their target both on the country and regional level. Model sensitivity to violating key assumptions and cross-validation with a data set that was not used in model parameterization encourage confidence in the predictions.

Paper 23

USE OF STABLE ISOTOPES TO EVALUATE HUMAN-BEAR MANAGEMENT SUCCESS IN YOSEMITE NATIONAL PARK, CA, USA

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Yosemite National Park has managed incidents between humans and black bears (*Ursus americanus*) for over hundred years. Although it is generally believed the amount of human food accessible to bears has decreased since the last open pit dump closed in the park in 1971, human-bear incidents continued to increase to intolerable levels as marauding bears continue to persist in Yosemite, causing human injury and thousands of dollars in property damage each year. In 1975, the park initiated a Human-Bear Management Plan to tackle the issues associated with conflict between humans and a "super-sophisticated population of bears." This plan initiated a proactive management strategy, however it failed to fully address the following elements due to budget constraints: public information and education, removal of unnatural food sources, enforcement of regulations regarding food storage and feeding animals, monitoring and control of human food-conditioned bears, and research. In 1999, YNP began receiving an annual congressional appropriation of $500,000 to implement these human-bear management measures. Currently, managers report that bears have less access to human food compared to bears prior to 1999, however there is currently no quantifiable measure besides comparing the number of annual incident reports to determine program success over time. Comparing the number annual incidents is not a valid indicator of management success because (1) old records are nonexistent or incomplete, (2) incident detection and recording rates increased with time as more resources became available, and (3) annual incidents are not standardized based on the number of known food-conditioned (FC) bears. In this study, we estimated the contribution of human food in FC bears diets over time to evaluate management success over the past 100 years. Specifically, we used stable isotope analysis to determine the isotopic composition of historic and contemporary bears tissues as well as their food sources. Hierarchical Bayesian stable isotope mixing models were used to determine the relative contribution of foods assimilated in bears' diets. This analysis was ultimately used to determine the contribution of human food to bears' diets during 4 time periods in order to evaluate the effectiveness of Yosemite's Human-Bear Management Program for the past hundred years.

SESSION 5. BEAR GENETICS

Chair: Michael Proctor

Paper 24

BROWN BEAR PHYLOGEOGRAPHY IN NORTHERN CONTINENTAL EURASIA: COMPARATIVE ANALYSIS OF PARTIAL AND COMPLETE MITOCHONDRIAL GENOMES.

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The last 1.8 million years of World history is known as a period of ice ages (Pleistocene). The repeated cycles of climatic cooling and warming that occurred during the Pleistocene greatly influenced the distribution of flora and fauna. There is still intense debate about how the expansion and contraction of ice sheets affected the distribution of different species, where the refuge areas used by species during unsuitable periods were located and at what time and in which direction recolonization events took place. The brown bear (*Ursus arctos*) has been used as a model species in phylogeographic studies attempting to answer these questions.

Aspects of brown bear phylogeography have been described by a number of studies. Two large mitochondrial (mt) clades (western and eastern lineage) and numerous subclades have been identified worldwide, and historical processes influencing the distribution of clades have been proposed. However, there is still very limited knowledge about the phylogeographic history of the world's largest continuous bear population, located in northern Eurasia. This study intends to fill this gap.

We collected tissue samples from 205 bears in northern continental Eurasia (Estonia, Finland and Russia). MtDNA sequences totaling 1943bp (full cytochrome b gene and 5' and middle control region sections) were determined in order to reconstruct the maternal phylogeography of bears in this area. To improve our understanding of phylogeoraphic relationships between adjacent brown bear populations, we also included database sequences derived from Alaskan and Japanese bears. Divergence times for brown and cave bear lineages were calculated using a novel approach based on multiple-calibration of sequence divergence.
Results based on partial mtDNA revealed that a severe population bottleneck was followed by a sudden demographic expansion from a single refuge area in northern continental Eurasia. Divergence time estimation suggests that the expansion was recent and most likely occurred after the last glacial maximum (22 000-17 000 BP). The close relationship between different haplotypes indicated that there was no significant geographic barrier in continental Eurasia that restricted migration.

Intra-specific analyses based on complete mitochondrial genome sequences are still rare. We present the findings of an analysis of 95 complete mitochondrial genome sequences from bears in northwestern Europe (Estonia, Finland and European Russia) and compare these results with earlier findings based on partial mtDNA sequences.

Paper 25

GENETIC STRUCTURE OF THE BROWN BEAR POPULATION IN NORTH-EASTERN EUROPE BASED ON ANALYSIS OF MICROSATELLITE DATA

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The brown bear (*Ursus arctos*) population in North-Eastern Europe spans a vast territory from northern Fennoscandia up to the Ural Mountains. It is generally viewed as the world's largest continuous brown bear population. However, detailed information about this population is scarce: its genetic diversity, population structure and patterns of gene flow, which are vital to understanding the population status and both spatial and temporal demographic trends, are still poorly understood. Recent phylogeographic studies based on mitochondrial DNA sequences have shown that bears in northern continental Eurasia are genetically rather homogeneous and that the brown bear population in this area underwent a sudden expansion after the last ice age, preceded by a severe bottleneck. While mitochondrial DNA is a very useful genetic marker for studies of late-Quaternary mammalian phylogeography, it is only informative about the history of maternal lineages. In order to reveal population genetic structure and gene flow in contemporary populations, incorporating both maternal and paternal inputs, highly variable nuclear markers such as microsatellites can be used. In this study, brown bears from Estonia, Finland and the European part of Russia (n=193), which together constitute a large proportion of the large North-East European population, were genotyped at 17 microsatellite loci. Heterozygosity varied from moderate (H_o= 0.649) in Estonia to high (H_o=0.832) in the Kirov oblast of Russia. Assignment analysis revealed the existence of 2 major genetic groups: one in Estonia and a second formed by all other bears (the latter was in turn divided into three subgroups). Isolation-by-distance explained a small proportion of the observed population structure in our data (Mantel test, R^2=0.066, p=0.001). Our results demonstrated that greater genetic substructuring of the brown bear population is apparent in areas where bear population density is high; by contrast, in less populated areas, the bear population is remarkably homogenous. Indeed, these results suggest that the degree of gene flow that occurs in much of the brown bear population in North-Eastern Europe is unparalleled in any other mammals studied to date.

Paper 26

THE POWER OF GENETIC MONITORING FOR STUDYING DEMOGRAPHY, ECOLOGY, AND GENETICS OF A REINTRODUCED BROWN BEAR POPULATION

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Genetic monitoring has rarely been used for wildlife translocations despite the potential benefits that this approach can offer compared to traditional field-based monitoring methods. In this study we apply genetic monitoring to the small reintroduced brown bear (*Ursus arctos*) population in the Italian central Alps. From 2002 to 2008, hair and fecal samples collected noninvasively plus tissue, blood, teeth and hair samples from captured or dead bears were used to follow the demographic and geographic expansion, and changes in genetic composition. Two thousand seven hundred ninety-three samples were collected in seven years of genetic sampling. Individual genotypes identified from these samples were used to reconstruct the wild pedigree since the translocation and revealed that the population increased rapidly, due to high reproductive rates (34 cubs, 16 litters), from 9 founders to more than 25 individuals individuals in 2008 (λ = 1.17-1.19). Spatial mapping of genotyped samples indicated that most bears were distributed in the region surrounding the translocation site; however, individual bears were found up to 163 km from the original translocation area. Subadult and young adult males were responsible for the largest movements. Levels of genetic diversity in the population were high, with expected heterozygosity of 0.74-0.79, and allelic richness of 4.55-5.41. However, multi-year genetic monitoring data also showed that mortality rates were elevated (15 individuals missing), immigration did not occur, one dominant male was responsible for siring all the cubs born from 2002-2005, genetic diversity declined, relatedness increased, inbreeding occurred, and the effective population size was extremely small (Ne = 3.04, ecological method). The comprehensive information collected through genetic monitoring is critical for implementing future conservation plans for the brown bear population in the Italian Alps. Moreover, this study provides a model for other reintroduction programs by demonstrating how genetic monitoring can be implemented to uncover aspects of the demography, ecology and genetics of small and reintroduced populations that will advance our understanding of the processes and factors influencing their viability, evolution, and successful restoration.

Paper 27

TIMING ESTIMATES ENHANCE OUR UNDERSTANDING OF BROWN BEAR PHYLOGEOGRAPHY.

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Reliable estimates for the timing of evolutionary events provide a valuable additional dimension to phylogeographic analysis by allowing the importance of historical processes to be determined with greater confidence. For example, if the existence of divergent genetic groups is believed to result from the appearance of a geographical barrier to geneflow (e.g. a water body or mountain range), such an interpretation can be supported by demonstrating that the onset of divergence coincided with the appearance of the barrier. The timing of such evolutionary events can be estimated using DNA sequence data in a number of ways that all rely on the accurate determination of a nucleotide substitution rate (i.e., the rate at which genetic sequences change through time). Armed with an estimate of the substitution rate, levels of genetic divergence between groups can be converted into estimates of time since the most recent common ancestor.

Among mammals, the phylogeography of the brown bear *Ursus arctos* has been uniquely well studied. DNA from numerous ancient remains and many contemporary samples has been analysed. Thus, the example of the brown bear can serve to guide phylogeographic studies on mammals. Attempts have been made to calculate divergence times between brown bear clades (monophyletic intraspecific groups) by combining observed levels of genetic divergence with one or more the following: i) generalised estimates of nucleotide substitution rates derived from interspecific comparisons and paleontological estimates for speciation events; ii) bear-specific substitution rates, based on paleontological estimates for the divergence time between brown bears and their close relatives, cave bears *Ursus spelaeus* and black bears *Ursus thibetanus*; and iii) substitution rates derived from empirically observed divergence between modern and accurately dated ancient brown bear sequences. Each approach has limitations, and a combination of approaches ii) and iii) appears the most suitable approach for datasets containing both closely and distantly related clades.

We present a novel timing analysis, incorporating all suitable modern and ancient brown bear samples. Timing estimates are calibrated using a combination of accurately dated ancient DNA sequences and paleontological estimates for the split between the brown bear and its close relatives, the polar bear *Ursus maritimus* and the cave bear. The results of this analysis are considerably different from previous attempts to estimate divergence for brown bear lineages. Our results indicate that most divergence events between modern brown bear lineages occurred within the time scale of the last glacial cycle i.e., approximately the last 120 thousand years. This finding suggests that climatic variations in the late Pleistocene had a considerable effect on the genetic diversity of brown bears; it also matches findings from other species, and perhaps reflects the large-scale megafuana extinction that occurred at this time. Moreover these findings suggest that models of population responses to climate change, and in particular the expansion-contraction model, may place undue emphasis on processes acting over multiple glacial cycles. In combination with patterns of ancient and contemporary genetic variation, and paleontological records, these timing estimates also lend support to certain hypotheses concerning large scale biogeographic movements, including a dynamic colonisation history of North America, with vicariance events brought about by changing biotic and abiotic conditions in Beringia (the land bridge connecting Siberia and Alaska).

SESSION 6. BEAR BEHAVIOR AND BEHAVIORAL ECOLOGY

Chair: Jon Swenson

Paper 28

FEMALE FITNESS IN RELATION TO SEXUALLY SELECTED INFANTICIDE IN A HUNTED POPULATION OF BROWN BEARS

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Life history theory attempts to explain the broad features of a life cycle from birth and growth until maturity, reproduction and the number of offspring until death. To study the evolutionary aspects of life history strategies and lifetime reproductive success requires long-term studies of unhunted populations. However, most populations of large mammals are hunted. Hunting might affect female fitness in brown bears (*Ursus arctos*) directly, by killing them, or indirectly, by killing adult males, which may lead to sexually selected infanticide (SSI) caused by newly arriving males. We have conducted long-term individual-based research on two hunted populations of brown bears in Scandinavia. The number of yearlings weaned increased with female longevity, tended to be higher in the south, and tended to increase with female body size, but the importance of female body size decreased with increasing age. We also analyzed the factors influencing survival of cubs in 174 litters. Litter size was not associated with litter survival, but factors that were highly significantly associated with it were male turnover (a proxy for SSI, negative), female body size (positive), population density (negative), study area, and the interactions of food conditions the previous year : area, spring litter size : population density (with the negative effect of litter size increasing with increasing density), and body size : area. The factors food conditions the previous year (postive) and the interaction male turnover : population density (the negative effect of male turnover increased with increasing density) were also significant. Thus, female fitness was influenced directly by hunting, by reducing longevity, and indirectly, by reducing litter survival due to SSI.

Paper 29

EVALUATION OF BEAR RUB SURVEYS TO MONITOR GRIZZLY BEAR POPULATION TRENDS

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Wildlife managers need reliable estimates of population size, trend, and distribution to make informed decisions about how to recover at–risk populations, yet obtaining these estimates is costly and often imprecise. The grizzly bear population in northwestern Montana has been managed for recovery since being listed under the U.S. Endangered Species Act in 1975, yet no rigorous data were available to evaluate the program's success. We used encounter data from 379 grizzly bears identified through bear rub surveys to parameterize a series of Pradel model simulations in program MARK to assess the ability of noninvasive genetic sampling to estimate population growth rates. We evaluated model performance in terms of: 1) power to detect gender–specific and population–wide declines in population abundance, 2) precision and relative bias of growth rate estimates, and 3) sampling effort required to achieve 80% power to detect a decline within 10 years. Simulations indicated that ecosystem–wide, annual bear rub surveys would exceed 80% power to detect a 3% annual decline within 6 years. Robust design models with 2 simulated surveys per year provided precise and unbiased annual estimates of trend, abundance, and apparent survival. Designs incorporating 1 survey per year require less sampling effort but only yield trend and apparent survival estimates. Our results suggest that systematic, annual bear rub surveys may provide a viable complement or alternative to telemetry–based methods for monitoring trends in grizzly bear populations.

Paper 30

PRELIMINARY FINDINGS ASSESSING THE OLFACTORY COMMUNICATION STRATEGIES OF BROWN BEARS

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Chemical communication research on large carnivores has in the past predominantly concentrated on social species, with more elusive solitary large felids and ursids receiving little attention. This study aims to bridge the gap between olfactory communication research in social and solitary carnivores by using comparative studies to assess territorial and non-territorial solitary carnivore species and the methods they employ to communicate chemically with conspecifics. We aim to gain a more coherent understanding of the behavioural motive behind scent marking in brown bears (Ursus arctos), giant pandas (Ailuropoda melanoleuca) and tigers (Panthera tigris), and the similarities within the order Carnivora.

Initial brown bear studies conducted in June and July 2009, examined tree selection for scent marking, assessing the hypothesis that selection is non-random and focusing on which individuals in a population conduct scent marking, on an estimated population size of 50 individuals. Direct visual observations, vegetation transects and remote camera traps were used to identify individuals, identify vegetation preferences for marking, and capture the behaviour of the animal during scent marking. The latter builds on data previously collected by Nevin, O.T. (May/June 2005-2006) and presented at the 18th International Conference on Bear Research and Management.

Our initial findings indicate that brown bear selection of trees for marking is nonrandom (>2 =138.99 P<0.05). The two tree species which were found to have the highest degree of marking attributed were the least represented in the landscape. Further investigation into the defining characteristics of scent marked trees found that both species of the tree (P<0.001) and its DBH (P=0.014) contributed to a marking response, with a slight preference for larger trees. We found no significant difference in the angle/lean of trees that were marked as opposed to those which were not (U=2309.50, P=0.95). Location of the tree was also taken for future analysis of the
positioning of scent mark trees within the landscape.

When assessing differences between age and sex class of individuals conducting scent marking behaviour, collaborative data from 2005, 2006 and 2009 shows that from a maximum sample size of 14 individuals, adult males were significantly more likely to mark than females or subadults, relative to their presence in the population (>2=17.78 P<0.001). There was also a highly significant difference between the frequency of use of trails containing active rub trees by different age-sex classes in proportion to the population (>2=41.42 P<0.001). Further data collection is planned for 2010 and 2011.

This study of chemical communication is important to bear conservation as noninvasive methods used in population assessment (e.g. DNA from hair snares) often make use of scent lures and/or marking behaviour. A more detailed knowledge of the social and functional aspects of scent marking, and related temporal patterns, can allow better estimates to be derived from these techniques by accounting for behavioural bias in sampling. By assessing how olfactory communication plays a role in the social organisation of solitary carnivores, we will be better equipped to understand the processes involved in territoriality, dispersal and reproduction. Such knowledge is fundamental when assessing the ecological needs of a species and the governing of population management.

Paper 31

THE BEHAVIOR OF SCANDINAVIAN BROWN BEARS WHEN MEETING HUMANS

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The brown bear (*Ursus arctos*) population is increasing in number and distribution in Scandinavia. The number of people who are injured or killed by bears is also increasing, and causing people's fear of bears to increase. If people and bears are to share the same landscapes, it is important that people know how to avoid being injured by bears. Thus, we must understand the circumstances involved when people are injured and how bears behave when meeting humans.

We interviewed all people who were injured by brown bears in Scandinavia since 1977 (N=25) and studied the police reports of the 2 cases where people were killed. In addition, we approached 42 bears equipped with GPS transmitters 261 times. We approached them at a distance of 50 m, upwind, while talking at a normal tone of voice while the bears were resting in a daybed during the middle of the day. We also report on our other studies of how bears use landscapes in response to the occurrence of humans.

All the people who were injured or killed were men and most were armed. Most of these cases occurred during the hunting season and most of the armed men had shot at the bear before they were injured. The results of our approaches gave a different picture. None of the bears showed aggressive behavior and they either left the area before, when, or after we passed or just stayed in the daybed. The daybeds were placed in very dense vegetation, where people rarely go, and they chose denser vegetation for daybeds when closer to human habitation or when there were more people in the forest. All our results were consistent in showing that bears were trying to avoid meeting people.

People appear to be most vulnerable to being injured by a bear when they are hunting, often with a dog, and surprise a bear at close range in dense vegetation. It is possible that the recent increase in the number of people injured by bears is due more to the recent increase in harvest quotas, and therefore bear hunting, than to the increase in bears, per se.

Paper 32

FORAGING BEHAVIOR OF ASIATIC BLACK BEAR IN RELATION WITH THE TEMPORAL CHANGE OF FRUIT ABUNDANCE OF VARIOUS SPEICES IN COOL TEMPERATE FOREST, JAPAN

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To clarify how the availability of fruit affect the foraging behavior of Asiatic black bear (*Ursus thibetanus*), we investigated the temporal change in fruit abundance of 11 species and the feeding signs of bears.

Study was conducted in the Nikko-Ashio mountains, Japan. Fruit abundance of 11 species which compose the major food items of bears in summer and autumn were obsereved (*Prunus veracunda, P. grayana, Cornus controversa, Castanea crenata, Quercus crispula, Q. serrata, Fagus crenata, F. japonica, Evodiopanax innovans, Eleutherococcus sciadophylloides, Sorbus commixta*) every ten days from July to November, 2008 and 2009. Three routes were set ranging from 650 to 1000m, 800 to 1200m, 1100 to 1600m a.s.l., with a length of 2km, 2.5km, 2.2km respectively and a plot of 20m by 20m were set each 100m of height. A total of 149 trees were observed in the plots and the number of fruits for each tree was counted for a unit time by a binocular. Then we converted the number of fruits counted per unit time to fruit number per unit area, and multiplied the crown area of trees and energy per fruit to estimate the fruit abundance on a calorie base. We searched for feeding signs such as broken branch, claw marks on tree trunk, feces along the routes on each survey.

In the summer, number of fruiting species and its abundance was low, and the bears foraged on species which were available at that time. In autumn, though several species of fruits were available at a time, acorns of *Q. crispula* and *Q. serrata* produced most of the energy. *Q. crispula* was the main food item for bears in autumn regardless of its abundance. The number of food items consumed increased on periods between when bears changed the main food items. Also, the period that bears start to forage on the main food item did not match with the peak of the fruits abundance, and instead the decrease in abundance of the adjacent food item was important.

These results indicate that bears selected their food item responding sensitively to the low abundance of fruits in summer and in contrast, they foraged on *Q. crispula* acorns selectively in autumn. The results also indicates that bears searched for the next food item after the previous has decreased and increase in movement distance during the searching period may have increased the probability of finding randomly distributed food items which resulted in the variability of consumed food items during that period. In addition, there were more feeding signs which were concentrated in specific altitude on 2008, whereas there were only few signs which were scattered over a broad elevational range in 2009. These difference in foraging patterns may be influenced by not only the amount of fruit production but also by the timing and duration of fruiting, especially the available period of *Q. crispula* acorns on tree crown.

This study showed the importance of observing fruiting period and duration of various species as well as its abundance.

Paper 33

BROWN BEARS PREDATION ON SIKA DEER FAWNS FOLLOWING ITS POPULATION GROWTH IN EASTERN HOKKAIDO, JAPAN

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After the Japanese colonization of Hokkaido, sika deer (*Cervus nippon*) declined to threatened level, but their population increased rapidly after the 1990s in eastern Hokkaido. It caused the increase in agricultural damage. To prevent the damage, nuisance control was carried out and many deer carcasses from this control and sport hunting were left in the fields. In eastern Hokkaido, brown bears (*Ursus arcto*s) started to consume deer throughout the year after 1994 because of the availability of deer carcasses (Sato et al., 2005).

Following the management actions, deer population and the number of deer controlled have been kept at the low level after 2000. If bears consume deer opportunistically, deer use by bears has decreased after 2000. Therefore to examine the relationship between deer use by bears and change of deer population, we compared the seasonal frequency of occurrence of deer in the scats of bears in 1999-2000 and in 2006-2008. As a result, deer consumption by bears was no difference between two periods. However we found some hooves of deer fawns in the samples.

We hypothesized that deer consumption by bears have not decreased because bears have started to prey deer fawns following its population growth. Our objects were to develop the easy and low cost method for monitoring deer fawns use by brown bears and to examine the relationship between deer population change and deer fawns use by bears.

To monitor deer fawn use by bears, we tried to distinguish fawns from others by hairs occurred in bear scats. We collected hairs from three parts (foreleg, abdome and back) of yearlings (n=3) and fawns (n=4) during the deer parturition period and measured the width of each hair (more than 15 hairs for one sample from each part) with SEM. The hairs wider than 140μm occurred only in the samples collected from yearlings.

Based on 140μm, we identified hairs occurred in bear scats into fawns and older than yearling. We calculated the percent frequency of occurrence for deer fawns and percent volume for eight major food categories in bear scats collected from the beginning of parturition period to 30 days after that in 1999-2008. Then we compared deer fawns use by bears in the period when deer population was high (1999-2000, n=35) and it in the period after deer population got to low (2006-2008, n=55). Although the availability of deer fawns has gotten less, deer fawns consumption by bears has gotten greater.

Brown bears consumed more deer fawns before and it occurred after the deer population exploded. Increase of deer population gave bears more chance to encounter fawns and that progressed bears' hunting skill. Bear cubs learned foreage behavior from their mother. Hereafter, the proportion of bears consuming fawns will increase among the populations. We also need to research the influence of the deer fawns use on bear breeding parameters.

Paper 34

PLATELET FUNCTION IN THE SCANDINAVIAN BROWN BEAR COMPARED TO MAN

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Hibernating Scandinavian brown bears (*Ursus arctos*) stay inside their winter dens for approximately 5-7 months but do not develop coagulopathy. However, little is known about the coagulation system in bears. Cardiovascular disease, including acute myocardial infarction, is a leading cause of death in humans globally. Because activated platelets are a major player in the development of myocardial infarction and stroke, platelet inhibition is a cornerstone in the treatment of cardiovascular disease. Because physical inactivity and lying flat on the ground are thrombogenic and because the brown bear apparently is free from thromboembolic events we hypothesized that brown bears would demonstrate reduced platelet activity shortly after leaving the den. In order to characterise the physiological impact we compared our findings to human platelet function.

Methods. Following immobilization, blood was drawn from 6 wild brown bears (3 females/3 males; between 1 and 16 years old) 7-10 days after leaving the den in mid April. Blood samples from 10 healthy human adults, before and after pharmacological platelet inhibition with 300 mg of acetylsalicylic acid and again after 600 mg of clopidogrel administration, served as control. We analyzed blood samples by standard blood testing and platelet aggregation was quantified after stimulation with various agonists using multiple electrode aggregometry.

Results. Adenosine diphosphate, aspirin, and thrombin receptor activating peptide tests were all reduced at least two-fold in bears compared to humans (table). There were only minor differences between bears and humans in hematological and biochemical parameters.

Using three different tests, we conclude that platelet function is reduced in Scandinavian brown bears compared to humans. The possibility that our findings reflect test-dependent and not true biological variations in platelet reactivity needs further studies. However, our findings represent the first descriptive study on platelet function in brown bears and may contribute to explain how bears can endure denning without obvious thrombus building.

Cont. Paper 34

Table. Platelet aggregometry. Scandinavian brown bear vs. humans

	Bears	Humans		
		Baseline	Acetylsalicylic acid 300 mg	Clopidogrel 600 mg
ADP-AUC	31.3 ± 3.9	63.4 ± 8.0 **)	62.5 ± 5.8 **)	30.8 ± 4.0 ##)
ADP-Aggregation AU	67.3 ± 8.1	120.7 ± 14.2 **)	114.5 ± 9.6 **)	60.9 ± 7.6 ##)
ASPI-AUC	33.7 ± 3.9	87.1 ± 11.0 **)	14.1 ± 2.1 ##)	60.9 ± 7.6 *) #)
ASPI-Aggregation AU	68.1 ± 8.6	158.2 ± 20.1 **)	34.4 ± 5.4 ##)	129.4 ± 10.3 **)
TRAP-AUC	10.2 ± 2.9	90.0 ± 9.1 **)	90.0 ± 7.2 **)	84.6 ± 6.9 **)
TRAP-Aggregation AU	24.5 ± 5.2	106.1 ± 24.1 **)	155.4 ± 11.7 **)	143.5 ± 12.4 **)

Values are mean ± standard error of the mean. ADP = adenosine diphosphate test; ASPI test = aspirin test; AU = aggregation units; AUC = area under curve; TRAP = thrombin receptor activating peptide.

**) and *) depicts P-values <0.01 and <0.05 vs. bear. ##) and #) depicts P-values <0.01 and <0.05 vs. human control by Holm-Sidak one-way analysis of variance.

Paper 35

INTERSEXUAL BROWN BEAR ASSOCIATIONS DURING THE BREEDING SEASON IN CENTRAL SWEDEN

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Intersexual association formation in the Scandinavian brown bear (*Ursus arctos*) is almost exclusively restricted to the breeding season, and thus most likely related with reproduction. We equipped individual bears with GPS-GSM tracking devices during 2008 and 2009, after immobilization from a helicopter. We monitored reproductive bears only, i.e. adult male bears (> 5 years old) and adult female bears that were not accompanied with cubs of the year or yearlings. We monitored bears from den emergence, around mid-April, until denning, around the end of October. We studied 10 and 22 males and 10 and 19 females during 2008 and 2009, respectively. The GPS-GSM collars delivered positions every 10 or 30 minutes, depending on individual, and season. We defined an intersexual association as any event in which two or more individuals of different sexes were at the same location (within 60 m) simultaneously (within 10 min). We detected 102 of these associations, with 55 specific male-female combinations. Associations varied in duration between less than 1 day (42.2 %) and up to 12 days (0.9 %). All associations were recorded between 6 May, and 15 July, with a peak in the frequency of observed number of associations during the first week of June. Half of the male-female combinations were repeated more than once during a breeding season. One pair was associated 11 times, totaling 26 days, during one breeding season. Both sexes were associated with a variable number of partners during a breeding season; males with 0 - 8 marked females, and females with 1 - 4 marked males. Observed associations were usually comprised of one male and one female, but we also observed 2 males with 1 female, and 3 females, 2 of which were unrelated, with one male. We also observed that both sexes showed roam-to-mate behavior. Social network software (the R Statnet package) revealed that during both years, almost all of the marked bears in an approximately 13,000 km^2 area were somehow interconnected within one network of 'social relations'. Our results show that the mating system of the brown bear is complex, and consists of various strategies; furthermore it indicates that many aspects, such as mate choice in both sexes, relative to female estrus cycling and mechanisms such as sexually selected infanticide, are still insufficiently known. These aspects deserve attention, since knowledge on mating systems is, besides the ethological value, of importance for the conservation and management of a species and its environment.

SESSION 7. BEAR MOVEMENT AND HABITAT USE

Chair: Andreas Zedrosser

Paper 36

BROWN BEAR HABITAT MODELING IN GEORGIA

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In Georgia, conservationists, managers and hunters debate about the status of the country's brown bear (*Ursus arctos*) population and there is no agreement as to how many bears there are or may be supported by the Georgian habitats. Lack of information makes the debate more intense and opinions are based on judgment rather than scientific data. Despite the existence of some field data and roughly outlined distribution maps we found that the information on the size and quality of brown bear habitats in Georgia is still largely absent. This information is crucial for assessing the status of the bear population and for developing national conservation measures. It would help managers and conservationist to estimate the national carrying capacity and to make a new, more accurate population number estimate.

Using our field data and Arc GIS programs we modeled brown bear habitats in Georgia and tried to understand which factors influence brown bear habitat quality and distribution in the country. We used various variables to assess bear habitat quality including: forest cover, elevation, slope, road density, human settlements and human density. We used GPS locations of bear signs collected in different parts of the country during 1999-2009.

We evaluated the total size of suitable brown bear habitat in the country and found that it is smaller than previously estimated. Mountain forest should be classified as the main brown bear habitat in Georgia. However its actual suitability for bears is largely dependent on human accessibility and the overall level of human presence.

Paper 37

RELATIONSHIPS BETWEEN ASIATIC BLACK BEAR BEHAVIOR, AUTUMN FOOD HABITS, AND HARD MAST PRODUCTION IN JAPAN

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We studied the relationships between the Asiatic black bear (*Ursus thibetanus*) behavior, autumn food habits, and hard mast production of 5 species from 2006 to 2008 in Japanese cool temperate forest, Nikko-Ashio mountains, central Japan. For the food habits, we collected bear feces opportunistically during food surveys and radio-tracking during autumn (September–November) of 2006 to 2008. We measured the abundance of hard masts at 82 points in an area of 50km × 50km. We counted the number of acorns or nuts with a binocular for 30 seconds, five times per each tree. Five kinds of hard mast are found in this area: *Fagus crenata, F. japonica, Q. crispula, Q. serrata* and *Castanea crenata*. We researched the bears' behavior by GPS radio-telemetry. Because GPS radio-telemetry can provide location information continuously, we estimated the movement rate using two methods. First, we used the minimum distance of dispersal distance (*MD*), which is the direct distance between each location of the day ("original point") and each subsequent location. Second, we used the cumulative distance of dispersal distance (*CD*), which is the cumulated distance estimated from all locations transmitted during movement from the original point and each subsequent location.

We analyzed food items in a total of 405 fecal droppings during 2006 and 2008. The dominant food items from September to November were hard mast, especially *Quercus* acorns. Frequency ratio of *Quercus* acorn was higher in 2007 than in 2006 and 2008. During the study period, no fruiting of *F. crenata* and *F. japonica* were observed. Masting of *Q. crispula* acorns were poor on 2006, good on 2007 and moderate on 2008. From 2006 to 2008, we captured and fitted GPS collars on 17 bears (9 male, 8 female). However, we could use data from only 15 bears. Median *MD* differed significantly between sexes. Median *MD* was longer in males than in females. Maximum *MD* differed significantly between seasons. Maximum *MD* was longer in autumn than in summer, as was maximum *CD*. However, bear ID, year, sex, age, and seasons had no significant effect on median *CD*. In autumn, there were negative relationships between both maximum and median *MD* and hard mast productions.

The results for median *MD* show that the locomotion of male bears is bigger than that of females. However, moving was over long distances regardless of sex, and occurred more in autumn than in summer, as shown by the results for maximum *MD* and maximum *CD*. Also, it is suggested that the locomotion in autumn becomes wider in poor hard masting years. Median *CD* did not differ between sexes, but *MD* did. These results might be related to the size of the home range, because females moved in a smaller home range than males even though activity did not differ between the sexes. These results may also explain why hard mast production was not related to maximum *CD* and median *CD* in autumn. Hard mast production might have affected only median *MD* and maximum *MD,* because in good hard masting year bears searched for hard mast in a more confined area than in poor masting years, even though their searching activity was the same.

Paper 38

A COMPARISON OF HOME RANGE SIZE, MOVEMENTS, HABITAT USE AND ACTIVITY PATTERNS OF RELEASED ORPHAN BROWN BEARS AND WILD CAPTURED BROWN BEARS IN THE CARPATHIAN MOUNTAINS OF ROMANIA

Leonardo Bereczky, Silviu Chiriac, Ramon Jurj

We define rehabilitation as bringing an orphaned bear cub to self sufficiency using methods which will allow its reintroduction into the natural habitats without developing nuisance behavior. Bears have been released back into the wild after being cared for by humans for over 30 years. However, very little data exists on the fate of reintroduced individuals. The Orphan Bear Rehabilitation Centre in the Romanian Carpathians is a currently conducting a project that includes bear rehabilitation and post release monitoring in an effort to compare home range size, movements, habitat use and activity patterns of released orphaned brown bears *(Ursus arctos)* with wild captured brown bears.

Between 2004-2009, 40 released brown bears were tracked using VHF radio and GPS/GSM telemetry systems in the North Eastern, Eastern and South Eastern Carpathians in Romania, to obtain information on movement, habitat use, home range, feeding habits and activity patterns. The rehabilitation method was based on offering relatively large enclosures with natural habitat, during the rehab process and minimal human contact. During the rehab process the feeding was made in such a way that the animals couldn't associate the food source with human presence. Data obtained from telemetry studies were compared to similar studies performed on wild captured individuals. The data revealed no significant differences between the ecological and behavior characteristics of released bears and wild captured brown bears in the Carpathian Mountains. The results indicated that both, released and wild captured individuals used home ranges between 1000-2500 km^2 for males and 35-300 km^2 for females. Activity patterns were more nocturnal when the animals were closer to a settlement and more diurnal in very remote areas. An analysis of the movement and habitat use data revealed interesting information which can be used to refine management plans for brown bears in Romania.

Paper 39

DISPERSAL ABILITY, HABITAT SUITABILITY AND DISTRIBUTION PATTERNS OF BROWN BEARS AS AFFECTED BY THE NEWLY CONSTRUCTED EGNATIA HIGHWAY – N. PINDOS - GREECE.

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It is widely accepted that highways represent a major threat for bears in terms of artificial barriers and/or direct mortality causes due to traffic accidents. Yet, because of the lack of sufficient evidence on newly established highway networks impact, few studies in Europe have addressed general rules on how a large highway influences behaviour and spatial distribution of brown bears especially during the construction phase. We used telemetry data from 18 brown bear (*Ursus arctos*) specimens, collected during a two year monitoring period (2006-2008) in the vicinity and core area (~ 800 sq.km) of the construction corridor of a 42km stretch of the new Egnatia Highway, located in eastern Pindos mountain range, prefecture of Grevena, Greece, in order to test whether the highway construction phase affected: (a) the dispersal ability, (b) preferences on habitat use and (c) distributional patterns of the species. We analyzed daily and night movement patterns but also home ranges of each individual (estimated by using Kernel based methods) to examine whether the distance from the highway is an important indicator of the quality or quantity of brown bears activity levels. Mean and maximum moving distances according to the time of activity and distance from the highway were examined as well as variations in mean direction with respect to the distance from highway (angular analysis of point patterns). To assess habitat suitability we used a series of digital sources to derive potential predictor variables (land use, topographical, vegetation). In addition, 17 variables were calculated by using neighbourhood statistics techniques. The significance of distance from highway and of the former predictor variables upon species distribution and habitat used were assessed by using Generalized Linear Models (GLM), Logistic Regression (LR) and Regression and Classification Trees (CART). The results of our analysis demonstrated that the size of the habitat polygon units used by bears significantly increased with the distance from the highway while their number decreased as the distance from highway increased. We found no significant differences in dispersal patterns related to the time of activity and/or distance from highway. Similarly, we found only limited evidence to support an effect of the highway upon bears movement angles. Distance from highway was recognized as one of the statistically significant values affecting the relative *abundance* (GLM) or *bear presence* (LR); bears seem to appear more often at distant sites from the highway. Analysis of presence/ absence data (by means of LR & CART- *predictive accuracy of models was high*) demonstrated a series of topographical and vegetation characteristic as important predictors. Distance from highway was recognized, in both models, as one of the critical values affecting the presence of an animal. Overall we suggest that the new highway functions as a critical landscape parameter (barrier) that significantly affects distribution, habitat use, movement patterns and frequency of occurrences of brown bears. Our analysis showed that there are no specific habitat parameters close to the highway corridor that hinder bears movements. Bears utilize the same habitat types within the overall landscape but move in a much more "conservative" pattern (in terms of duration and habitat surface used) when found in proximity of the highway corridor. The results of our study will essentially contribute in further adjustment of mitigation measures along the highway as well as in close monitoring of their efficiency during highway operation in the critical area.

Paper 40

LANDSCAPE CHARACTERISTICS INFLUENCE LOCAL GRIZZLY BEAR ABUNDANCE

TABITHA A. GRAVES[1], KATHERINE C. KENDALL[2], J. ANDREW ROYLE[3], PAUL BEIER[1], JEFFREY B. STETZ[4], AMY MACLEOD[4]

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We identify landscape characteristics (habitat and human) correlating with abundance in a grizzly bear (*Ursus arctos*) population in northwestern Montana, USA. Over 1500 genetic samples of 545 grizzly bears collected in 2004 across the ~ 8 million acre Northern Continental Divide Ecosystem were formatted as a spatial mark-recapture data set to estimate local bear abundance. We used a hierarchical Bayesian analysis incorporating 1) detection probabilities, 2) multiple sampling methods, and 3) spatial autocorrelation to identify the landscape variables most important to abundance of male and female grizzly bears. We outline the modeling procedure and its utility when investigators are interested in abundance rather than presence/absence. Variables examined for their influence on abundance included: amount of mesic habitat, precipitation, avalanche chute area, amount of open habitat, terrain ruggedness, solar radiation, and area recently burned, plus several human-related variables including road density, trail density, hunting effort, presence of outfitter camps, and food storage protection level. We discuss the variables selected in this analysis and the implications for ecology and management of grizzlies in northwestern Montana.

Paper 41

THE SHARED PREFERENCE NICHE OF SYMPATRIC ASIATIC BLACK BEARS AND SUN BEARS IN A TROPICAL FOREST MOSAIC

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Patterns of habitat partitioning by ecologically similar species can occur through either divergent or shared niche preferences. Using foraging signs distinguished to species, we investigated habitat selection by sympatric Asiatic black bears (*Ursus thibetanus*) and sun bears (*Helarctos malayanus*) in three forest types (two low elevation, one montane) in western Thailand from 2001–2003. We quantified bear sign using 71 strip transects, conducted across all seasons. We sought to evaluate overlap in their habitat use, and spatial co-occurrence, and thereby assess evidence for the mechanism of their coexistence via one of these two niche models. Both species fed mostly on fruit, and foraging signs of both occurred in all three forest types. Insect feeding signs were rare (<8% of the sign sample), and were mostly from sun bears (84%). Significant differences in habitat use occurred only in montane evergreen forest, the habitat in which fruit was most abundant; black bear activity there was six times higher (14 signs/ha) than that of sun bears (2.3 signs/ha). Habitat use was more equable between the two species in semi-evergreen (5.9–9.2 signs/ha) and mixed deciduous forest (2.1–2.3 signs/ha). Of 10 local and landscape-scale habitat attributes examined, fruiting tree density was the best predictor of occurrence for both species. Models that included interspecific competition (fresh foraging activity of the other species) were much less supported than the top models without competition. Foraging signs of both species were found on >60% of sampling transects (0.3–0.6 ha), although sign age indicated that the two species uncommonly occurred together within this small area at the same time. Their co-occurrence at both coarse and fine spatial scales and use of the same resources (fruit trees) indicated common niche preferences. However, their habitat use differed in ways expected from their physical differences: larger black bears dominated in the most fruit-rich, higher-elevation habitat, and smaller sun bears took advantage of less-preferred insects. Broadly overlapping fundamental niches combined with asymmetric competition along resource gradients are features consistent with the concept of shared preference niches. Near exclusive of use of some resources provides each species a refuge from the competitive effects of the other, enabling them to share a wide range of other resources.

Paper 42

MOVEMENT RATES AND DENNING CHRONOLOGY OF GRIZZLY BEARS IN NORTHEASTERN ALASKA USING GLOBAL POSITIONING SYSTEM SATELLITE COLLARS.

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Grizzly bears (*Ursus arctos*) in arctic Alaska occur at low densities and have low rates of recruitment, long reproductive intervals and seasonally limited food resources. As part of a larger study of bear resource use, our objective was to calculate rates of movement and distances moved that could be related to spatial use of the landscape. We put Global Positioning System (GPS) satellite collars on 11 different bears (10 adult males and 1 adult female) that were followed between September 2006 and August 2009. We programmed collars to acquire up to 6 locations each day. Collars remained on bears for an average of 322 days. We used consecutive locations acquired at 4 hour intervals to calculate distances moved (km) and rates of movement (km/hr). From locations of 8 male bears, we determined the length of the den occupation and dates that bear entered and exited dens. The mean rate of movement for all bears was 0.44 km per hour. More than half of all movement rates were <0.20 km/hr and 33% were <0.05 km/hr. (N=8200). Distances moved and rates of movement, as well as sequences of movements, were used to identify clusters of locations needed to evaluate resource use. Adult male bears entered dens in late September to early November (mean = 12 October) and emerged in late April to late May (mean = 25 April). In the winter of 2008-2009, bears entered dens earlier and exited later than in 2006-2007. Male bears were in winter dens for an average of 195 days (range = 174- 226 days) indicating that arctic grizzly bears spend half of their lives in dormancy.

Paper 43

AUTUMN FOOD HABITS AND MOVEMENTS OF ASIATIC BLACK BEARS ON TOYAMA PREFECTURE, JAPAN: REGARDING HARD MAST PRODUCTION OF BEECH FAMILY

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We examined food habits and movements of Asiatic black bears (*Ursus thibetanus*) in relation to the hard mast production. Nine bears (four males and five females) were traced with GPS collar during July-November of the years 2005-2007 at the lower and higher elevations in Toyama prefecture. We investigated the food habits of each bears by feces and bear shelves found at GPS location points.

Bears fed on beechnuts (*Fagus crenata*) in the years of good beechnut production, while fed on acorn of Mongolian oak (*Quercus crispula*) and konara oak (*Q.serrata*) in the years of poor beechnut production. Moreover, bears fed on not only hard mast but also Japanese persimmon (individuals captured at alt.300-500m) and bear meat (individual captured at alt.1100m), in the year of poor production both of beechnut and Mongolian oak acorn. The home range elevations of bear changed annually in response to the vertical distributions of these food items.

Results suggested that bear's food habits and movements are change annually corresponding to hard mast production to some extent. However, when both of beechnut and Mongolian oak acorn were abundant, all bears fed on beechnut selectively. This result indicates bears feed on specific food species selectively even if there are two or more food items which are abundant. We investigated the bear food habits on individual level, and observed variety of food habits among individuals; there were bears which fed on konara oak acorn and the one which fed on Mongolian oak acorn in the years of poor beechnut production. Therefore, the autumn food habits and home range elevation of bears were influenced not only by hard mast production but also by food preference in bears and the regional or individual variation.

SESSION 8. STATUS & CONSERVATION OF EURASIAN BEARS

(Coordinated by IUCN/BSG)
Chair: Dave Garshelis

IUCN Bear Specialists Group suggested holding the session that would target at statuses and conservation measures for bears specifically in Eurasia.

The following experts were requested to prepare short case studies and/or status reports from their countries/regions of expertise:

- **Status & conservation of European brown bears -** Jon Swenson and Djuro Huber
- **Case study report on conservation of brown bears in the Pyrenees** - Pierre-Yves Quenette
- **Past and present distribution of the black and brown bears of Asia** - Dave Garshelis
- **Status & conservation of North Asian brown bears** - Tsutomu Mano
- **Status & conservation of South Asian brown bears** - Ozgun Emre CAN and Sathyakumar Sambandam
- **Status & conservation of Asiatic black bears** - Dave Garshelis and Mei-Hsiu Hwang
- **Distribution and conservation status assessment of Asiatic black bears in Taiwan** - Mei-Hsiu Hwang
- **Status & conservation of Sun bears** - Gabriella Fredriksson and Rob Steinmetz
- **Case study report on habitat loss and poaching of sun bears in Indonesia** - Gabriella Fredriksson
- **Case study report on the SE Asian bear farms & trade in bear parts** - Matt Hunt
- **Status & conservation of Sloth bears -** Harendra Singh Bargali
- **Case study report on the status of dancing sears in India** - Neil D'Cruze
- **Status & conservation of giant pandas -** Dajun Wang
- **Conservation implications for captive bears in Eurasia** - Jose Kok
- **Case study report on captive bears in India**- Brij Kishore Gupta

Please note, that timing for this session differs from other scientific sessions of the Conference and varies from 3 minutes (short communications) to 20 minutes (for more comprehensive reports).

Each presenter is aware of her/his approximate time slot; for other delegates the duration of each presentation and questions will be announced at the session.

Workshop 1: Captive Bear Issue and Its Management – The Bear Sanctuaries

Aim: Aim of this workshop is to present the broad aspects of bear sanctuaries including the origins of bears, management including facility design and size, bear health and welfare (especially behavioral aspects, group sizes), to share experiences and provide the information exchange that is crucial for building cooperation network to work on captive bear issue and its welfare.

Chair: Jose Kok, director of Alertis, EAZA bear TAG chair, Agnieszka Sergiel, Institute of Zoology, University of Wroclaw

Rapporteur: Coen Kuyten, project coordinator and welfare consultant, Alertis

- Leonardo Bereczky - Reasons of wild bears' appearing in captivity
- Lazaros Georgiadis - Sanctuaries and education
- Jose Kok - Sanctuaries - their role in conservation and research, standards and minimum requirements
- Marion Schneider - Integrating behavioural aspects into planning and running bear sanctuaries
- Jan Schmidt-Burbach – Veterinary care
- Irakli Kutsia NACRES – Welfare problems of captive bears in Georgia
- Agnieszka Sergiel – Captive bears welfare monitoring in Poland
- Koen Cuyten – Large bear enclosures for brown bear
- Gabriella Fredriksson – Bornean sun bear sanctuary

Discussion and preparation of draft recommendations:

Bears in captivity origin from a variety of sources. Cubs can be rescued as orphaned, some can be confiscated as pets, dancing bears, former circus performers or from bile extraction farms. Mostly they are unsuitable for release into the wild due to behavioural changes acquired during the period of human care. Thus they need to be lifetime maintained in captivity and it means lifetime care in sanctuaries, zoos or other captive institutions.
The following issues are to be discussed:

1. Reasons of such bears' appearing in sanctuaries and ways of minimizing this problem
2. Public awareness - use of such bears in education
3. Aspects of direct management in captivity - enclosure size, content and fences, nutrition, veterinary care, behaviour etc.
4. The idea of bear network and the list of sanctuaries - information exchange and availability of options for possible placement
5. Bears in captivity: their role for conservation relevant research and its consequences for housing, management and educational level of staff.

Workshop 2: Human Bear Conflict in the Caucasus

Aim: To review human-bear conflict in the Caucasus and elaborate effective mitigation measures considering international experience and the local socio-cultural and political environment.

Chair: Irakli Shavgulidze, NACRES

Rapporteur: Gareth Goldthorpe, Fauna and Flora International

Presenters:
Robin Rigg, SWS - Slovak Wildlife Society
Dr. Alistair Bath, Department of Geography, Memorial University of Newfoundland, St. John's, Newfoundland
Dr. John Beecham, Human-Bear Conflicts Expert Team Chair
Dr. Ozgun Emre Can, Carnivore Research & Conservation Coordinator, Nature Association for Turkey

Discussion and preparation of draft recommendations

The many forms of human-bear conflict (HBC) are yet to be better understood both globally and in the Caucasus. Nevertheless the maximum use of available information coupled with international experience should allow the planning of potentially effective mitigation measures to help the long-term survival of the Caucasus brown bear population. Certain socio-cultural and historical aspects may be crucial in establishing the overall context: while each of the Caucasus countries differ in many respects, brown bears and humans have co-existed for centuries throughout the Region; at least in some parts of the Region bears still seem to enjoy a better profile than many other wild carnivores; they have been traditionally hunted for skin and to lesser extent for meat too; in the former Soviet Union bears were actively persecuted and a special bounty system was operated on all wild carnivores. In addition post-soviet economic problems and governments' inability to respond as well as current plans for tourism development have and will pose new challenges. Presently, some of the important questions are:

- What would be most effective approaches to address HBC in the Region or its separate parts/countries?

More specifically:

- Is the prevention the best strategy?
- What can be done to increase bear acceptance? Will awareness raising be sufficient? Is the approach of keeping bears at "social carrying capacity" ultimately more beneficial than full protection?
- How to manage problem animals?

Additional specific issue:

- Crop/livestock insurance *vs.* compensation schemes.

Workshop 3: Large Carnivores in the Caucasus
(Under auspices of the Council of Europe/Bern Convention)

Proposed Agenda

1. **Introduction**
   By Mr Eladio Fernández-Galiano (Council of Europe) - *7 minutes*

2. **Integrating large carnivores, their prey and ecological connectivity**
   By Mr Urs Breitenmoser - 20 *minutes*

3. **Linking with of regional conservation initiatives -***10 minutes eeach*
   a. Large carnivores in the IUCN programme for Southern Caucasus
      By Mr Ramaz Gokhelasvili.
   b. integrating LC in the Ecoregional conservation Plan for the Caucasus
      By WWF Caucasus Programme Officer
   c. Taking care of LC needs in the building of the Emeral Network in the Caucasus
      By M Levan Butkhusi (Coordinatior of NACRES Emeral Network team)

4. **Status and main conservation problems of large carnivores in the Caucasus**
   Status of LC in Armenia by Hasmik Ghalachyan, Head of Department. Ministry of Nature Protection of Armenia
   - Status of LC in Azerbaijan by Elsahd Asgerov, Institute of Zoology, National Academy of Sciences of Azerbaijan
   - Status of LC in Georgia by Mr Irakli Shavgulidze, NACRES
   - Status of LC in Turkey

5. **Possible solutions and Recommendations**
   Open discussion

6. **Dealing with Human dimension aspects in Large Carnivores conservation**
   By Mr Alistair Bath – *20 minutes*

Workshop 4: Common Guidelines for Genetic Study of Brown Bears in Europe

On behalf of the network of partners participating in the "**First & Second International Workshop on the genetic study of the Alps-Dinara-Pindos and Carpathian brown bear (*Ursus arctos*) populations"**

Aim: The partners participating in the network have already prepared the guidelines and a comprehensive report (attached) on the status of genetic research on brown bears in Southeastern Europe. The aim of the proposed workshop is to demonstrate the power and value of genetic research in conservation and management of bear populations (especially in small and endangered populations), as well as to propose the guidelines for such work. The conservation aim of the workshop is to achieve that results from different research teams on different segments of the same bear population or on different populations are comparable and compatible.

Chair: Djuro Huber

Rapporteur: volunteer sought

Presenters:

Alexandros Karamanlidis et al.: Genetic research of brown bears in the Alps - Dinara – Pindos and Carpathian Mountains
Tomaz Skrbinsek: Use of genetic tools in estimating Slovenian brown bear population size
Ettore Randi: New frontiers in the genetic studies of bears
John Linnell: The importance of genetic research to help realize population level management of brown bears in Europe

Discussion and preparation of draft recommendations:

A broad discussion is going to take place that will hopefully lead to establishment of an international committee that will endorse and further develop the existing "common guidelines for genetic research on brown bears". We expect that the listed speakers or their alternatives will attend the Conference and no specific requests for their expenses will be raised.

List of Posters

#	Country	Title	Author(s)
1	Albania	Conservation status of brown bears in southern Albania	Karamanlidis A.A., S. Pllaha, M. De Gabriel Hernando, L. Georgiadis, S. Keri, L. Krambokoukis, K. Shore, and A. Zedrosser
2	China	Mapping brown bear (*Ursus arctos)* habitat and human-brown bear conflict in western China	Dajun Wang and Juan Li
3	China	Geriatric management of captive bears	Heather Bacon, Jill Robinson, and Nicola Field
4	China / Vietnam	Seasonal feeding of socially housed captive bear groups	Heather Bacon, Nicola Field, and Charles Wheelhouse
5	Croatia	Brown bear habitat suitability in Croatia	Ana Prohaska, Josip Kusak, and Djuro Huber
6	Croatia	Ranges and movements of brown bears in Croatia: comparation of methods used for calculations	Josip Kusak, Ana Prohaska, Tomislav Gomerčić, and Djuro Huber
7	Croatia	Brown bear damages in Croatia, during the 5-year period 2004 – 2008	Magda Sindičić, Đuro Huber, Tomislav Gomerčić, Zrinko Jakšić, Annette Mertens, Aleksandra Majić Skrbinšek, and Alen Slavica
8	Germany	Behavioural and autonomic thermoregulation in Malayan sun bears - preliminary results	Marion Schneider and Lydia Kolter
9	Greece	Genetic status of brown bears in northern Greece prior to the construction of the “Egnatia” highway	Karamanlidis A.A, M. Straka, M. De Gabriel Hernando, E. Drosopoulou, L. Georgiadis, L. Krambokoukis, L. Paule, and Z. Scouras
10	Greece	Seasonal changes in diet and the role of agricultural land for the brown bear (*Ursus arctos l*.) in NE Greece	Giannakopoulos Al., Akriotis T., Mertzanis G, Beecham J., Hliopoulos Y , Godes., C Tragos A., Riegler S, and Pilides C
11	Greece	Conservation status of brown bears in the Dinara – Pindos and Stara Planina – Rila - Rhodopi Mountains	Georgiadis L., M. Sindičić, G. Giannatos, K. Jerina, A.A. Karamanlidis, S. Kunovac, M. Paunović, S. Pllaha, T. Skrbinšek, A. Stojanov, E. Tsingarska, and D. Huber
12	Greece	Identification of corridors and linkage zones for brown bears as a compensation measure to the impacts of the construction of the “E65” highway in central Greece	Georgiadis L., D. Bousbouras, D. Chouvardas, C. Evangelou, L. Krambokoukis, E. Lampou, and A.A. Karamanlidis
13	India	Niche gradient of bear species in Uttarakhand and Himachal Pradesh, India	Aishwarya Maheshwari and Diwakar Sharma
14	India	Conservation status of Asiatic black bear and Himalayan brown bear in Pir Panjal Himalayan range, India	Chauhan, N.P.S. and Rathore C. Bipan
15	India	Status of highly endangered Malayan sun bear and conservation threats in India	Chauhan, N. P. S. and Janmejay Sethy

List of Posters (cont)

#	Country	Title	Author(s)
16	India	Dimensions of human-sloth bear conflict in different states in India and mitigation strategies	Chauhan, N. P. S.
17	India	Status and distribution of bears in the state of Uttarakhand, India.	Harendra Singh Bargali
18	India	Asiatic black bear - human conflicts around Dachigam National Park, Kashmir, India	Sathyakumar, S., Charoo, S.A., and Sharma, L.K.
19	India	Dancing bears in India: application of a sustainable livelihoods approach	Ujjal Kumar Sarma, Bhagat Singh, Neil D'cruze, and Aniruddha Mookerjee
20	Iran	Status and conservation of brown bear in Northern Central Alborz Protected Area	Bagher Nezami
21	Italy	Assessing the effect of sub-sampling to efficiently design bear diet studies: the case of the Apennine brown bear	Di Domenico G., P. Ciucci, E. Tosoni, and L. Boitani
22	Italy	Status of the brown bear population in Trentino, central italian Alps, at the end of 2009	Claudio Groff
23	Japan	Reproductive dispersal for brown bears in Urahoro and adjacent areas, Southwestern part of the Akan-Shiranuka region in eastern Hokkaido inferred from genetic analysis	Tetsuji Itoh, Hidetsugu Nakamura, Kyoko Kobayasi, Tsutomu Mano, Yoshikazu Sato
24	Japan	Improvement of the harvest-based estimator of a brown bear population by applying an independent estimation: an approach to bear population monitoring in Japan	Tsutomu Mano, Hiroyuki Matsuda, Shosuke Natsume, and Hifumi Tsuruga
25	Japan	White colored brown bears in Kunashir and Iturup island, South Kuril islands	Yoshikazu Sato, Hidetsugu Nakamura, and Noriyuki Ohtaishi
26	Japan	Autumnal habitat selection of Japanese black bear from GPS telemetry data in Nikko-Ashio Mountains	Yui Nemoto, Chinatsu Kozakai, Koji Yamazaki, Shinsuke Koike, Ami Nakajima and Koichi Kaji
27	Nepal	Status of brown bear in Nepal	Achyut Aryal
28	Netherlands	Abstract project forest rangers/hard release bear cubs	Gerard Baars
29	Norway	Brown bears possess anal glands with secretions coding for sex	Frank Rosell, Susan M. Jojola, Kristian Ingdal, Bård A. Lassen, Jon E. Swenson, Jon M. Arnemo, and Andreas Zedrosser
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Posters

Poster 1

CONSERVATION STATUS OF BROWN BEARS IN SOUTHERN ALBANIA

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Following a rapid population decline and range constriction throughout its Holarctic distribution, most countries around the world have stepped up their research and conservation efforts in order to stem the extinction process of brown bears *(Ursus arctos)*. These efforts have resulted in the collection of a considerable amount of scientific data and the design and implementation of elaborate management and conservation plans. The decade-long political isolation of Albania has had its effect on the conservation of brown bears as well, by preventing information on the conservation status of the species reaching interested conservation stakeholders around the world and by preventing international cooperation in the protection of the species.Through an international cooperation, a study was carried out in 2008 – 2009 aiming to assess the conservation status of brown bears in southern Albania (i.e. south of Tirana). The objectives of the study were to collect basic information on the distribution, demography and genetic status of the species and evaluate the extent of human – bear conflicts and the magnitude of the problem of bears held in captivity. These objectives were pursued by field surveys collecting direct and indirect evidence of bear presence, by genetic analysis of hair samples and questionnaires. During field research, bear presence was verified in more than 25 locations, mainly in the southern part of the country to the border to Greece. The collection of 23 hair samples from six sampling locations enabled the identification of five individuals and a preliminary assessment of the genetic status of the species in the country. The questionnaires carried out regarding the welfare status of the species in the country resulted in the identification of 25 bears held, often under marginal welfare conditions, as “pets” in restaurants, privately as “photo bears” or in private zoos. Capture of cubs from the wild to meet the demand for bears in captivity appears to be a common practice. In addition, 136 questionnaires were carried out regarding the status of wild brown bear populations and the extent of human – bear conflicts; the results indicate wide-scale conflicts of humans with bears and a generally negative public perception of the species. This situation leads often to deliberate killing of bears. The results of the study indicate that currently the conservation status of brown bears in southern Albania is unfavourable. This is based mainly on the negative public perception of the species, the ongoing tradition of keeping the species in captivity for exhibition purposes and the deliberate killing of the species. The results of the study should draw the attention, both nationally and internationally, of bear conservationists and interested stakeholders on the plight of the species in Albania. The results will be used to pressure the government of the country to harmonize with European policy standards on species management and protection in view of the aspirations of the country to join the European Union.

Acknowledgements: We would like to extend our gratitude towards the field teams of TWA and ARCTUROS for collecting the field data, often under unfavourable conditions. This project received generous financial support from Alertis, fund for bear and nature conservation, the International Association for Bear Research and Management and the NGO ARCTUROS.

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Poster 2

MAPPING BROWN BEAR (*URSUS ARCTOS)* HABITAT AND HUMAN-BROWN BEAR CONFLICT IN WESTERN CHINA

Dajun Wang, Juan Li

Interpreting Landsat image data and combining other GIS data layers, we mapped the potential distribution of Brown bear (*Ursus arctos*) in 7 provinces or autonomous regions in western China. Then we sampled 40% of the potential habitat in Qinghai province to conduct ground truthing, including sign survey and interview to assess the distribution map, and revised the result until we got 80% accuracy. The total area of brown bear habitat in western China is XXX km^2, and fragmented into XXX isolated patches. From the survey and interview information, we also mapped the human-bear conflict distribution in Qinghai province. The root causes of the conflict and solving methods was discussed based on the local knowledge and experiences from other case studies.

Poster 3

GERIATRIC MANAGEMENT OF CAPTIVE BEARS

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The Animal's Asia Foundation has rescued over 260 bears (*Ursus thibetanus* n = 170, *Ursus arctos* n= 3), now housed at its China bear rescue centre. The majority of these bears are rescued from Chinese bile farms, are middle to old aged and are an excellent representation of the various challenges faced when managing a geriatric bear population. Problems of older bears in captivity are well documented in the literature and have a significant welfare impact on the lives of captive bears, however a comprehensive discussion of geriatric bear management techniques is lacking.

This paper will briefly discus the major issues faced when managing older bears in captivity and then focus on the various husbandry and medical strategies that may be employed to mitigate the impact of geriatric diseases in captive bears. Particular emphasis will be placed on the management of the more prevalent diseases including dental disease (87%), musculoskeletal disorders (70%), and ocular disease (17%).

We have found that a holistic veterinary and bear management approach combining appropriate weight monitoring and management, training, medical diagnostics and medical and surgical therapies, and sympathetic enclosure design and social interactions to be effective in mitigating the welfare concerns raised when managing geriatric bears. This approach may prevent the progression of some disease problems, leading to improved welfare of geriatric bears in captivity. This holistic approach may have applications in other captive bear facilities.

Poster 4

SEASONAL FEEDING OF SOCIALLY HOUSED CAPTIVE BEAR GROUPS

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The nutritional management of bear social groups poses several challenges. Mediation of food-related aggression is essential for the formation of a cohesive social group, and sub-optimal nutrition or excessive calorie intake may predispose to obesity or disease. Additionally, feeding strategies have a large impact on social behaviour, mental stimulation and the expression of normal behaviours.

This paper will present the development over the past two years of the current feeding strategies employed at the Animals Asia Foundation's China and Vietnam bear rescue centres, The two centres are home to Asiatic black *Ursus thibetanus* (n = 199), sun *Helarctos malayanus* (n = 4) and brown bear *Ursus arctos* (n=3) species, many of whom suffer from significant disease syndromes, to which appropriate nutritional support is crucial. Nutritional management through the rehabilitation and integration periods will be discussed as well as longterm management of diets in an attempt to reflect natural feeding cycles throughout the year.

We have found the impact of dietary management during integration periods to be particularly significant, and adoption of a more naturalistic feeding strategy that reflects natural seasonal variation has resulted in reduced negative interactions between bears and more harmonious social groups, a reduction in stereotypical behaviour and increased foraging times and better control of weight .

Poster 5

BROWN BEAR HABITAT SUITABILITY IN CROATIA

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Croatia's territory together with the neighbouring Slovenia and Bosnia and Herzegovina support one of the last healthy populations of brown bear (*Ursus arctos*) in Europe, the Dinara-Pindos population. Habitat fragmentation and degradation have been recognised as some of the most important threatening factors for bears, and the most difficult ones to address. This study seeks to (1) determine key factors for measuring suitability of brown bear's habitat on a national level, (2) to describe current habitat suitability for brown bear in Croatia and (3) evaluate the importance of protected areas for the long-term persistence of high quality habitat. In this study, 6915 point locations from nine GPS-collared bears from Gorski Kotar and Lika, tracked in the period from September 2003 to December 2009, were used to produce a GIS-based habitat suitability map based on the Mahalanobis distance model. To evaluate the protection level of the prime habitat areas, we analysed the portion of habitat having suitability values above 75% that is included in the existing and proposed protected area network.

First, grid regression analysis for ArcView 3.3 was employed to identify variables that significantly influence the distribution of brown bear locations. Then, grids of relevant parameters with resolution of 250 x 250 m were used as the input for Mahalanobis distance analysis using the ArcView 3.3 extension. Five of 10 tested variables showed significant influence for habitat suitability. Forest cover (ANOVA, F=15.13, t=0.565 P= 0001), ungulate diversity (ANOVA, F=14.20, t=3.77, P=0.0001) and elevation (ANOVA, F=7.76, t= 2.77, P=0.005) had positive influence. Pastures and meadows (ANOVA, F=12.07, t= -3.47, P=0.0005), and agricultural fields (ANOVA, F=4.04, t=-2.01, P=0.04) had negative influence. Slope, aspect, road density and human population density had no significant influence on the habitat quality at the scale considered. Map of habitat suitability pinpointed forested mountainous regions as key habitat areas for brown bear. The surface of 4288.63 km^2 of the brown bear prime habitat is currently covering 7.58% of Croatian territory; 3718.63 km^2 or 86.71% of that belongs to the mountainous area of Gorski kotar and Lika, known to be permanently inhabited by brown bears. The rest of the prime habitat is situated on the mountainous areas that are either known to be occasionally visited by brown bear individuals (e.g. Ucka) or have no records of this species' presence (e.g. Papuk). With the respect to the adequacy of the current conservation, existing protected areas cover only 22.39% of prime habitat in Gorski kotar and Lika. Having 570.0 km^2 or 13.29 % of suitable areas outside of current bear range in Croatia suggests that natural dispersal (e.g. to Ucka and Cicarija) is a likely. Finally, with respect to the current level of protection, the current protected area network only covers a small portion of the brown bear's prime habitat. Therefore, increasing the size of protected areas in brown bear's habitat through NATURA 2000 to 2627.14 km2 or 70.6% of prime bear habitat, as well as a sustainable management of the rest of the prime habitat will be vital in supporting the current numbers of this species, in the face of further human developments in the region. Additional studies to gain more information on the habitat suitability in the neighbouring countries (Bosnia & Herzegovina and Slovenia) would provide basis for population level conservation and management of Dinara-Pindos bear population.

Poster 6

RANGES AND MOVEMENTS OF BROWN BEARS IN CROATIA: COMPARATION OF METHODS USED FOR CALCULATIONS

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Telemetry tracking is 40 years old method of choice for revealing patterns of movements and sizes and shapes of home ranges of non conspicuous animals. That information is often the base for management of species. With the use of GPS technology, large amounts of high quality GPS locations quickly accumulate. Various methods to calculate the movements and ranges of animas are available today, giving very different results. Here we present the results of GPS tracking of bears in Croatia and the comparation of three methods for calculation of home ranges. Nine brown bears (*Ursus arctos*), five males, four females, in ages from 2.5 to 15 years (average=5.1), were tracked by the use of GPS-GSM collars in Croatia between 2003 and 2009. Tracking time lasted from 42 to 409 (avg=214) days. Collars were scheduled to attempt GPS fix every two hours. The GPS fixing was successful in 48.8% of attempts, resulting in 9882 locations. Home ranges and utilization distributions were calculated as minimum convex polygons (MCP), fixed kernels (FK) where smoothing factor (h) was obtained by least square cross validation (h_{LSCV}). We also used newer method called "local convex hulls" (LoCoH) calculation, where we selected adaptive algorithm, with factor a=maximal locations distance. With MCP we used 100% and 95% of locations, while with FK and LoCoH methods we used 95% and 50% of locations. Calculated home ranges were overlaid on bear habitat suitability map to compare how resulting polygons match with habitat map. The average length of day-to-day movements of all tracked bears was 1674m (n=1395, average range was 48 to 9976, SD=1767). The average time between two GPS fixes was 3.47 hours (n=9814, range 1.1 to 37.2 SD=3.6). During this time tracked animals moved 515.1 m (n=9814, range 0.8 to 8079, SD=848). Recalculated to one hour, the average movement was 217m (n=9814, range 0.2 to 4703, SD=408). Traditional 100% MCP for all bears was 249.7 km^2 (range 31.6 to 963.9, SD=330.5), Areas of 95% MCP for all bears covered only 93.0 km^2 (range 17.8 to 358.6, SD=105.1). Fixed kernels (95% FK) covered 169.5 km^2 (range 17.8 to 62.7, SD=19.8). Local convex hulls (95% LoCoH) covered 48.8 km^2 (range 8.7 to 141.0, SD=49.2). Female ranges were much smaller than the ones of males. Resulting 100%MCP ranges were 2.7 times larger than 95%MCP ranges, but 95% MCP were 1.8 times smaller than 95% FK ranges. LoCoH ranges (95%) were 1.9 and 3.5 times smaller than 95% MCP and 95% FK home ranges respectively. When overlaid on bear habitat suitability map, both MCP and kernel home ranges included unsuitable areas (lakes, sea, settlements; Type II error) and 95% kernel ranges included areas away of any known location (Type I error). Home ranges calculated by LoCoH method had "holes" and "pockets", which actually were patches of unsuitable habitat on habitat map. Home ranges calculated by kernel method were larger than MCP, but both would give satisfactory results if the habitat is continuous and homogenous. With the increase in habitat patchiness (fragmentation) LoCoH method gives better results than the other two methods. LoCoH polygons can also include unsuitable areas, but when the sampling effort is insufficient i.e. tracking time shorter than one year, too long interval between GPS fixes and low GPS success rate. Considering the average hourly movements of bears in Croatia (217m), the 2 hours GPS fix interval would be sufficient, but only if GPS success rate would be close to 90%. Further analyses will reveal which calculations do the best represent the bear use of the habitat.

Poster 7

BROWN BEAR DAMAGES IN CROATIA DURING THE 5-YEAR PERIOD 2004 – 2008

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The brown bear (*Ursus arctos L.*) population in Croatia has been steadily increasing since 1950`s, nowadays reaching its biological and social carrying capacity - a population of around 1 000 individuals inhabits an area of 12 372 km^2 (almost 22% of the land surface). Since 2005 bears are managed by a National Management Plan, which regulates yearly quotas and requests recording and reporting all relevant events, including bear caused damages on human property. In areas where bears are hunted damage compensation is paid by hunting unit leaseholders, whereas in national parks and in areas with only accidental presence of bears compensation is paid from the state budget.

Data about human-bear conflicts in Croatia prior to implementation of the Management Plan are scarce, with no precise recordings about damage on agriculture and domestic animals. This paper analyzes data about human-bear conflicts in Croatia, gathered during the first 5 – year period (2004 – 2008) of organized data collection. It is probable that not all the damage got registered, but we believe that this data truly reflect the real situation. In total 220 cases of bear damage have been reported in this period (average 44 per year), with cost approximately 42 000 $ in terms of compensation. In these five years the number of damage cases was: 23, 88, 16, 46 and 47, in 2004, 2005, 2006, 2007 and 2008 respectively. In most cases damage has been on agricultural goods: cereals – 44 cases (20.0%), orchards (mostly plum and apple) – 34 (15.5%) and vegetable (mostly carrot) fields – 38 cases (17.3%). Totally 20 cases (9.0%) of damage in apiaries have been documented. Attacks on poultry (20), sheep (15) and rabbits (8) accounted for 81% of the damage on domestic animals, and 19.5% of the total damage cases. Larger domestic animals rarely were injured or killed. In fact, during the 5-year period only 5 attacks on goats, 2 on cows, one each on a donkey, pig and horse have been documented.

All attacks have happened within the area where bears are hunted, so in this period no bear damage has been compensated by the state. Consecutive series of attacks, which were concentrated in a shorter period, indicate that those attacks were caused by the same problematic individuals, probably attracted by garbage. Bear attacks on humans have not been recorded in this period.

As presented in this paper, human-bear conflicts were infrequent in Croatia and the material damage was not significant for a population of 1 000 bears. This reflects the good traditional knowledge of people used to coexist with bears. However, during the same period media occasionally reported about an “oversized, problematic” brown bear population. Therefore more damage prevention and management of problematic bears are the key issues of the bear management in Croatia, as well as cooperation with hunters and general public, including strong public campaigns.

Poster 8

BEHAVIOURAL AND AUTONOMIC THERMOREGULATION IN MALAYAN SUN BEARS - PRELIMINARY RESULTS

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The thermoneutral zone (TNZ) is the range of ambient temperatures (T_A) inside of which the rate of metabolism remains constant. It corresponds to the ambient conditions a species has evolved in. Below and above the lower (T_{LC}) and the upper (T_{UC}) critical temperatures regulation of body temperature, which adds to the physiological costs, is achieved by both behavioural and autonomic means. The activation of the various thermoregulatory mechanisms follows a hierarchical system that aims at minimising energy expenditure. There is little information on thermoregulation in Malayan sun bears (*Helarctos malayanus*). They inhabit the tropical forests of southeastern Asia, which are characterized by low temperature fluctuations. Open areas exposed to direct solar radiation are avoided. The critical temperatures of sun bears have not yet been determined. Inferring from the climatic conditions in their natural habitat it can be assumed that their TNZ is relatively narrow and lies within the range of tropical temperatures. The aim of this study is to investigate the effect of different ambient conditions on both behavioural and autonomic thermoregulatory mechanisms of Malayan sun bears.

Infrared thermography, a non-invasive method that detects heat dissipation via the body surface, was applied in order to estimate the TNZ of sun bears by determining the range of temperatures where body surface temperature (T_S) is close to T_A. Eight adult sun bears in European zoos were included in thermographic measurements at T_A between 5°C and 32°C. To assess the contribution of behaviour related to thermoregulation, observations were conducted in five adult sun bears at T_A ranging from 18°C to 30°C by instantaneous scan sampling. Activity, body posture, selection of substrate, choice of shady places, and the occurrence of panting were recorded every 60 seconds resulting in 40 observation hours for each animal. Ambient temperature [°C], humidity [%], wind velocity [km/h], and solar radiation [W/m^2] were measured four times per hour.

The analyses of the infrared images revealed that at T_A between 24°C and 28°C T_S are equal to T_A, below and above those temperatures heat is dissipated over the whole body surface, indicating that the TNZ of Malayan sun bears lies within this temperature range. For further analyses, T_A of 24°C was set as T_{LC} and 28°C as T_{UC}. Overall activity increased significantly below the T_{LC} ($p=0.048$) from 47.8 % to 55.1 %, whereas no decrease in activity could be found above the T_{UC}. Changes in the proportion of body postures during resting were not significant, even though resting in a maximal extended position increased from 6.9 to 15.1 % above the T_{UC}. Panting occurred at T_A between 25°C and 30°C merely after physical activity. There was a tendency towards a greater amount of staying in water above the T_{UC}, but the increase was not statistically significant ($p=0.059$). In contrast, the use of shady places significantly increased above the T_{UC} ($p=0.011$), indicating that trees are a critical resource for sun bears not only for foraging but also for thermoregulation.

First analyses of behavioural observations support the estimate of the thermoneutral range of Malayan sun bears. However, more behavioural data at higher temperatures similar to those occurring in their natural range are necessary. The results offer a first insight in thermoregulation in Malayan sun bears. Findings will be discussed with respect to the adaptive potential of the species and its consequences for *in situ* and *ex situ* conservation.

Poster 9

GENETIC STATUS OF BROWN BEARS IN NORTHERN GREECE PRIOR TO THE CONSTRUCTION OF THE "EGNATIA" HIGHWAY

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The brown bear (*Ursus arctos*) is considered to be endangered in Greece, mainly due to deliberate killing and habitat alteration. Of particular concern are the effects on habitat continuity from the construction of large-scale infrastructure projects, such as highways. The "Egnatia" highway, a 680km-long highway linking the western to the eastern part of Greece, poses an imminent threat to the survival of brown bears in Greece as it dissects their main habitat in the country, in the Northern Pindos Mountains. In order to collect information that will promote the establishment of effective mitigation measures a scientific study is being conducted, consisting of three distinct phases: the first phase consisted of assessing the status of the environment at a 40km-long stretch of the highway in the Prefecture of Grevena prior to its construction; the second and third phase include monitoring the effects of the construction and operation of the highway respectively.Within the framework of the first phase of the study particular attention was given in assessing the genetic status of the brown bear in the area. In 2003 – 2004 genetic samples were collected opportunistically and in 2005 systematically; laboratory procedures were optimized for the amplification of 10 polymorphic loci that enabled individual identification. Statistical analyses included the calculation of measures of genetic diversity (i.e. using programs GENEPOP, GENETIX), which were then compared with measures of genetic diversity of populations with known demographic history, the assessment of genetic structure (i.e. programs STRUCTURE, GENETIX), the assessment of the recent reduction in population size (i.e. program BOTTLENECK) and the estimation of total population size using rarefaction (i.e. program GIMLET). A total of 445 genetic samples were collected and 131 of them analyzed; we identified a minimum of 49 individuals and detected low levels of genetic diversity which was consistent with evidence found of a recent reduction in effective population size. No evidence of genetic structure was found but there were indications of migration of individuals from outside the area, which was consistent with information collected through the concurrent satellite monitoring of bears in the area and the genetic study of bears throughout the country. Since the construction and completion of the "Egnatia" highway in 2008, 16 individuals identified during our study have been recaptured in the same study area and one outside it. The genetic data collected from the area prior to the construction of the "Egnatia" highway consist a unique dataset, that will not only enable in the long-run the evaluation of the effects of the construction of the highway on the local bear population and the implementation of effective mitigation measures, but also, on a theoretical level, to evaluate the effects of the construction of a highway on genetic diversity.

Acknowledgements: We would like to extend our gratitude towards the field team of ARCTUROS for collecting the field data, often under unfavourable conditions. The set-up phase of the genetic part of the study (2003 – 2004) was carried out within the framework of the "Monitoring project on impact evaluation of Egnatia highway construction (stretch 4.1) on large mammals in the area of Grevena", co-funded by EGNATIA ODOS S.A., the Hellenic Ministry of Environment, Planning & Public Works and the E.U. (DG Regio); the main part of the study (2005) was funded by the NGO ARCTUROS.

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Poster 10

SEASONAL CHANGES IN DIET AND THE ROLE OF AGRICULTURAL LAND FOR THE BROWN BEAR (*URSUS ARCTOS L.*) IN NE GREECE.

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The present study concerns the research on food habits and habitat suitability of brown bears in a mixed agri-forest environment in NE Pindos Mountains. In total, 229 scats of brown bear and 794 signs were collected during the period 2006-2007. The most important food category in spring was found to be hard mast (*Quercus sp*), green vegetation Wheat (*Triticum sp*.) and Sow thistle (*Sonchus oleraceus*) while in summer continued to be wheat seeds (*Triticum sp*.) as well as cultivated fruits- soft mass (*Prunus sp. Prunus avium*).

In autumn oak seeds (*Quercus sp*), grapes (*Vitis vinifera*), and apples (*Malus domestica*) appeared to be the main food for brown bear. The field data indicated that agricultural land habitats are important, in particular because forage is often high caloric and available in these areas after and before denning period. Open habitats and agricultural land such us cereal fields, fallow land, orchards, vineyards etc, in combination with forest habitats are important for providing food, such as wheat seeds and wild grasses especially through spring season that fruit production is imaginary. Findings indicated that brown bears use agricultural land habitats close to forests while an important percentage of their diet consists of cultivated plants, plants from fallow lands and hard mast (oak etc). From the other hand brown bears cause many damages on agricultural products, bee yards and livestock every year and this increase human-caused bear mortality. Moreover, European Agriculture Policy leads to agricultural activities' reduction in mountain areas which affects some wildlife species.

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CONSERVATION STATUS OF BROWN BEARS IN THE DINARA – PINDOS AND STARA PLANINA – RILA - RHODOPI MOUNTAINS

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Despite being legally protected throughout the biggest part of their range, brown bears (*Ursus arctos L.*) in southeastern Europe face a number of threats and their survival is still far from being secured. A general misconception and significant hindrance in the effective conservation of the species is the local range in which management measures are planned and implemented. With home ranges that can span over several countries, brown bear conservation and management efforts should be planned and carried out on a transboundary level. Considering the legislative, logistic and scientific differences and the differences in conservation and management priorities between different countries, coordinating and bringing them under a common conservation framework is a considerable challenge. Within the framework of a SEE-ERA.NET program, an effort was launched in 2006 to recreate the BALKAN NET, a network of conservation bodies in countries sharing continuous large carnivore populations in southeastern Europe. This network managed to gather data from eight countries and link scientists and conservationists of the area. One of the primary goals of their cooperation was to assess the conservation status of brown bears in the region. In order to guarantee a uniform method of data collection, a standardized protocol for reviewing published data and summarizing information on ongoing research and conservation activities was devised. Data collection included information on various topics, such as distribution, population size and trends, mortality, reproductive and legal status of the species in the country, management priorities, human – bear conflicts, threats and research and conservation actions carried out in each respective country. The compilation of information from each participating country produced a clear picture of the status of the brown bear populations in the Dinara-Pindos and Stara Planina – Rila-Rhodopi Mountains, both on a biological and a conservation and management level. While the general status of the species in the northern part of the range (i.e. Slovenia and Croatia) can be considered as favorable, conservation conditions for brown bears in the region deteriorate as one proceeds towards the southern part of the range and improve again slightly reaching the southernmost edge of the species distribution, in Greece. While the participants presented some minor information gaps in certain areas, some countries, such as Albania lacked even basic information on population parameters and mortality figures. Considerable research efforts are still required in order to fill in these knowledge gaps. The assessment of the conservation status of brown bears in the Dinara – Pindos and Stara Planina – Rila-Rhodopi Mountains enabled the identification of research, management and conservation priorities for the species, both on a national and a transboundary level. The information compiled will be used to improve the National Action Plans for the species in each respective country and serve as the groundwork for a transboundary Action Plan for brown bears in the region.

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Poster 12

IDENTIFICATION OF CORRIDORS AND LINKAGE ZONES FOR BROWN BEARS AS A COMPENSATION MEASURE TO THE IMPACTS OF THE CONSTRUCTION OF THE "E65" HIGHWAY IN CENTRAL GREECE

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A new threat endangering the survival of wildlife in Greece is the fragmentation of the limited habitat available in the country through the construction of large infrastructure projects, such as roads. The "Egnatia" highway, which links the western to the eastern part of the country, is such an example and its effects on the local brown bear (*Ursus arctos*) population are being closely monitored. The construction of a new highway, the "E65", linking the southern to the northern part of the country, aligned between the mountain ranges of Pindos and Olympus - Pieria, will most likely negatively affect habitat connectivity of all large mammals living in the area furthermore. In order to prevent the eventual fragmentation of natural habitats, special mitigation measures have been planned for a 40.8 km section of this road, including 5.1 km of tunnels and 4.1 km of large bridges.

In addition and in order to ensure natural habitat continuity on a wider scale, a pilot study was carried out aiming to identify and propose special additional compensatory measures. Using the brown bear as an indicator species the study aimed in identifying the local linkage zones that would ensure intermountain habitat connectivity and was based on GIS mapping and on the least cost analysis model. The model's input were land use types, the impact of human settlements and the type and density of the road network.

The results of the study identified the actual and potential corridors and linkage zones that allow brown bears to move between the Pindos and Olympus - Pieria Mountain ranges. The main land use types in the model affecting habitat connectivity were coppice oak forests, arable lands and grasslands. Based on these results inversion of coppice forests to high forests in the areas surrounding the construction site of the highway has been proposed and actively promoted in order to secure the long term functionality of the corridors and linkage zones.

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NICHE GRADIENT OF BEAR SPECIES IN UTTARAKHAND AND HIMACHAL PRADESH, INDIA

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We compared niche gradients for assessing habitat characteristics of Asiatic black bear and Himalayan brown bear through sign surveys including direct sighting, scat, pugmark, digging sign and interviews of shepherds. Asiatic black bear evidences (n=10; 02 sighting, 07 scat, 01 pugmark) were recorded from 05 Protected Areas between altitude range 3200m-3535m. Himalayan brown bear evidences (n=27; 01 sighting, 19 scat, 03 pugmark, 04 digging) were recorded from 03 Protected Areas between altitude range 3100m-4080m.
For Asiatic black bear, slope range between 10°-60° (mean slope 41°). Most of evidences (60%) recorded from shrubland and 40% from forest. Most of the evidences were recorded from hill-slope (60%) followed by cliff (20%), stream bed (10%) and valley floor (10%). Whereas, Himalayan brown bear evidences were recorded slope range between 0°-60° with mean slope 24°. Most of evidences were recorded from grassland (52%) followed by shrubland (44%) and barren land (4%). Almost 52% evidences were recorded from hill-slope followed by valley floor and stream bed (37%), scree slope (7%) and cliff (4%).

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CONSERVATION STATUS OF ASIATIC BLACK BEAR AND HIMALAYAN BROWN BEAR IN PIR PANJAL HIMALAYAN RANGE, INDIA.

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We studied the status and distribution of Asiatic black bear (*Ursus thibetanus*) and Himalayan brown bear (*Ursus arctos*) along the Pir Panjal range in lesser Himalayas, India during 2005-2008. Informal interviews of local people in randomly selected villages located in 4 forest divisions were conducted to collect information on occurrence of bears and conservation threats.

The Pir Panjal range has 2340 km^2 forests and 1980 km^2 of alpine pastures. Black bear occupied 5 broad habitat categories (Moist temperate forest with conifers, Mixed forest with conifers and broad leaves species, Grassland and forest blanks, Agricultural land and Near water bodies. Whereas brown bear occupied 10 habitat categories (Himalayan moist temperate forest with conifers, Mixed forest with conifers, Subalpine forests dominated by birch and fir species, Grassland and forest blanks, Near water bodies, Alpine exposed rocks, Moist sub-alpine scrub, Dry alpine scrub and Riverine forest and Agricultural land). Asiatic black bear usually occur between 1200-2500m and brown bear above 2500m. We interviewed 98 persons in 21 villages in Chamba, 106 persons in 27 villages Churah, 85 persons in 17 villages in Pangi and 94 persons in 19 villages in Bharmour divisions. They sighted black bear and brown bear in different habitat categories. Black bear was sighted by 67.3%, 3.1%, 21.4% and 8.2% respondents in forests, pastures, crop fields and village areas respectively of Chamba division, whereas brown bear was sighted 8.2%, 79.6%, 9.1% and 3.1% respectively. In Churah forests, pastures, crop fields and village areas, 83%, 0%, 11.3% and 5.7% respondents sighted black bear respectively, and 2.8%, 81.1%, 15.1% and 1% sightings of brown bear respectively. In forests, pastures, crop fields and villages of Pangi division, 68.2%, 2.4%, 22.3% and 7.1% respondents sighted black bear respectively; whereas 7.1%, 84.7%, 8.2% and 0% respondents sighted brown bear respectively. In forests, pastures, crop fields and villages of Bharmour division, 64.9%, 1.1%, 26.6% and 7.4% respondents sighted black bear respectively; whereas 7.5%, 75.5%, 13.8% and 3.2% respondents sighted brown bear respectively. However both the bear populations are threatened due to expansion of human habitation, habitat degradation and fragmentation, excessive mining, encroachment on forests, illegal timber extraction and collection of medicinal plants, human-bear conflicts, poaching and livestock grazing. Management issues related to habitat restoration and protection of bear populations have been discussed. Recommendations to combat these threats have been made.

Poster 15

STATUS OF HIGHLY ENDANGERED MALAYAN SUN BEAR AND CONSERVATION THREATS IN INDIA

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Sun bears (*Helarctos malayanus*) remain the least known bear species in the world. We carried out field surveys to know the status and conservation threats of Malayan sun bear in and around protected areas (PAs) and reserve forests (RFs) in state of Mizoram, Manipur, Nagaland and Arunachal Pradesh in India during 2006-2008. Informal interviews of local people living in the vicinity of PAs and RFs were conducted and information on direct sightings and indirect evidences such as faecal matter, foot prints etc. of sun bear and prevailing threats were collected. Out of 58, 38, 26 and 43 villages of Mizoram, Manipur, Nagaland and Arunachal Pradesh respectively, confirmed presence of sun bear was in PAs and RFs of 21, 19, 7 and 24 villages respectively. According to 238 respondents from Mizoram, 264 from Manipur, 136 from Nagaland and 228 from Arunachal Pradesh, the confirmed presence of sun bear by direct sighting was 17.4%, 26.9%, 17.6% and 18% (respondents) respectively; by indirect evidences was 34.8%, 37%, 19.9% and 33.3% respondents and by both direct sighting and indirect evidences was 10.2%, 5.5%, 12.5% and12.3% respondents. Whereas 37.6%, 30.6%, 50% and 36.4% respondents had no information of its presence or absence in their areas in Mizoram, Manipur, Nagaland and Arunachal Pradesh respectively. Overall status of occurrence of sun bear was found to be low to medium in and around PAs and RFs in these states except Dampa tiger reserve in Mizoram (84.6% respondents) and Namdapha tiger reserve in Arunachal Pradesh (88.5% respondents) where its occurrence was relatively high. But the potential threats for survival of sun bear have been alarming. Rapid deforestation resulting in habitat destruction and fragmentation has been a serious concern. The extent of poaching of Asiatic black bear and sun bear for illegal trade of their body parts is on the increase; thereby the populations seem to be declining fast. According to 71.2%, 48.7%, 67.7% and 69.4% respondents, indiscriminate hunting of sun bear was reported to be high in Mizoram, Manipur, Nagaland and Arunachal Pradesh respectively. We recorded 5 sun bear poaching cases in Manipur, 7 in Nagaland and 7 in Arunachal Pradesh in last two years. Documentation of some of these cases has been done. Recommendations for controlling poaching activity and conservation and management of sun bear population have been made.

Poster 16

DIMENSIONS OF HUMAN-SLOTH BEAR CONFLICT IN DIFFERENT STATES IN INDIA AND MITIGATION STRATEGIES.

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In many places in India, human and sloth bear (*Melursus ursinus*) coexist and share few common resources. Due to exponential increase in human population, there is continuous loss, degradation and fragmentation of sloth bear habitats. Consequently, sloth bears frequently stray out of forests into human habitation and crop fields for their food requirement and due to sudden encounter; they attack on people. The paper presents the nature and extent of human-sloth bear conflict, causal factors and mitigation strategies.

Human-sloth bear conflict has been reported in most of the sloth bear inhabited areas, but it was highest in Central India. In Madhya Pradesh, there were 566 cases of human casualty by sloth bear from 2004 to 2008. In North Bilaspur forest division, 286 incidences of human casualties took place during 2000 to 2008; out of which males were attacked more than females. Out of 166 surveyed villages, 110 were found affected from sloth bear menace. Five persons were killed and one male and 4 females were killed and eaten. In Andhra Pradesh, 20-30 human casualties are caused by sloth bears annually. In and around Panna National Park, 46 incidences of sloth bear attacks were reported from 33 villages from 1998 to 2008. From April 2002 to March 2008, 56 human casualties by sloth bears were reported in Bihar; 32 cases occurred in Dalma wildlife sanctuary and 19 cases in Palamau tiger reserve. One hundred, seventy six human casualties by sloth bear occurred from 2000 to 2008 in Orissa. Sloth bear also cause considerable damage to agricultural crops. Information on mode of bear attacks and human casualties have been analyzed with respect to seasons, activity pattern, age and sex class and place of occurrence and presented. Damage to maize and groundnut crop was highest (25-35%). The local people have increasingly become intolerant to bear menace, and sometimes they chase and kill nuisance bears in retaliation. Presently, sloth bear populations have become highly threatened due to illegal trade in its body parts and removal of live bears from forests.

Resource sharing, non-timber forest produce collection, human disturbance, livestock grazing and crop raiding were found to be the major factors responsible for the human-sloth bear conflict. Conservation of sloth bear in the country is possible only through mitigation of human-sloth bear conflict, and control of poaching. Important recommendations are: 1. Regulation of cattle grazing in sloth bear habitat, 2. Restriction on human activities in forests and crop fields, especially in the mornings, 3. Regulation on collection of non-timber minor forest produce and food items of bear interest, 4. Protection of potential bear habitat and its improvement, 5. Education awareness among local people.

Poster 17

STATUS AND DISTRIBUTION OF BEARS IN THE STATE OF UTTARAKHAND, INDIA.

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Out of the total 8 species of bears, two species occur in Europe, three in North America, one in South America, and six in Asia. Four species namely the sloth bear (*Melursus ursinus*), the Asiatic black bear (*Ursus thibetanus*), the Himalayan brown bear (*Ursus arctos*) and the Malayan sun bear (*Ursus malayanus*) exist in India.

Like other parts of the globe habitat degradation, diminished food resources, trade in body parts and increased conflict with humans are posing serious threat to the conservation of bears. In addition, bear body parts have been integral parts of traditional Chinese medicines since centuries. To protect the species all the four species of bears are listed under Schedule I of the Indian Wildlife (Protection) Act 1972 and Appendix I of CITES.

The State of Uttarakhand is situated in the northern part of India and can be divided into three physiographic zones namely, the Himalayas, the Shiwaliks and the Terrai region. Three species of bears namely the sloth bear, the Asiatic black bear and the Himalayan brown bear are reported from the State.

The recorded forest area of the state is 34,662 km2 which constitutes 64.79% of its geographical area. The forest cover of the state is 45.70% of the geographical area. About 19% of the geographical area is under permanent snow cover, glaciers and steep slopes where it is not possible to grow trees due to physical limitation.

Under the current project, information on status and distribution of bears was collected from 21 forest divisions situated in 13 districts of Uttarakhand. Pithoragarh, Tehri and Uttarkashi forest divisions support large populations of Asiatic black bear. Human-bear conflict is not reported from the Tehri and Uttarkashi divisions but incidences of human mauling and cattle lifting have been reported from Pithoragarh Forest Division. Likewise Champawat, Nainital and Badrinath forest divisions also support significant populations of the Asiatic black bear.

Considering the long term conservation of bears in the state, it is important to manage and protect habitats that support sizeable populations of bears. Studies focusing on causal factors of human-bear conflict should be considered on priority basis to understand the circumstances and suggest site-specific measures to mitigate the conflict.

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ASIATIC BLACK BEAR - HUMAN CONFLICTS AROUND DACHIGAM NATIONAL PARK, KASHMIR, INDIA

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We investigated the patterns of Asiatic black bear (*Ursus thibetanus*) – human conflicts using semi-structured questionnaires (n=305) in villages located on the fringes of Dachigam National Park that fall under the South and Central Wildlife Divisions, Kashmir, India, from June 2007 to July 2009. The black bear – human conflicts were recorded in the form of crop damage, livestock predation, human attacks and sometimes even death of humans. Crop damage was observed to be the most common type of conflict as reported by over 80% of the respondents. Maize, apple, cherry, pear, and walnut were raided by black bears. The extent of crop damage varied in different months and can be related to the fruiting patterns of horticulture crops such as cherry (June - July), and apple and walnut (September - October). The crop protection measures adopted by the villagers included: drumming of empty tin or metal containers, putting up scare crows, keeping guard dogs, barbed wire fencing and animal-proof walls. Among the protection measures, drumming was the most commonly used as over 81% respondents were using this technique. Animal-proof walls (stone & cement) were found to the most effective in preventing crop raiding by bears, but were too expensive for most villagers to afford. There were 27 cases of bear attacks on humans during 2007-09. Most of the bear attacks were on people working in crop fields (65%) followed by in forests (25%) and in villages (10%). Over 55% of the attacks occurred during crepuscular period and the maximum number of human attacks (45%) occurred during summer and autumn season as a consequence of high human activity in agricultural fields and orchards during these seasons when villagers were either going for work or returning after work. Of the total human-bear encounters reported (n=68), 40% resulted in injuries to human. Of the 34 livestock depredation cases by bear, 31 were livestock killings in cattle sheds and three were in forest, and most of the cases occurred during nights. Black bear-human conflicts were high in areas that were close to forest, and in general, bear-human conflicts decreased with increasing distance from forested areas. The villages that are situated between 1,900-2,200m elevation zones are close to black bear habitats were the most affected as the villagers were also mostly forest dependent making them more vulnerable to bear-human conflicts. The conflict cases varied at different elevation zones ($H= 4$, $df= 4$, $p=0.406$) with the maximum occurring in the 1900-2000m elevation zone largely due to bear raiding cherry orchards that are grown at these elevations. Using these relationships a linear regression model was derived to predict the index of human-bear conflict frequency for a particular village location and a distribution map of villages classified as low, medium, high and very high potential of being affected by frequent human-bear conflicts has been prepared. Relative frequency of crop raiding along with relative frequency of livestock killing and human attacks were pooled and normalized to derive an index of damage for a village due to bear conflict and the results have been presented in a map indicating the most affected, highly affected, moderately affected and least affected villages. We suggest the following actions for reducing bear-human conflicts around Dachigam National Park: (i) development and maintenance of conflict database and monitoring (ii) awareness creation, (iii) strengthening of local and traditional black bear deterrent methods, (v) supervised livestock grazing and strengthening of livestock night shelters, (vii) monitoring of rescued bears after release into the wild by using colour-coded collars or ear-tags, and (viii) creation of conflict management teams to respond to conflict situations.

Poster 19

DANCING BEARS IN INDIA: APPLICATION OF A SUSTAINABLE LIVELIHOODS APPROACH

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The Kalandar community is known to have performed with dancing bears since medieval times. Sloth bears (*Melursus ursinus*) are listed as "Threatened" on the IUCN Red List of Threatened Species. The dancing bear tradition impacts negatively on wild populations as cubs are poached to fuel this practice. The tradition also raises serious welfare issues. The Wildlife Protection Act of 1972 made this practice illegal in India, but poor enforcement and a lack of acceptable alternatives have allowed it to continue. Today, Kalandars are mainly confined to villages inside forests, semi-urban settlements or on the periphery of villages. To help eradicate the practice of 'dancing bears' in India we applied the "Sustainable Livelihoods Approach" (SLA) as an analytical tool to identify ways to advance the livelihoods of dancing bear owners. We initiated the study, in Chorbhatti near the town of Bilaspur, Chhattisgarh state, in 2006. Twelve former bear owning families currently benefit from the initiative which is implemented via a social scientist that fully integrates themselves into the community. Working together, with selected beneficiaries and their dependents, an alternative livelihood is selected and the necessary training and support is provided. During implementation we identified several key challenges that can affect a beneficiaries progress: (1) large families characterised by a lone earning member; (2) inclination of the male members towards semi-nomadic lifestyle; (3) heavy debts from private money lenders; and (4) weak enforcement of existing wildlife law by the government (partially because sloth-bears are not considered as a priority animal e.g. the tiger). However, the SLA approach is helping to overcome these challenges. The progress of each beneficiary is evaluated via the following indicators: (1) non utilization of a dancing bear; (2) more stable economic status; (3) increased confidence in the alternative livelihood; (4) increased integration into civil society; (5) empowerment of female members of the community. The SLA framework is empirical, replicable and should be viewed as a valuable tool to be implemented in combination with other initiatives (e.g. public awareness and enforcement related activities) to ensure an ethical and non-reversible end the dancing bear practice in India.

Poster 20

STATUS AND CONSERVATION OF BROWN BEAR IN NORTHERN CENTRAL ALBORZ PROTECTED AREA

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Central Alborz Protected Area (CAPA) is one of the Brown Bear habitats in Iran. A comprehensive study in Golestanak Core Zone in the CAPA which focused on brown bear Ecology from 2005 to 2008 for four years. Measuring the connections and conflicts between the bears and human communities besides finding threatening factor of this species in CAPA was one of goal in this study. In order to obtain these goals, regular field control, and interview with people in villages were served. Hunting for pleasure by hunters and local people, poor management of the protected area is causing reduction bear numbers.

Poster 21

ASSESSING THE EFFECT OF SUB-SAMPLING TO EFFICENTLY DESIGN BEAR DIET STUDIES: THE CASE OF THE APENNINE BROWN BEAR

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Scat analysis is a widely used technique to investigate bear food habits, mainly because of the non-invasiveness, the large sample sizes potentially available, and the relative low cost of collecting fecal samples, especially if collection is incidental to other field activities. However, truly representative samples, both at the local (i.e., home range) and temporal (i.e., seasonal) scales, are generally quite large, thus requiring a great amount of lab time to process. Scat processing (hand separation, items identification, and quantification) often ends up competing with other important field activities in research projects and, if not properly planned, may drain excessive time and personnel, or simply become untenable. The most frequent solution to reduce this problem provides that each fecal sample is not processed entirely, but a given number of aliquots is randomly selected from each scat. A basic assumption of this process is that qualitative and quantitative content of the selected aliquots strictly reflects content and proportions of the entire fecal sample, or that the effect of sampling variability is negligible. However, objective procedures as to how assess the effect of such sub-sampling on accuracy and precision of dietary analyses are rarely described, and number (and dimension) of selected aliquots are generally arbitrarily chosen.

To functionally integrate a study on diet composition within a broader 5-year research project on the Apennine brown bear (*Ursus arctos marsicanus*), we were interested in evaluating the most efficient lab protocol for scat analysis under different sub-sampling scenarios. Based on a sample of 373 bear scats, collected from June to December 2006 in the Abruzzo National Park and adjacent areas, we investigated (log-likelihood test, linear regression, rank correlation, Mann-Whitney U-test,) the effect of reducing from 5 to 1 the number of aliquots (10 ml) for each scat sample on the seasonal estimates of diet composition. Our evaluation was both qualitative and quantitative, using traditional quantification methods (i.e., Frequency of Occurrence and Mean Percent Volume). We also measured mean processing time for each scat sample to allow a cost (loss of precision)/benefit (reduction of lab time) analysis and highlight the most efficient lab protocol. Dietary analyses showed considerable stability on both qualitative and quantitative grounds with increasing sub-sampling, even though few food items of secondary importance were occasionally missed using 1-2 aliquots. Using 5 aliquots for each scat, time (mean±SD) spent for separation (43±55 min), identification (21±24 min), and volume quantification (10±13 min) averaged 74 min per scat, or 92 min including filtration and sub-sampling. On average, each aliquot required 14.8 min of processing. By projecting the processing time for the number scat samples expected to be collected on an annual basis, the 2-aliquot subsampling represented the most efficient choice: at negligible costs in terms of precision, this subsampling scheme is expected to correspond to a 60% reduction in lab time.

Poster 22

STATUS OF THE BROWN BEAR POPULATION IN TRENTINO, CENTRAL ITALIAN ALPS, AT THE END OF 2009

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Ten years after the translocation, carried out in the 1999-2002 by the Adamello Brenta Natural Park, together with the Autonomous Province of Trento and the National Wildlife Institute, the management of policies for the conservation of the brown bear (*Ursus arctos arctos*) in Trentino (Italy) is entering a new phase.
In my presentation I will provide an overview of:

1. the status of the population at the end of 2009, reporting major findings on population structure, reproduction and mortality rates, missing bears, dispersion, use of territory;
2. the implementation of the guidelines developed by the Administration for monitoring the brown bear population (samples collection for genetic tests, use of GPS and VHF), for damages prevention and compensation, as well as for emergency management (activities by the emergency team, use of bear-dogs, hard-releases, garbage management, road-accidents management);
3. the communication policies, including the information campaign “Getting to know the brown bear”;
4. the human resources and financial costs of such management policies, an evaluation of the present carrying capacity of the territory, including both ecological and social aspects, as well as the prospects for the management of the brown bear population in Trentino and in the Italian Alps.

As G.O. responsible for wildlife management I will highlight the complexities of managing the survival of the brown bear in a human dominated landscape, such as the Alps.

Poster 23

REPRODUCTIVE DISPERSAL FOR BROWN BEARS IN URAHORO AND ADJACENT AREAS, SOUTHWESTERN PART OF THE AKAN-SHIRANUKA REGION IN EASTERN HOKKAIDO INFERRED FROM GENETIC ANALYSIS

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Urahoro, southwestern part of the Akan-Shiranuka Region in eastern Hokkaido, is typical area in which human - bear conflict such as crop damages and village invasions by brown bear (*Ursus arctos*) has increased during the 2 decades. As a conventional management program against the conflict, bears were killed for nuisance control without discrimination in Urahoro. Monitoring the levels of genetic variation and the population structure in brown bear population can provide useful information for management and conservation plans. So the basic information for genetic diversity and the spatial distribution of genetic polymorphism are required. Previous study by polymorphic analysis of mitochondrial DNA (mtDNA) control region showed that bears living in Urahoro belongs to Cluster A (HB02a), central type of haplotype in Hokkaido, and a borderline of distribution between haplotypes of Cluster A (HB02a) in the southwest and Cluster B (HB13b) in the northeast of the Akan-Shiranuka Region. Immigration of adult males and dispersing young males to Urahoro from the northeast of the Akan-Shiranuka Region has also confirmed. To examine genetic variation, mtDNA haplotype and reproductive relationships among bears in Urahoro and its adjacent area, 17 microsatellite maker and nucleotide sequences in mtDNA control region were analyzed for 132 tissue samples collected from nuisance control killed and taken from bears captured for ecological study in the study area during 1996-2008. We obtained 42 potential father - offspring pairs, 15 potential mother - offspring pairs and 5 potential parents - offspring pairs. The value of mean relatedness (*r*) of the potential father - offspring pairs and the potential mother - offspring pairs is about 0.5, respectively. From the information of potential father - offspring pairs and mtDNA haplotypes, adult males immigrated from the northeast (HB13b) frequently mated with natal philopatric females (HB02a) in the southeast. In the potential parents - offspring pairs, kin-relationship between potential father and mother is considered to be non-related as the value of mean *r* is 0.036. These relationships indicated the actual reproductive dispersal by males mated with females of different mtDNA haplotype of a distant to avoid inbreeding.

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IMPROVEMENT OF THE HARVEST-BASED ESTIMATOR OF A BROWN BEAR POPULATION BY APPLYING AN INDEPENDENT ESTIMATION: AN APPROACH TO BEAR POPULATION MONITORING IN JAPAN

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The brown bears (*Ursus arctos*) of Hokkaido, Japan have been exposed to hunting pressure and hundreds of bears have been killed for over 100 years. Distribution range and population size of bears decreased from the 1960s to the 1990s in Hokkaido by the heavy hunting pressure of the spring prophylactic bear kills which were carried out from 1966 through 1989 in the hope of bear population decline. The authors presented a harvest-based estimator of brown bear population size and dynamics in the Oshima Peninsula region for the period of 1968-1997 (Mano *et al*. 2001). The estimator can provide population size and dynamics with considerable accuracy if given the declining population trend in spite of the uncertainty of various parameters, and this condition was valid for the period of the 1960s -1980s during which the population trend was apparently declining due to the spring bear kills. However, for the period after the spring bear kills abolishment in 1990, the bear population trend was uncertain, and the inaccuracy of estimation dramatically increased in the recent years (Mano 2008, Tsuruga and Mano 2008). It became necessary to limit the recent estimation with some additional conditions to improve estimation results; thus, we changed the conditions of simulation. First, the class not to decline to extinction was limited to only the adult segment. Second, we set an upper limit of the female population size extrapolating estimated bear density in the high density area of the bears range using hair snare method (Tsuruga *et al*. unpublished). By the introduction of the two conditions, estimated total bear population size (831) and its SD (176) in 2008 declined to 78% and 46% of those obtained without the new conditions (1059, 384) respectively. Density estimation by independent methods can improve the harvest-based bear population dynamics estimation in Hokkaido, and combined analysis using several independent methods should be encouraged to increase the accuracy of monitoring.

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WHITE COLORED BROWN BEARS IN KUNASHIR AND ITURUP ISLAND, SOUTH KURIL ISLANDS

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We observed brown bears (*Ursus arctos*) with white fur and confirmed a white fur of the hunted brown bear at Kunashir and Iturup Island during the research on wildlife since 2001 as a part of the exchange program for experts between Japan and Russia. Both of islands belongs southern part of Kuril Islands, located between Kamchatka and Hokkaido. A White colored bear is also found in the famous Japanese-style painting work “Inninkari-zu”, one of the twelve portrait series of Ainu people, named “Ishu-retsuzo” (1790) by Hakyo Kakizaki (1764-1826). We became interest in this bear (Inninkari bears, hereafter), and conducted literature survey and interviews on local people during 2008-2009. Objectives of our study are to find record related to Inninkari bears in literature, to clear the present status of Inninkari bears, to compare the color polymorphism of the brown bears of the world with Inninkari bears, and to reveal a feature of Inninkari bears. Inninkari painted in “Inninkari-zu” is the chief of Ainu people in eastern Hokkaido and 2 young bears he took (one had white fur with black nose and claw, and the other had dark brown fur) are considered to be from Kunashir or Iturup. Komiya (2008) refer to a white colored brown bear born in Iturup had been reared in Ueno Zoo, Tokyo, during 1878-1881. Tarao (1893), a Japanese explorer, recorded white colored brown bears in Iturup as well as black and gold colored bears in his report of an exploration for the Chishima (Kuril) Islands. In a preliminary field survey in October 2009, we saw a young Inninkari bear and took a picture of another Inninkari bear by camera traps. From the interview survey in Kunashir, a local hunter stated that the proportion of Inninkari bears account for 10% of the whole brown bear population. Inninkari bears were observed more in the northern part of the Island, where has a higher density of bears than the southern part. Though some bears change their face and back color from dark brown to light brown or silver, Inninkari bears have white fur from their birth. Most of local people pointed out that white fur cover only the upper half of the body, i.e. head, back, upper side, and fore legs, and dark brown fur cover the lower half thinly. They also observed female dark brown bears with young Inninkari bears, though they have never observed female Inninkari bears with young bears. A hunter said all three of the Inninkari bears he shot were male. The former staff of wildlife refuge in Iturup also observed female dark brown bear took a young Inninkari bear in Iturup. We also found an Inninkari bear on the grassland of the coast terrace from the survey boat during our preliminary survey in Iturup in 2002. As we could search literature for fur color of brown bears of the world, we could find no description about white colored fur for brown bears, though pale brown, gold, blond, silver, and creamy white fur with dark brown legs were reported as well as dark brown fur. At least, there were no clear description for white fur in head and forelegs except for Inninkari bear. White fur seems to be disadvantage for anti-predatory strategy. In Kunashir and Iturup, there has been no or little wolves and less hunting activities. We suspect one of the reasons for the restricted distribution and persistence of the Inninkari bears are lack of predator and low hunting pressure.

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AUTUMNAL HABITAT SELECTION OF JAPANESE BLACK BEAR FROM GPS TELEMETRY DATA IN NIKKO-ASHIO MOUNTAINS.

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In recent years, Japanese black bear mass intrusion to residential area becomes social problem. Japanese black bear occurs to confliction to human at residential area, and often causes to damage of crop and human being. In the year when the bear mass intrusion was occurred, a peak of the bear intrusion was recognized during late summer to autumn. However, mechanism of Japanese black bear mass intrusion is not well known, and information of behavior of Japanese black bear was fractional. Therefore, we analyzed autumnal habitat selection of Japanese black bear in Nikko-Ashio Mountains, central Japan. When we analyzed the habitat selection by GPS collared bears (2006: n=5, 2007: n=5), we used two habitat environment indices, both an existed vegetation map (EVM) and vegetation survey through quadrat setting in intensive used area. Then, we inspected justice of hypothesis that Japanese black bear prefer the place that exist many acorn stands, because habitat selection of Japanese black bear can be influenced by food abundance, particularly acorn in autumn. In the result, whereas correct answer rate of hypothesis by habitat selection analysis using EVM was almost 66%, one by habitat selection analysis through quadrat survey was over 90 %. Thus, although bear's habitat selection evaluated that bears preferred to use vegetation type that did not dominant acorn species by habitat selection analysis using EVM, bears actually preferred to use the patchily place, that existed a lot of acorn species stands, in these vegetation type forest. When we compared difference of preference level by each species in habitat selection through quadrat survey, Mizunara oak (*Quercus mongolica var. grosseserrata*) was the most preferred by Japanese black bear in autumn. However, we found difference of variety of preferred acorn species between 2006 and 2007. Although bears the most preferred *Quercus mongolica var. grosseserrata* only in 2007, bears preferred various acorn species, *Quercus mongolica var. grosseserrata*, Konara oak (*Quercus serrata*) and Chestnuts (*Castanea crenata*) etc., in 2006. We considered that difference of preferred acorn species between years was influenced by difference of acorn production level between years. In 2007 when *Quercus mongolica* var. *grosseserrata'*s acorn production was average, bears selected them that were the most available acorn in study area from reading of EVM. In contrast in 2006, when acorn production levels, except for *Castanea carenata,* were poor, then the bears might not only utilize *Quercus mongolica* var. *grosseserrata* like in 2007. In 2006, acorn production was poor in the whole study area, and thus the bears were able to only use acorn species that bare at small patches of study area. Furthermore, we documented that monthly home range sizes of 2006 tend to larger than those of 2007 with no statistical significance. In our study, bear's habitat selection followed hypothesis and bears intensive used the patchily place that existed acorn species in forest. Particularly, it is possible that distribution and acorn production of *Quercus mongolica var. grosseserrata* that was the most abundant acorn species in study area was the most influenced for behavior of Japanese black bear in autumn in Nikko–Ashio Mountains. We suggested that in the year when the acorn production was poor in whole region, the bears expanded their home range due to searching the sparsely existing acorns. Hence it was one of the possibilities that the bears frequently intruded into human residential areas. However, if we use EVM for evaluate habitat selection of Japanese black bear, we can misevaluate habitat selection of Japanese black bear in autumn. When we apply habitat selection analysis of Japanese black bear, we consider the necessity of attention to importance of small patches that has abundant food resource and we need more minute vegetation map than EVM as 1/50000 scale map.

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STATUS OF BROWN BEAR IN NEPAL

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Brown bears *(Ursus arctos*) were once known to exist in both Nepal and Bhutan, but current information on their numbers and distributions is lacking. We document the presence of brown bear (*Ursus arctos*) in Nepal using field survey and interviews with local people. We were able to confirm the existence of a remnant population in the Manasalu Conservation Area and Annapurna Conservation Area based on finding scat and digs for Himalayan marmots (*Marmota himalayana*). We were also able to confirm presence of Brown bear corridor between Annapurna Conservation Area and Shy Phoksundo National Park, as a preliminary information we also suspected the presence of Brown bear in Shy Phoksundo National Park, for confirmation detail survey needed. Base on field survey we found Brown bear from 4100 to 5500m altitude. Based on interviews with local people, it appeared that the presence of brown bears in the area is relatively recent and likely as a result of immigration of bears from Tibet. Interviews with local herders also indicated that livestock losses due to brown bear predation amounted to approximately NRs 318000 (US$ 4240) in Manasalu conservation.

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ABSTRACT PROJECT FOREST RANGERS/HARD RELEASE BEAR CUBS

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This protocol will show options to release young bear cubs in order to give them a change to survive in nature instead of staying for 25 years - and even more – in dramatic circumstances in captive confinement.

GOALS:
-reduce poaching and illegal hunting
-instructing forest rangers how to deal with found bear cubs
-stabilize in situ bear cub population

ACTIONS:
-Found bear cubs- older than 5 month – release directly after complying with protocols – on suitable locations
-If cubs are younger than 5 month – create a den – to accommodate the cub-without any contact with humans – feed on regularly basis-7-12 times a day- and release after fulfilling all protocols.

PROTOCOLS:
The project has developed various protocols with which important data can be obtained on bear cubs in many bear range countries.
Pay off: it is better for any bear cub to have the opportunity to survive [25% survival rate] than to be kept in captivity for its lifetime.

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BROWN BEARS POSSESS ANAL GLANDS WITH SECRETIONS CODING FOR SEX

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Olfactory communication occurs in most carnivores, and many use anal gland secretion (AGS) in scent-marking. The scent can contain a variety of information, including sex-related cues. Currently, there is disagreement about whether bear species, other than the giant panda (*Ailuropoda melanoleuca*), possess anal glands. We documented anal sacs in brown bears (*Ursus arctos*) and analyzed AGS from 17 free-ranging, sexually mature individuals using gas chromatography-mass spectrometry. We hypothesized that brown bear AGS codes for sex on the basis that it does in giant panda AGS, and predicted that AGS shows sex differences in gas chromatogram profiles, in number of compounds, and in digital and analog coding of chemical compounds. We also predicted that the color of AGS differs between male and female brown bears. Our results support the prediction that male and female AGS differs in gas chromatograms, in analog coding, and in color. However, we found no significant difference between sexes in number of detected compounds or in the digital coding. We found 90 different compounds in their AGS. Our results confirm that brown bears possess anal glands which relay information about sex, and suggest other chemical information critical to the bears' social system is likely encoded in the AGS.

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MONITORING STRESS IN CAPTIVE BEARS USING NON-INVASIVE FECAL ENZYME IMMUNO-ASSAY (EIA)

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This study was an investigation of changes in corticosterone metabolite secretion associated with captive environment. Fecal samples have been collected for 11 months (April 2006 – February 2007) from 11 captive individuals among four species: European brown bear (*Ursus arctos arctos* – 5 individuals), Asiatic black bear (*Ursus thibetanus* – 4 individuals), polar bear (*Ursus maritimus* – 1 individual) and spectacled bear (*Tremarctos ornatus* – 1 individual) kept in Wroclaw Zoo. Studied bears were divided into three groups by outdoor access regime – diurnal access (night indoors), full access (indoors only for service) and no access outdoor (closed indoors for 4 to 10 years). Samples were stored at -20 ^{0}C until analyses. Wet feces (0,5 g) were extracted with 4,5 ml 90% methanol. After centrifugation the extracts were transferred into new tubes, then subjected to the steroids EIA. Preliminary evaluation of EIA procedure showed 11ß-hydroxyetiocholanolone as the most likely detected and in highest concentrations. The analyses showed significant variations in stress values in bears (K^2=18.812, p=0.0001). The stress levels were visibly higher when some untypical events took place eg. after introduction of a new individual into adjacent cage and the likelihood that this relationship was accidental is lesser than p=0.0001.

EIA method is proved to be powerful, non-invasive tool to monitor an animal's endocrine status eg. adrenocortical activity associated with captive conditions. As one part of the study it was used to investigate also hormone-behaviour relationships as the behavioural observations of bears were conducted. The temporal proximity of potentially stressful event, behavioural response and increases in corticosterone metabolites can be used as an important measure in the management of stress in captive animals.

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RISK ASSESSMENT TEAM – A TOOL FOR HUMAN – BEAR CONFLICTS MANAGEMENT IN THE ROMANIAN EASTERN CARPATHIANS

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LIFE + "Nature", the financing instrument of the European Commission, decided to finance a new project focused on finding solution for improvement of the bear (*Ursus arctos*) management in Romania. On Romanian Eastern Carpathians, the defined project area, the favorable habitats for bears are overlapping with human settlements and cultivated or animal grazed spaces. This situation combined with the habitat degradation, reduction of food sources and lack of reaction of the wildlife managers, lead at major conflicts which are increasing every year. The level of bear damages on the project's area is the biggest at the Carpathian's level. Usually the damages are made in crops, life stocks and bee farms near the bear habitats. The biggest concern is the fact that the damages are showing an increasing trend, increasing also the human –bear encounter risk being also an indicator for the habituation process of some individuals. At the moment the risk assessment, is made by the wildlife management units, which in most of the cases are evidencing problem bear cases in order to justify the maximal intervention number (that can be harvested) allocated by the central authority for environment protection. In this context the forming, with demonstrative character, of a team which can evaluate the potential risks in the habituated or problem bear cases, which can propose to the responsible authority and wildlife manager the optimal solution for reducing these risks, is opportune in order to insure the reduction of the killed individual's number and also for minimize the bear-people conflicts. The Risk Assessment Team (R.A.T.) is based on a methodology, that include also field work procedure to identify problem bear and to evaluate the behavior of the bears, in the context of human permanent presence. The main goal of this action is to analyze the risk that a problem bear represents for humans, near by villages and farms, in areas with high level of conflicts. The results of the R.A.T. activities, are used to help the public authorities to decide the necessary measures to reduce the conflicts, taking in to account also other measure than hunting. Also the R.A.T activities will help the decision factor to improve the regional and national management, aiming for human-bear conflict reduction.

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BEST PRACTICES FOR BROWN BEAR CONSERVATION IN THE CARPATHIANS SOUTH-EAST AREA

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Located in the curvature of the Romanian Eastern Carpathians, the mountain and hilly part of Vrancea County includes within its limits, a large area covered by brown bear favorable habitat. Estimations achieved by hunting fund managers reveal the existence of a total of about 450 bears on 230 000 ha, which places the area between the first three important areas for bears conservation in the Romanian Carpathians. In order to conserve this core population, between 2002 and 2009 there were carried out two consecutive projects whose purpose was in situ conservation of large carnivores in the Vrancea County. The two projects funded by European Union through LIFE Nature program (LIFE02NAT/RO/008576 and LIFE05NAT/RO/000170), were implemented in partnership with the University of Bucharest, Forestry Department and non-governmental environmental organizations (www.carnivoremari.ro). Conservation of brown bears was achieved through research actions of the species ecology (habitats favorability analysis for large carnivores species, estimating home-range through invasive techniques of monitoring VHF and GPS, estimating habitats occupancy and relative abundance through non invasive techniques such as DNA analysis, remote cameras, pellet account, track counts), actions for establishing functional protected areas (creating of a local ecological network, elaborating the management plan for large carnivores, correlation the local network with European ecological network NATURA 2000), direct conservation actions (save bear exemplars in difficulty with the help of a Mobile Intervention Units and establishment of a rehabilitation center) and educational activities. Bears monitoring through VHF and GPS techniques was a pioneer action in studying this species in Romania, similar studies being made only on a small sample of bears by ICAS Brasov. Between 2003 and 2008, a number of 25 bears were captured and monitored using VHF radio-telemetry and, on the beginning of 2004 there were fitted first 2 GPS collars on bears exemplars in Romania. This was one of the most important activities, providing the support for designing and argument the necessity of existence of the ecological network for large carnivores protection and also information necessary achieving the local management plan of large carnivores. The capture of brown bears was achieved using cages with two sliding doors, within which there were mounted closures devices. To the captured animals there were fitted ATS (Advanced Telemetry Systems) or GPS 2000 collars. The life of VHF collars was 1095 days and the GPS was 500 days, for operating system a location at 7 hours. For monitoring bears specimens released from traps mounted by poachers there were used mini radio-transmitters M3430 Bear Ear Tag. After capture, bears were tranquilized using sedation substances (medetomidina and ketamine). Biometric measurements have shown that generally, through this method, there are captured young bears, inexperienced. Mature male and female bears are more cautious and therefore are more difficult to capture with cages. Results obtained from radio-telemetry and GPS monitoring have shown that in the conditions offered by habitats presented in the curvature of the Carpathians, male use very large territories (ca. 120 km2), females using smaller areas (45 -65 km2). It was observed that a large number of bears came down in hilly areas, mostly intense inhabited, for feeding in areas with fruit trees and maize. This is also a major source of an important conflict between brown bears and rural inhabitants. Used for scientific substantiation of implementation the European ecological network Natura 2000 in Vrancea County, brown bears monitoring will continue beginning with 2010, EPA Vn being the beneficiary of a new LIFE + project(LIFE08NAT/RO/000500), whose aim is the implementation of best practices and demonstrative activities for brown bears conservation in the Central-Eastern Carpathians.

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A PILOT STUDY INVESTIGATING THE NON-INVASIVE HAIR-SNAGGING METHODOLOGY IN THE RUSSIAN FAR EAST WHERE BEARS ARE NOT THE TOP CARNIVORE

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The non-invasive hair-snagging methodology for bears has been well-established as a viable population census tool. A pilot hair-snagging study was conducted in the Sikhote-Alin Zapovednik, a large protected reserve in the Russian Far-East during the summer of 2008. The purpose of the experiment was to 1) explore the viability of the methodology where Siberian tigers and wild boar could complicate results, and 2) to test the methodology and its application in a unique environment with limited infrastructure and resources. Brown bear and Asiatic black bear hair was successfully captured at rub trees and hair-snagging sites. Remote cameras at the field sites captured only brown bears, although Himalayan black bears were visually confirmed in the area. Wild boars occasionally frequented the hair-snagging sites, but did not appear to share bear rub trees, and Siberian tigers often shared marking trees with bears. The methodology was successful in the natural environment and the technique has now been demonstrated to Russian protected area staff. However, the success of the methodology is dependent on access to sufficient resources for field and lab work, as well as proper analysis tools. Logistical constraints and lack of access to genetic facilities have repeatedly jeopardized the study, and genetic analysis is still pending. While there is global conservation concern for Russia's bear populations, this pilot demonstrates that success is more complicated than just getting the science right. It will be paramount in the future to engage government and NGOs in recognizing the need for capacity building and increased access to resources for the methodology to be truly successful.

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THE BEHAVIOR OF SCANDINAVIAN BROWN BEARS WHEN MEETING HUMANS

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The brown bear (*Ursus arctos*) population is increasing in number and distribution in Scandinavia. The number of people who are injured or killed by bears is also increasing, and causing people's fear of bears to increase. If people and bears are to share the same landscapes, it is important that people know how to avoid being injured by bears. Thus, we must understand the circumstances involved when people are injured and how bears behave when meeting humans.

We interviewed all people who were injured by brown bears in Scandinavia since 1977 (N=25) and studied the police reports of the 2 cases where people were killed. In addition, we approached 42 bears equipped with GPS transmitters 261 times. We approached them at a distance of 50 m, upwind, while talking at a normal tone of voice while the bears were resting in a daybed during the middle of the day. We also report on our other studies of how bears use landscapes in response to the occurrence of humans.

All the people who were injured or killed were men and most were armed. Most of these cases occurred during the hunting season and most of the armed men had shot at the bear before they were injured. The results of our approaches gave a different picture. None of the bears showed aggressive behavior and they either left the area before, when, or after we passed or just stayed in the daybed. The daybeds were placed in very dense vegetation, where people rarely go, and they chose denser vegetation for daybeds when closer to human habitation or when there were more people in the forest. All our results were consistent in showing that bears were trying to avoid meeting people.

People appear to be most vulnerable to being injured by a bear when they are hunting, often with a dog, and surprise a bear at close range in dense vegetation. It is possible that the recent increase in the number of people injured by bears is due more to the recent increase in harvest quotas, and therefore bear hunting, than to the increase in bears, per se.

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NON-INVASIVE GENETIC MONITORING OF BROWN BEARS IN SERBIA

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One main difficulty in the conservation of endangered wildlife is the lack of reliable information on its status. This lack of knowledge can often be attributed to financial and logistic constraints as well as the lack of trained personnel to collect data. The ongoing evolution and refinement of non-invasive sampling and genetic monitoring techniques provides practical solutions to these problems. Brown bears (*Ursus arctos*) in Serbia are considered to be endangered, with fewer than 70 individuals still remaining in the country. Despite their endangered status, little is known on the demographic and genetic status of brown bears in the country.

Using non-invasive genetic monitoring techniques a study was carried out in 2009 in order to collect baseline information on these two topics. In April 2009 a network of non-invasive genetic sampling stations was established in the main distribution range of the species in Serbia, in the western part of the country. The network was located in four different areas (Gorusice, Makaze, Racansica Slivovica and Gorni Dupac) and consisted of seven sampling stations that were placed at bear rub trees and feeding stations.

The sampling stations were visited on a monthly basis (April – December 2009) and a total of 150 hair samples were collected. Genetic analysis of the samples identified 10 individuals and enabled a preliminary assessment of the demographic history, genetic diversity, gene flow and connectivity to other bear populations in the region.

This is the first systematic attempt to evaluate the genetic status of brown bears in Serbia and the results of the study will be used in order to identify future research priorities and improve management and conservation actions for the species in the country.

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DON'T SHOOT! DEVELOPING ALTERNATIVE SOLUTIONS TO RESOLVING BEAR–HUMAN CONFLICT IN SLOVAKIA

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Brown bear (*Ursus arctos*) numbers in Slovakia have grown from near extirpation in the 1930s to several hundred individuals in an occupied range of c.13,000 km^2, with densities now reaching 11 inds./100 km^2 in some core areas. This has led to a resurgence of conflicts with humans. Overlap of bear and wolf (*Canis lupus*) distributions with sheep farming is c.90%; predation on livestock is commonplace. Bears also cause damage to beehives and crops, exhibit nuisance behaviour in recreational and residential areas and occasionally injure people, sometimes seriously. Although economic damage is negligible on a national scale, it can result in significant hardship for those individuals affected. In addition, a heightened sense of fear among the public, stoked by media reporting of attacks, threatens to reduce acceptance of bear presence. Since the ending of a 30-year moratorium on hunting in the 1960s, managers have relied heavily on lethal control to mitigate conflicts. Permits are issued annually for the shooting of ≤10% of estimated bear numbers. According to official guidelines, hunting is targeted at areas where conflicts with human interests occurred in the previous year, the assumption being that population control can limit damage to socially acceptable levels. This strategy does not seem to be effective either in controlling bear numbers or preventing further conflicts. Since 1999 the Slovak Wildlife Society and the Wolves and Humans Foundation have been working with local communities to mitigate conflicts between large carnivores and people, reduce the unnecessary killing of large carnivores and increase tolerance for large carnivores among rural populations.

Activities have included:-

- Re-establishing the use of traditional livestock guarding dog breeds such as the Slovenský čuvač and Caucasian shepherd, to protect sheep flocks from wolves and bears; providing dogs and training to vulnerable farms;
- Installing electric fencing to protect livestock and beehives from predators, and food stores in remote cottages from bears;
- Installing 'fladry' barriers to protect livestock from wolves;
- Designing, testing and installing bear-proof refuse containers and other structures at rural hotels and campgrounds;
- Importing and distributing bear pepper spray;
- Conducting human dimensions research to assess knowledge of and attitudes towards carnivores and their management;
- Implementing various education and awareness raising activities, such as a Slovak version of the film, 'Staying Safe in Bear Country', manuals for teachers, presentations for school children and travelling exhibitions.

In 2009 we created the White Dog Fund: a new initiative to continue and extend this work. By raising funds to provide people in rural areas who shoulder the real cost of co-existing with carnivores with prompt financial and practical assistance to resolve conflicts, we promote *"Sharing responsibility for predators"* (http://www.medvede.sk/index1.php?action=WhiteDog). We have shown the appropriate use of livestock guarding dogs to be associated with lower levels of predation and an absence of surplus killing. Our bear-proof refuse container has successfully passed trials with both wild and captive bears. At this stage, other results are largely anecdotal, but encouraging. For example, following the installation of electric fences in 2008-09, no further damage was suffered at two apiaries and a sheep farm which had previously suffered repeated damage.

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STATUS AND HUNTING MANAGEMENT OF THE BROWN BEAR IN THE WESTERN CARPATHIANS

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Introduction We present some key findings from our 2007 assessment of the status of the brown bear (*Ursus arctos*) in Slovakia. Bears in the Western Carpathians have recovered from 20–60 in the 1930s to a current estimate of c.800–900 individuals. Slovakia accounts for >81% of the occupied range and >95% of bears in the Western Carpathians, the remainder being in Poland and the Czech Republic. Management actions in Slovakia therefore play a key role. Natura 2000 sites may not prevent suitable habitats becoming fragmented and bears in the Western Carpathians being genetically isolated unless mitigation measures are taken. But public acceptance of bears and their conservation is influenced by a perception that "over-populated" bears are the cause of bear-human conflicts. Historically, lethal control has been the method of choice for limiting damage by bears. Although no longer legally hunted in Poland or the Czech Republic, the brown bear is both a protected species (under national and EU legislation) and a game species in Slovakia, where the annual quota is set at c.10% of the estimated population.

Methods

- Distribution was mapped using hunters' reports.
- Current population size was estimated using results from model area censuses to recalibrate official game statistics.
- Population growth was calculated from natural logarithms of contemporary expert estimates of population size in 1932–2005.
- Hunting, mortality and damage (adjusted to constant prices) were assessed from records held at Slovakia's State Nature Conservancy.

Results

Population size, growth and density

- The observed annual growth rate since 1932 has averaged 4.5% per year.
- We estimate the current population size between 770 and 870 individuals in a total occupied range of 16,500 km^2.
- Mean density is c.5 bears/100 km^2, with 11 bears/100 km^2 in some mountain ranges.

Hunter harvest and bear-human conflict

Legal hunting is the largest cause of known mortality, but has not prevented population growth. We estimate maximum sustainable yield at 8.5% p.a. (c.70 bears). In 2000–2006, 11–35 bears p.a. were shot. Bears weighing >100 kg are more likely to be male. Focusing quotas on bears <100 kg has reduced the proportion of males harvested from 79% in 1958–1980 to 62% in 1994–2005, but this measure is very unpopular among trophy hunters and probably contributed to a decrease in the harvest since 1992. Hunting advocates often claim that damage to agriculture (<€60,000 p.a.) and human injury (1–8 cases p.a.) happen because there are "too many" bears. However, the real value of compensation payments has fallen to 44% of levels in the 1960–1980s, probably due to a decline in livestock breeding and beekeeping.

Conclusions

- Recent levels of legal hunting appear to be sustainable, but there is a need for more robust monitoring of population parameters.
- Damage levels have fallen despite there being more bears and less legal hunting.
- Even substantial protected area networks may not prevent degradation, fragmentation and loss of habitat becoming important problems.
- To improve acceptance of bears, we recommend prioritising prevention of conflicts with electric fences, guarding dogs, bear-proof bins etc. and raising awareness of safety advice.

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COOPERATION WITH LOCAL RESIDENTS FOR THE SUCCESSFUL RESTORATION OF ASIATIC BLACK BEAR IN SOUTH KOREA

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The restoration of large mammals such as bears is really complicated and continuous success depends upon having the program eventually involve local people rather than outsiders, regardless of its location. And also public education and a broad base of public support are the only long-term solution. So we have been running education programs and ecotourism inside and outside of our center (SRC; Species Restoration Center of Korea National Park Service) to inspire the awareness of nature conservation and to build the consensus for bear restoration. And also we are working on diverse community programs such as "Hononary guards for ABBs, Local community for protective area of ABBs, Gathering for discussion with local residents, Supporters for ABBs etc." and through the installing of electric fence (146 points) around honey farm, special night duty for prevention of damage from bears during summer season which damage is concentrated and prompt compensation after damage (307 damages from bear since 2005), we are making efforts to diminish negative mind for bear restoration. And illegal poaching tools which are one of the biggest problems to obstruct successful bear restoration are 1,086 units eliminated by SRC. Besides for the enforcement of public relations we cooperate with several broadcasters and publishing companies, it has been reported on bear restoration 1,311 times including newspaper and news since 2005.

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TREATMENT OF EHRLICHIOSIS ON THE ASIATIC BLACK BEAR IN SOUTH KOREA

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As a part of restoration project of Asiatic Black Bear (*Ursus thibetanus ussuricus*), 29 cubs have been introduced from Russia and North Korea and released into the wild, because they are endangered species in South Korea. All of the bears were conducted quarantine and health screening including canine distemper, rabies, dirofilariasis, ehrlichiosis test.

In two bears, the results of complete blood counts revealed abnormally low number of platelets, when compared to the range in normal cubs. The first one (RF-23) had no remarkable clinical sign, but the other one (RM-24) showed anorexia, emaciation and coughing up phlegm. The PCR analyses using the collected blood samples indicated that the two cubs of 29 bears had been infected with Ehrlichia spp. On the basis of these findings, they were diagnosed as ehrlichiosis, and doxycycline of 10 mg/kg was administered orally every 24 hours. After 14 days treatments, they did not revealed any clinical signs, and *Ehrlichia spp*. were not detected on PCR analysis on day 21 and day 180 after the beginning of treatment.

It has been reported ehrlichiosis in several species of wild animals in the world, however infection of Asiatic Black Bear is uncommon and especially its treatment is not reported.The case reported here describes the clinical findings, diagnosis and treatment of ehrlichiosis in two cubs of 29 Asiatic black bears in Korea.

Key words: bear, doxycycline, ehrlichiosis, thrombocytopenia

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HOME RANGE OVERLAPPING OF THE ASIATIC BLACK BEAR DURING THE MATING SEASON IN SOUTH KOREA

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This study is conducted as a part of Asiatic Black Bear (ABBs) restoration project, in 2008 it is analyzed home range of 6 bears which are sexually mature (more than 3 years old). The analyzed period is the mating season of ABBs in Korea (between May and July) and the objects are 4 years old (male; 2, female; 1), 5 years old (male; 1, female; 2). All of the bears are monitored by radio telemetry and we analyzed Fixed Kernel 50% which is core area of home range, moving distance per day and altitude by using the ArcGIS 9.3 and HRT Extension

Each home range of 5 years old female NF-08 and NF-10 were overlapped with NM-14 (♂, 5 years old male) 0.26㎢, 10.61㎢ and they gave birth. However 4 years old female RF-18 didn't give birth, although the home ranges are overlapped 4.41㎢ with RM-15 (♂, 4 years old) and 13.49㎢ with RM-19(♂, 4 years old). As a result of these, it is estimated that the age must be reached more than 4 years for the parturition though further research is needed.

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TRENDS IN THE DAMAGES ATTRIBUTED TO BROWN BEARS IN THE CANTABRIAN MOUNTAINS (NW SPAIN) IN 1991-2008

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The Cantabrian brown bear population (Ursus arctos) is one of the most threatened worldwide and its monitoring deserves particular attention by managers and scientists. Changes in the population have only been interpreted in terms of size and spatial distribution. However, other ecological, behavioural and human-related issues may be essential for the management and conservation of populations of large carnivores. Here we analyze the trend in damages to livestock and agriculture attributed to brown bears in Asturias (NW Spain) in 1991-2008, based on administrative official forms. The study area attended in this study comprised ~75% of the brown bear population in the Cantabrian Mountains, which size was estimated at 70-90 bears in the 1990's.

The exponential growth rate in affected beehives is 17.3%, 7% for fruit trees, and 6.5% for sheep. The attacks to horses decreased (-5.3%) and there was no trend for cattle and goats. The annual average number of damages for 2006-2008 is 603 beehives, 147 fruit trees, 14 cows, 7 goats, 5 horses, and 22 sheep.

Even considering the low reliability of some cases in terms of true authorship and actual use by the bears, e.g. those cases involving livestock, the results suggest some changes in the feeding behaviour of the species, with multiple potential causes. Whereas the increase in bear numbers may have contributed to the observed pattern, the increase in damages to beehives goes far beyond the estimated bear population growth, even considering the most optimistic scenario. As suggested by recent studies on Cantabrian bears diet, changes in both natural and human related resources availability, due to local and global factors, may also be an explanatory reason. On the other hand, the withdrawal of livestock carcasses due to sanitary reasons (which is applied in Europe since 2002) does not seem a significant factor; the increase in damages to beehives and fruit trees before the rule regarding carcasses (1991-2001) was 30.4% and 18% respectively, without significant trends in other types of damages. Other factors, e.g. habituation to humans, could also be involved in the observed trends. For example, in a study parcel of 185 km^2, with 328 inhabitants distributed in 19 villages, 352 beehives were attacked during 2006-2008, and 55 of them (16%) were inside a single village.

This study is included in the Brown Bear Research Project 2008-2010 carried out by Principado de Asturias and the Estación Biológica de Doñana (Spanish Council of Research, CSIC).

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THE FIRST LONG TERM CAMERA-TRAP SURVEY IN TURKEY: PRELIMINARY RESULTS ON BROWN BEARS

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Information on large mammals of Turkey is limited and there is a need for widely applicable, reliable and effective field methods to gather data for management and conservation initiatives. Conducting field surveys by the use of camera-traps are becoming increasingly popular among researchers in the last decade. The use of camera-traps for collecting field data on wildlife started recently and previous work has shown that camera-trapping has the potential for collecting data on wildlife in Turkey. We conducted a long-term camera trap survey to collect data on the presence, activity patterns and habitat preferences of mammal species in Yenice and Bartın Forests located in northern Turkey during 2006-2009. We intensively sampled an area of 454 km^2 by using 83 camera trap units for a total of 18.804 active camera-trap nights. Preliminary analysis of the camera trap records showed that a total of 351photographs of brown bears were collected where at least 22 photographs contained female brown bears with 1-2 bear cubs. Most (49.57%) of the bear activity were confined to 18:00-24:00 hours but bears were also observed to be active during the day (30.13%). Brown bears were mostly active in August, September and October in a year. No bear activity was observed in January and bear activity in February and March were minimum. We observed that brown bears were quite adapted to the activity pattern of people and bears were observed to utilize the sites right after the completion of forestry activities such as logging in various locations. The risk of vandalism and theft is an issue for most of the camera-trap surveys but we lost only 8.4% (7 out of 83 camera-traps) during nearly three years of operation. We conclude that camera-trap surveys can be instrumental in collecting data on brown bears at large scales in Turkey and camera trap data can be used to understand the extent of the areas occupied by brown bears, movement and habitat preferences of brown bears, connectivity of bear populations in Turkey where such information is currently very limited.

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POPULATION VIABILITY MODELING WITH HARVESTING SCENARIOS FOR A BROWN BEAR POPULATION AT YUSUFELI, ARTVIN, TURKEY

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Bears are important as targets for trophy hunting in many countries, sometimes providing local income to impoverished remote communities. On the other hand, it has been shown that removing especially certain age classes and sexes can strongly influence population dynamics, and if not regulated, may negatively affect population viability. Therefore, agencies responsible for bear management should carefully consider the pros and cons of harvesting bears.

Although empirical data on the effects of such harvests are difficult to obtain for most cases, computer simulations through age-structured models can help compare the impact of possible harvest scenarios, and guide managing agencies in their decision making. Here we report our findings on the simulated (legal and/or illegal) harvesting of brown bears (*Ursus arctos*) in the Yusufeli district, Artvin province, Turkey. The study area covers known hotspots of human-brown bear conflict and the site where most trophy hunting of bears has occurred in the recent past. The study area of 800 km² covers almost all the Barhal basin (situated roughly between 40° 33' to 41° 06' N, 41° 08' and 41° 54' E). As part of the Kaçkar Mountain Southern Range, it is dominated by forests with Euro-Siberian phytogeographical elements (*Picea orientalis, Pinus sylvestris* and *Abies nordmanniana)* but also includes formations with many elements of the Irano-Turanian or Mediterranean realms. About three quarters of potential brown bear habitat overlaps with human settlements.

We used RAMAS Metapop to build a population model with 6 age classes jointly for males and females for duration of 50 years. Density dependence was assumed to be of contest type affecting all vital rates. Survival rates were either based on our own data or adapted from relevant literature. Mean litter size was 1.52 cubs and average breeding interval was 2.5 years. Maximum growth rate was assumed to be 1.1. The initial abundance was 144 and the presumed carrying capacity 200, with a standard deviation of 0.2, fluctuating over the years. The model included demographic and environmental stochasticities, where a CV of 30% for survival and 15% for fecundity were assumed.

We simulated several scenarios that involved different levels of poaching and legal trophy hunting. Estimated levels of poaching (2-3 individuals of each sex/year) led to maintenance of current population density. However, additional annual removal of 5 trophy bears of different age and/or sex composition significantly increased probabilities of extinction up to 0.66 – 0.98. In one scenario, frequent removal of older males resulted in no breeding in some years due to lack of adult males, leading to an unprecedented decline in overall numbers. Less frequent trophy hunting at every 2 or 3 years improved the viability of the study population down to an extinction risk of 0.15 and 0.00, respectively.

Our simulations reveal that even low levels of trophy hunting may cause a risk for populations when simultaneous poaching exists. Allowing trophy hunting only once every third year is the only viable option among the scenarios we have tested. However, if poaching is stopped, then all our scenarios become viable, improving local income levels due to trophy hunting and at the same time assuring long-term persistence. We propose that population viability models should more often be used as a tool to test possible scenarios in population management.

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HUMAN-BEAR MANAGEMENT LEXICON OF TERMS AND CONCEPTS

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Bear population management includes four main goals: conservation, sustained yield harvest, control, and human-bear management. The common goal of human-bear management programs is to protect humans and ensure the long-term conservation of bears by preventing human-bear conflicts and other bear incidents. Despite similar program goals, poor (or lack of) communication within and among agency personnel (e.g. managers, biologists, field staff) is one of the major reasons human-bear management programs operate differently. In order to communicate effectively agencies must (1) clearly define terms and concepts used in human-bear management, (2) use terms in a consistent manner, and (3) frequently evaluate and share their program's successes and failures using a common language. We used a modified Delphi method to structure a group communication process among human-bear management experts and bear research biologists from North America in order to construct a human-bear management lexicon. Forty-two terms and concepts in human-bear management were identified, defined, and discussed by 16 experts to create the lexicon. The purpose of this paper is to clarify terms and concepts for human-bear managers and research biologists, and to instigate discussion about more prudent means of administering bear population management programs worldwide.

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SPLIT PARTURITION OBSERVED IN A CAPTIVE NORTH AMERICAN BROWN BEAR

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Reproductive physiology in North American Ursids is characterized by mating in late spring/early summer and delayed implantation. Implantation of blastocysts occurs in late fall followed by a presumed 60 day gestation. Females typically give birth to litters of 1 to 4 cubs during January or February. In the spring and summer of 2008 at the Washington State University Bear Research, Education and Conservation Center, female grizzly bears were mated with two adult males. Pregnancy was determined via plasma progesterone concentrations in blood samples collected in late October 2008 (onset of hibernation). Elevated progesterone concentrations (2.63 vs. 0.73 ng/ml) indicated one of the two females was pregnant. General behavior was monitored during hibernation via 24h video recordings. On December 31st, 2008, two cubs were born to the adult female with elevated progesterone concentrations. Normal maternal behavior was observed for the next 16 days. On January 17th, 2009 the female stood and moved away from the nest. A prominent flow of amniotic fluid was observed and within minutes, a third viable cub was born, 17 days after her first parturition. The small cub was moved by the female to the nest with the other two larger cubs and reared normally. All cubs appeared to be the same size and the same level of immaturity at birth. During subsequent months, cub gender and weights were determined and hair samples were collected to determine paternity. The youngest cub was female and the two older twin cubs were males. Despite the small birth size of the female, there were no statistical differences in body weights or growth rates between cubs until the last weighing prior to hibernation (Oct. 24th, 2009). At this point, the dominant male was significantly heavier than both siblings. DNA results confirmed that all cubs were sired by the same male even though both males actively bred. These findings suggest that either: 1) the female was mated during two fertile estrous cycles with the same male which led to dramatically different implantation dates, 2) that a mating during a single estrus cycle resulted in temporally spaced fertilizations and implantations separated by ± 17 days, or 3) fertilization occurred during the same time frame for all embryos but implantation was ± 17 days later in the last cub born. To our knowledge, this is the first confirmed documentation of split parturition in a captive brown bear. Taken together with evidence of females emerging from hibernation with cubs of different sizes in the wild, our findings suggest that 'runts' in some litters may be the result of split parturition. Whether this phenomenon alone is sufficient to explain the differences in cub sizes remains to be determined as competition for food resources among siblings could also account for differences in body size.

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PHYSIOLOGICAL INTEGRATION OF SEASONAL CUES BY THE NORTH AMERICAN BROWN BEAR

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In many temperate zone animals, seasonal cycles of reproduction, migration and hibernation are synchronized to changes in daylength (photoperiod). The brain mediates this synchronization via a diverse set of neural pathways and endocrine signals. The objective of this study was to characterize several endocrine and behavioral rhythms in the North American brown bear (grizzly bear*, Ursus arctos horribilis*) and to determine their relationship with prevailing photoperiod. Daily locomotor activity was observed during three consecutive hibernation months (Dec through Feb) over a three-year period and over a two-year period during the active phase (Mar through Oct) in 6-9 captive male and female bears (aged 1-21 yrs). Activity duration and the phase angle difference between activity onset/offset and dawn/dusk, respectively were determined for both hibernating and non-hibernating periods. Blood samples were collected at summer and winter solstices and vernal and autumnal equinoxes over a 24 h period to obtain a daily hormone profile across seasons. Samples were analyzed for melatonin and cortisol, two endocrine phase markers of the circadian system that exhibit strong endogenous and seasonal rhythmicity in many temperate zone mammals. The duration of activity increased as a function of daylength ($r^2 = 0.82$, $P < 0.001$) with the exception of the fall hyperphagia period when the bear's activity pattern appeared to dissociate from photoperiodic cues. This fall hyperphagia period was characterized by an elevated, constant active period irrespective of decreasing daylength and the relative good body condition of these captive bears. Furthermore, the phase angle relationship between onset of activity and dawn along with the offset of activity and dusk did not remain stable ($P < 0.001$) between hibernating and non-hibernating periods, suggesting that entrainment to photoperiodic cues was not stable. Melatonin secretion was highly rhythmic ($P < 0.001$ main effect of time of day), but present at concentrations that were as low as 1/50th that occurring in humans and domestic animals (i.e., between 1-4 pg/ml during darkness). Cortisol secretion also exhibited a strong daily rhythm ($P < 0.01$, main effect of time of day). Both melatonin and cortisol daily profiles exhibited seasonal variation ($P < 0.01$, time by season interaction). Melatonin rhythms were characterized by seasonal changes in both mean concentrations and changes in peak phase relative to dark onset. The interval between the cortisol peaks and troughs was highly correlated with photoperiod (Pearson r = 0.98), reflecting an expansion and contraction of the daily cortisol rhythm with season. Together, the results of the present study demonstrate that: 1) captive grizzly bears exhibit daily locomotor rhythms during non-hibernating and hibernating periods with a clear diurnal pattern, 2) cortisol and melatonin are secreted rhythmically and exhibit both daily and seasonal variation. The exceedingly low melatonin concentrations and small pineal gland in the brown bear suggest a less important role for this endocrine mediator in the entrainment to annual changes in daylength than in other seasonal mammals. This finding, together with the unstable phase angle relationship between photic signals and activity onsets/offsets, may also help explain why the brown bear is able to occupy a variety of temporal niches either directly or indirectly in response to human presence, changes in food availability, or conspecific interactions.

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SPATIAL ECOLOGY OF GRIZZLY BEARS IN NORTHWESTERN MONTANA

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We will use genetic information to assess the influence of habitat and human influences on dispersal and gene flow of grizzly bears (*Ursus arctos*) in the Northern Continental Divide Ecosystem (NCDE). We ask three questions:

1. What landscape and population characteristics promote dispersal in a natural population of grizzly bears? Natal dispersal comprises three key steps: 1) emigration, 2) movement through the landscape, and 3) immigration. We will identify parent-offspring pairs to look at the three stages of dispersal directly.
2. Can we quantify resistance of landscape characteristics to gene flow? Gene flow reflects a process occurring over several generations and results only when individuals disperse and reproduce. We will use a Bayesian approach with circuit theory to measure the resistance of landscape characteristics using genetic distance as a response variable.
3. What landscape or population characteristics describe areas where dispersal occurs but gene flow does not result?

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BLACK BEAR DENSITY IN GLACIER NATIONAL PARK, MONTANA

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No demographic information exists on the status of Glacier National Park's (GNP) black bear (*Ursus americanus*) population. In 2004, we sampled the black bear population within GNP plus a 10 km buffer using noninvasive hair collection methods as part of a 7.8 million–acre study of the regional grizzly bear (*U. arctos*) population. We collected 5,645 hair samples from 550 baited hair traps, and 3,807 samples from multiple visits to 1,542 natural bear rubs. Microsatellite analysis identified 600 (51% F) individuals from the 2,848 samples identified as black bears. Data from individual bears were used in closed population mark–recapture models to estimate black bear population size and density in the 6,600 km^2 greater GNP area. Preliminary results suggest that the density of GNP's black bear population was equal to or greater than other interior populations sympatric with grizzlies, despite the high density of grizzlies in this area. This project represents the first estimate of black bear abundance for this area, and demonstrates the efficiency of multi–species projects to inform management. Given the high density of both bear species we documented, it may be appropriate to reconsider the suitability of GNP as a translocation location for bears captured at conflict sites outside the park.

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The IUCN-BSG recently formed a Human-Bear Conflict Expert Team to address the issue of human-bear conflicts. Human-bear conflicts are an international problem involving all eight species of bears across much of Europe, Asia, North America, and the South American Andes. Conflicts between bears and people can result in economic losses, human injuries and fatalities, and consequent retributions against bears. The new Expert Team is made up of bear experts and social scientists with considerable experience on human-bear conflict issues. They have been tasked by the BSG to provide advice and information to decision makers in government, specialized non-governmental organizations, and other interested persons to improve their understanding and management of human-bear conflicts. Human-Bear conflict situations are often complex and each situation requires careful analysis and an interdisciplinary, science-based approach that can effectively address conflicts in a way that reduces the economic burden of bear conservation efforts on affected people, improves bear welfare, and creates a positive framework for human-bear coexistence. The new team will take a proactive approach to human-bear conflicts by identifying critical strategies and evaluating short- and long-term management options for resolving conflicts. Some important principles associated with human-bear conflicts are summarized in this presentation.

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CHRONIC PROGRESSIVE HAIR LOSS AMONG CAPTIVE ANDEAN BEARS IN NORTH AMERICA

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Captive Andean bears (*Tremarctos ornatus*) sometimes exhibit a chronic skin condition whose symptoms increase in severity over the course of several years. The most obvious symptom is progressive hair loss (alopecia), which is generally bilaterally symmetric. Hair loss occurs on the limbs and feet, and the lumbar region; hair thinning frequently occurs in the face and periocular region. Additional symptoms include episodes of pruritus and dermatitis, and mucupurulent ocular discharge, or conjunctivitis. Diagnostic procedures often reveal responses to allergens and bacterial/yeast dermatitis. In the past, as husbandry and veterinary staff at separate institutions have independently attempted to treat this condition, it has been thought to arise from an allergic reaction, or a parasite, or an infection. Because of these presumed causes, veterinary and husbandry staff have attempted to treat the condition with fatty acid supplementation, antihistamines, antibiotics, antifungals, steroids, immunotherapy, and changes in diet and other environmental conditions. Responses to treatments have been variable across cases, and no treatment has permanently resolved the clinical symptoms. It is now known that this condition occurs in captive Andean bears in North America, South America, and Europe. Among other mammals, skin disorders and hair loss may result from "stress", nutritional deficiencies, endocrinological disruption, or the action of parasites or pathogens. In addition, conditions including hair loss may result from multiple factors, such as genetics, environmental antigens, and parasites. One such condition is atopy, or atopic disease. In atopy, the immune system becomes sensitized to environmental antigens that do not produce symptoms in normal animals. Given the global distribution of this condition, we doubt that it results from a common allergen, pathogen, or nutritional deficiency. We therefore aim to characterize this condition, identify risk factors, or protective factors, describe any other symptoms associated with hair loss, and form hypotheses for treatment or prevention. Given the wide range of possible risk factors, we are collecting data on both husbandry variables and veterinary variables, in a retrospective case-control study of bears held at zoological institutions in North America. There are 67 Andean bears (40 males, 27 females) in this population, with an average age of 20.43 ± 5.82 (SD) years as of 1 Jan 2010. As of 31 December 2009, we have collected both husbandry and veterinary data on 9 males and 8 females, and partial data on another 10 males and 10 females. We have identified 8 Andean bears, 13.3% of the population, with a chronic skin condition involving progressive hair loss. All the affected bears are females, so even if we have already identified all affected bears, the prevalence rate among females would be 29.6% (8 of 27 captive females), versus a prevalence rate among males of 0%. Of the bears in our sample at present, those likely to have chronic hair loss are females, housed with males. We hypothesize that hair loss in Andean bears is merely the most obvious symptom of a serious condition, potentially caused by the social housing of a species that is normally solitary in the wild. Additional data are being collected on both affected and unaffected individuals.

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FOOD INTAKE AND FEEDING BEHAVIOUR OF ANDEAN BEARS AND MALAYAN SUN BEARS IN CAPTIVITY

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The Andean bear, *Tremarctos ornatus*, belongs to the subfamily of Tremarctinae and is the only representative of Ursids in South America. This subfamily differs in its skull morphology and certain features of the masticatory apparatus from the Ursinae, which should influence food intake behaviour. The diet of Andean bears is predominantly based on vegetarian food including fruits, berries, cacti and fibrous bromeliads. These plants can locally reach high densities in South America and constitute therefore a constant food supply for bears. Paisley and Garshelis *(2006)* assumed that bears, living in such high density patches, should get satiated relatively quickly, so that they would spent less time with foraging and feeding. Consequently, they should increase their resting activities. Yet, results from the study in 2006 show that the activity patterns of Andean bears are similar to those of other foraging bear species. Even though Andean bears live in habitats of high food densities, they spent as much time with feeding related activities as bears forced to cover large distances in search of food.

In this study, we hypothesised that the fine structure of feeding behaviour in particular the masticatory behaviour of Andean bears is different from that of the Ursinae and that these differences might contribute to the unexpectedly elevated activity of this species. Therefore, different chewing related variables of Andean bears and Malayan sun bears were compared. Both bear species are similar regarding their tropical habitat, year round activity without hibernation and their size. We assumed that, in comparison to the Malayan sun bear, Andean bears would show a lower chewing and intake rate, meaning that they would need more time to consume the same amount of food.

During 4 months, meal length, food preferences, number of bites/food item, chewing time/food item, chewing slaps/food item (chewing rate) and feeding time/food item were measured in 4 Andean bears at Zurich zoo and 4 sun bears at Cologne zoo by means of focal animal sampling *(Martin & Bateson, 1993)* and continuous recording *(Martin & Bateson, 1993)*. Food manipulation time, intake rate (g/min), bite rate (bite/min), bite size (g/bite) and chewing frequency (slaps/min) are calculated from the observed variables. To make the results comparable to other studies intake rate and bite size will be related to the dry matter content of the food items appearing in the diets of both species: apples, pears, grapes, carrots and green salad. Our results suggest that Andean bears effectively have a lower chewing rate (slaps/min) than Malayan sun bears. In addition, intake rate (g/min) is also lower in Andean bears than in Malayan sun bears. Regarding bite size (g/bite) and bite rate (bites/min), both bear species appear to be similar.

The results will be compared to data from other bear species and they will be discussed with respect to the differences in skull morphology between Ursinae and Tremarctinae. The effect of the specific features of their feeding behaviour on the activity budget of wild living Andean bears will be evaluated.

References

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STATUS OF BEAR SPECIES IN IRAN

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Two species of bear inhabit in Iran, Brown bear can be found in Alborz and Zagros Mountains and also Hyrcanian forests in the South of Caspian Sea and the other is the “critically endangered” Baluchistan black bear which the western most extension of it’s distribution occur in South East Iran. There are various threats to existence of bears in Iran including poaching as retaliation to bear raid to cultivated lands or apiculture, road kills and also capturing cubs (black bear) for smuggling to other countries. Systematic surveys on current status and trend of both species highly recommended in future.