23RD INTERNATIONAL CONFERENCE ON BEAR RESEARCH AND MANAGEMENT

"Bears and humans in the 21st century: challenges and solutions for a peaceful coexistence"

Thessaloniki, 05 – 11 October 2014

Conference Venue: Olympion Complex & Electra Palace Hotel

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CONFERENCE ORGANISATION

PLANNING COMMITTEE

Chair: Alexandros A. Karamanlidis

ARCTUROS

SCIENTIFIC COMMITTEE

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PROFESSIONAL CONFERENCE ORGANISER: SYMVOLI | Conference & Cultural Management

The 23rd International Conference on Bear Research and Management is under the auspices of the:

HELLENIC MINISTRY OF ENVIRONMENT, ENERGY AND CLIMATE CHANGE

SPECIAL SECRETARIAT OF FORESTS

Special Secretariat of Forests
Ministry of Environment,
Energy and Climate Change

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EGNATIA S.A.

ΕΓΝΑΤΙΑ ΟΔΟΣ Α.Ε.

WELCOME MESSAGES

It is my great pleasure to welcome the 23rd International Conference on Bear Research & Management, with a twofold role: as the Mayor of the host city, THESSALONIKI, and the Founder and President of the hosting organization, ARCTUROS.

ARCTUROS, a non-profit environmental organization, through its constant and passionate presence for more than 20 years, has significantly contributed to wildlife conservation in Greece, by protecting mountainous ecosystems with an emphasis on bears and large mammals.

When ARCTUROS was founded back in 1992 we had to act urgently to rescue all the dancing bears in Greece and put an end to this horrible tradition. And we succeeded. We also had to act urgently in order to secure a minimum population for the brown bears that live in the mountainous areas in Greece. And we did that too. Today we feel that it is our obligation to ensure the harmonic coexistence between bear populations and humans. And this conference is a major contribution to this regard.

Reaching the point of hosting this significant International Conference on Bear Research and Management, ARCTUROS proudly offers -on a national and regional level- to researchers and professionals the chance to participate in an international scientific platform of this sector, to present research and practices from the broader Balkan and Mediterranean context, and to relate this to the scientific developments worldwide.

With the participation of more than 200 conference delegates from approximately 40 different countries from all over the world, THESSALONIKI becomes the host city of an international meeting of broad representation and the Mediterranean focal meeting point for bear research, conservation and management. Conference participants should expect to discover a unique destination, a city of many stories, of a multicultural past that creatively reflects on its modern identity.

Both ARCTUROS and THESSALONIKI are proudly hosting the IBA 2014 Conference, and I would like to welcome you to a constructive scientific dialogue on Bear Research and Management!

Sincerely,

Yiannis Boutaris

Mayor of Thessaloniki

Founder & President of ARCTUROS

About ARCTUROS

ARCTUROS is a Greek, non-governmental organization seeking to enhance biodiversity and sustainability in the rural and mountainous areas of Greece. ARCTUROS implements cross-border projects in order to protect mountainous ecosystems, with an emphasis on bears and large carnivores, aiming at the integrated management of protected mountainous regions and the provision of expertise for natural environment interventions.

The **ARCTUROS** Environmental Center, which operates in the region of Macedonia was instrumental in resolving the problem of captive bears and wolves in Greece, while raising public awareness about large mammals and their habitat in the country.

Scientific research of ARCTUROS focuses currently on evaluating the genetic status of brown bears in Greece, estimating population size and understanding the marking and rubbing behavior of the species.

Support the efforts of ARCTUROS to protect Greek biodiversity!!!

Visit: www.arcturos.gr

Message

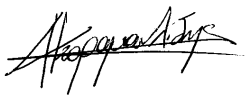
"*Bears and humans in the 21st century: challenges and solutions for a peaceful coexistence*"

In ancient Greece bears were revered as mythical creatures and were associated to the goddess Artemis and the resurrection of nature. It is therefore quite symbolic and fitting that Greece should host now an international conference on bears. Greece is currently struggling to revive its economy in order to overcome the effects of the worst financial crisis in its modern history, to protect its unique biodiversity and ultimately redefine its place as a nation in the 21st century. For the conservation of brown bears in Greece the main challenge during these troubled times will be to identify and effectively mitigate the negative interactions between humans and bears.

The proposed theme of the Conference is "Bears and humans in the 21st century: challenges and solutions for a peaceful coexistence". With this theme we aim to draw attention to the problems bears are facing in Greece, and hopefully garner public interest and support for their effective solution. The Conference theme is also representative of one of the major challenges for bears around the world: in midst of an enduring global financial crisis, national economies are reshaping and restructuring themselves in order to become more competitive and resilient in the new world of the 21st century. These structural changes have significant effects on the conservation of global biodiversity, including bears. From the effects of global warming on polar bears to the problems arising from bears living in the proximity of humans in Europe and North America, all bear species are affected by the new realities of the 21st century. Identifying these conflicts in a world that is changing rapidly will be the major step towards finding the solutions that will ultimately secure the survival of these species on a world-wide scale.

The 23rd International Conference on Bear Research and Management aims to be a forerunner in this process by providing a meeting point and becoming the public outlet for the most experienced specialists in the field of bear research, conservation and management.

Welcome to Thessaloniki!



Alexandros A. Karamanlidis

Scientific Coordinator ARCTUROS

Chair of IBA2014 Conference

Message

On behalf of everyone at World Animal Protection I would like to say how pleased and proud we are to be sponsoring the 23rd International Conference on Bear Research & Management. We are delighted that this year's conference is being held in North Greece with ARCTUROS.

Both the IBA and ARCTUROS are an integral and valued part of our history of working to protect bears. Twenty two years ago dancing bears were common sights on Greek streets, but by working together we have made this cruel practice history.

Animal welfare is clearly an integral part of the IBA's work and we are delighted that the theme for this year's conference is 'Bears and humans in the 21st century: challenges and solutions for a peaceful coexistence'. We are also thankful for the work and determination of all the IBA members who ensure that the welfare of wild and captive bears continues to be part of the global agenda.

Bears are one of the world's most iconic wild animals, yet tens of thousands are still forced to endure extreme abuse their whole lives, often for entertainment or profit. Our achievements in Greece should act as a reminder of what we can accomplish to protect them by working together.

While there is still so much work to be done, I know that we will all continue to move the world to protect bears and safeguard their futures.

Sincerely,

Mike Baker

Chief Executive

World Animal Protection

We were known as WSPA

(World Society for the Protection of Animals)

WORKSHOPS

Workshop I

Bears in human proximity: causes and effective solutions to dealing with negative interactions

Workshop Organizer: ARCTUROS

Workshop Chair: A.A. Karamanlidis

Guest Speakers: Andreas Zedrosser, Marko Jonozovič

Sponsor: Hellenic Ministry of Environment, Energy and Climate Change

Human – Bear Conflicts, including approaches of bears to human settlements, have been identified as one of the major conservation problems for the brown bear (*Ursus arctos*) in Greece. This workshop aims at providing the necessary background for understanding the proximate causes of why bears approach human settlements and presenting the most effective solutions of dealing with negative human – bear interactions. The workshop will built upon the extensive research and management experience of the Scandinavian Bear Project and the Slovenia Forest Service.

Workshop II

Strategic planning for recovery of Mongolia's Mazaalai, or Gobi bear. Finding the right solutions for a critically endangered population in a warming world

Workshop Organizers: J. Batbold, A. Bayasgalan, Yo. Onon, Ts. Tuya, Harry Reynolds

Workshop Chair: Harry Reynolds

Sponsors: Mongolian Ministry of Environment and Green Development, Ulaanbaatar, Mongolia & Gobi Bear Project, Gobi Bear Fund, Inc., PO Box 80843, Fairbanks, AK 99708, U.S.A

Critically endangered Gobi bears (Mazaalai) likely number less than 45 and are now confined to about 15,000 km^2 of habitat in the desert mountains and steppe of the Great Gobi Strictly Protected Area (GGSPA). Until about 1970, this bear, which relies primarily on vegetation as a food resource, occupied about 30,000 km^2. Bear activities are centered around three oasis complexes each with ~7-14 known springs, but annual precipitation has recently been as low as 35-100mm and there is evidence that the GGSPA water tables have declined as a result of climate change. Genetic diversity is low, but adequate reproduction still occurs. There is no evidence of direct human-caused mortality and legal access to the area is presently confined to managers and government-permitted conservation projects. Herders are allowed to graze livestock within a buffer zone along the northern border of GGSPA from November through April. Small-scale illegal mining has recently increased dramatically and may reduce bears' access to water sources. Parliament has twice voted against measures that would allow large-scale mining within the GGSPA. Recovery of the Mazaalai population and re-occupancy of its former range are national goals.

The aims of the workshop are to (1) discuss effectiveness of conservation measures presently being taken; (2) present and further develop a draft strategic conservation plan for recovery of the Gobi bear; and, (3) engage the expertise of the assembled IBA members to explore additional measures that might prove beneficial to enhance the carrying capacity and range re-occupancy for these bears.

The workshop will begin with a 10-minute synopsis of problems to be faced and present efforts to overcome them. Invited speakers will give short assessments of specific aspects of present efforts for a total of 20 minutes. The remainder of the workshop will be devoted to suggestions for improvement of the strategic plan.

GOVERNMENT OF MONGOLIA
MINISTRY OF ENVIRONMENT AND GREEN DEVELOPMENT

Workshop III

Are we solving the right problem? Working for human-bear conflict resolution in developing countries

Workshop Organizers: Ozgun Emre Can, David Macdonald

Workshop Chair: Ozgun Emre Can, David Macdonald

WildCRU, Department of Zoology, University of Oxford, The Recanati-Kaplan Centre, Tubney House, Abingdon Road, Tubney, Abingdon, OX13 5QL, UK

Workshop Presenters: Ozgun Emre Can, John Beecham, Aleksandar Dutsov, Gabriella Fredriksson, David Macdonald, Robin Rigg, Lorraine Scotson, Ximena Velez-Liendo, Bhupendra Yadav.

Sponsor: WPA

The impact of human-bear conflicts on bear conservation is believed to be increasing in many areas across the range of bear species. However, middle and low-income countries where people and bears live next to each other require a closer look. According to the United Nations, in 36 years time, about 7.8 billion people (87% of the world's population) will be living in developing countries. This implies that many people will find themselves near bears, making conflicts increasingly likely. Failure in mitigating the conflicts in poorer parts of the world may reduce society's tolerance of bears and hamper conservation efforts. Therefore the development of effective mitigation policies is essential, particularly in such areas to make a positive difference to millions of people's lives as well as bears.

The aims of the workshop are (1) to discuss what is needed to make a positive change in conflict management throughout developing countries; (2) to identify transferable lessons to be shared between people tackling similar problems in different countries and (3) to discover how the professional community of bear researchers and conservationists can best help those researchers.

The workshop session will be composed of talks by invited speakers with experience in working in middle and low-income countries. Each speaker will share their experience with participants in 20 minutes (15 minutes talk and 5 minutes for questions and answers) and there will be a 30-minute round-table discussion after the talks.

CONFERENCE PROGRAMME

SUNDAY 5th October, 2014		
	09:00 – 17:00	**IBA Council Meeting** (Mezzanine Hall @ Excelsior Hotel)
	18:00 – 20:00	**Registration** (tbc)
	20:30	**Welcoming Event – Ice Breaker** (Boat Trip @ Thermaikos Gulf)

MONDAY 6th October, 2014 @ Olympion Complex		
07:00 – 08:00		**Registration**
	08:00 – 09:00	**Welcome from the Local Planning Committee and IBA President**
	•	Alexandros Karamanlidis, Scientific Coordinator of ARCTUROS / Chair of IBA2014 Conference
	•	Konstantinos Dimopoulos, Director of Special Secretariat for Forests - Hellenic Ministry of Environment, Energy and Climate Change
	•	Yiannis Boutaris, Mayor of Thessaloniki / Founder & President of ARCTUROS
	•	Dr. Jan Schmidt Burbach, Senior Wildlife and Veterinary Advisor - World Animal Protection
	•	Representative of Egnatia S.A.
	•	Jamsran Batbold, State Secretary of the Ministry of Nature, Environment and Green Development
	•	Karen V. Noyce, President of International Association for Bear Research & Management

	09:00 – 10:00	**Opening session**	
Invited	09:00 – 09:20	Legakis A	The biodiversity of Greece and the implications of the economic crisis
Invited	09:20 – 09:40	Tsoukala A	The cave bear story of Greece
Invited	09:40 – 10:00	Swenson JE	When conservation works; relatively good news about large carnivore recovery in Europe
	10:00 – 13:00	**Session: Bears of the World – Chairs: A. Trajce, S. Molina**	
Invited	10:00 – 10:20	Huber Đ	Nine countries sharing one population: can we secure the future of the Dinara-Pindos bear population?
158	10:20 – 10:40	Trajçe A, Hoxha B, Trezhnjeva B, Mersini K	Population status and conservation concerns of brown bears in Albania
111	10:40 – 11:00	Palomero G, Blanco JC, Ballesteros F, Carlos Nores C	Brown bear in the Cantabrian Mountains (NW Spain). The partial recovery of one of the most endangered European bear populations
	11:00 – 11:20	*Coffee Break*	
96	11:20 – 11:40	Kendall KC, Macleod AC, Boyd KL, Boulanger J, Royle JA, Kasworm WF, Paetkau D, Proctor MF, Annis K	Abundance, density, and distribution of grizzly bears in the Cabinet-Yaak ecosystem
66	11:40 – 12:00	Tirronen K, Panchenko D	Brown bear population in coastal ecosystems of White Sea on the Kola Peninsula
92	12:00 – 12:20	M. Moqanaki E	Genetic census of a regionally-important population of Syrian bears in the Iranian Caucasus reveals a substantially smaller population size than what is perceived

122	12:20 – 12:40	Pop I-M, Bereczky L, Papp C-R, Chiriac N	"Invisible" border - new data old problems. A Romanian-Ukrainian case study
63	12:40 – 13:00	Cáceres Martínez C, Acevedo A, Sánchez R	Availability and occupancy of the Andean bear habitat (*Tremarctos ornatus*) in National Natural Park Tama, Norte de Santander, Colombia
	13:00 – 14:30	*Lunch Time | STUDENT SESSION | Press Conference*	
	14:30 – 15:30	**Workshop I:** **Bears in human proximity: causes and effective solutions to dealing with negative interactions**	
	15:30 – 17:30	**Session: Bears and Infrastructure – Chair: Y. Mertzanis**	
Invited	15:30 – 15:50	van Manen FT, Karamanlidis AA, Huber Đ	Transportation networks and bear conservation: A review
80	15:50 – 16:10	Mertzanis Y, Iliopoulos Y, Godes C, Giannakopoulos A, Riegler A, Riegler S, Tragos A, Tsaknakis Y, Lazarou Y, Petridou M, Aravides E	The use of telemetry to mitigate a new highway functioning as a deadly barrier for brown bears in NW Greece
38	16:10 – 16:30	Finďo S, Kalaš M, Skuban M, Kajba M, Slamka M	The contribution of transport infrastructure to bear habitat fragmentation in Slovakia
	16:30 – 16:50	*Coffee Break*	
55	16:50 – 17:10	Hooker MJ, Chamberlain MJ	Highway-related movement of American black bear (*Ursus americanus*) in Central Georgia, U.S.A
61	17:10 – 17:30	Cotovelea A, Ionescu O, Ionescu G, Jurj R, Sirbu G, Fedorca M	Gene flow in Carpathian brown bear population before infrastructure development

	17:30 – 18:30	**Workshop II:** **Strategic planning for recovery of Mongolia's Mazaalai, or Gobi bear.** **Finding the right solutions for a critically endangered population in a warming world**
	18:30 – 18:50	**Video Session**
	18:50	**BSG Chairs and Steering Committee Meeting** (Mezzanine Hall @ Excelsior Hotel)

TUESDAY 7th October, 2014 @ Olympion Complex			
	08:00 – 11:00	**Workshop III:** **Are we solving the right problem? Working for human-bear conflict resolution in developing countries**	
	11:00 – 11:20	*Coffee Break*	
	11:20 – 13:00	**Session: Bear Foraging Ecology – Chair: J.B. Hopkins**	
2	11:20 – 11:40	Oi, T	Two different omnivores: Why do Asiatic black bears have larger home ranges than sympatric Japanese macaque groups?
98	11:40 – 12:00	Takahata C, Takii A, Izumiyama S	Seasonal changes in habitat selection by Asiatic black bears in aged modified landscape in Japan
183 Selected	12:00 – 12:20	Hopkins III JB	Stable isotopes to investigate the diets of bears
28	12:20 – 12:40	Lafferty DJR, Monroe AP, Mowat G, Paetkau D, Belant JL	Genetic and dietary divergence in a brown bear population across a coastal-interior transition zone
15	12:40 – 13:00	Mowat G, Curtis PJ, Stricker CA, Arckinstall D, Lafferty DJR	Does sulfur help to measure diet for grizzly bears?

	13:00 – 14:30	*Lunch Time*	
	14:30 – 16:30	**Session: Population Ecology Studies – Chair: F. van Manen**	
24	14:30 – 14:50	Yusefi GH, Costa V, Fahimi H, Khalatbari L, Sehhatisabet ME, Beja Pereira AG	Noninvasive genetic tracking of Asiatic black bears (*Ursus thibetanus*) at its range edge in Iran
42	14:50 – 15:10	Laufenberg J, Clark JD, Chamberlain MJ, Chandler RB, Davidson MM, Hooker MJ, Lowe CL, O'Connell KC, Troxler JC	A population viability analysis for the Louisiana black bear (*Ursus americanus luteolus*)
124	15:10 – 15:30	Kopatz A, Eiken HG, Schregel J, Aspi J, Kojola I, Hagen SB	Genetics of population recovery – spatio-temporal analyses on the demographic and geographic expansion of the Finnish brown bear *Ursus arctos*
147	15:30 – 15:50	Graves TA, Stenhouse GB, Hooten MB, Royle JA	Counting grizzly bears more affordably in Alberta, Canada
161	15:50 – 16:10	Skrbinšek T, Jelenčič M, Jerina K, Huber Đ, Reljić S, Trontelj P	Monitoring of effective population size in a hunted population of brown bears shows effects of different management approaches in neighboring countries
71	16:10 – 16:30	Sallay A, Berde L, Hackländer K, Zachos F, Sittenthaler M, Chiriac S	Kin-related social organization among food-conditioned brown bears in Baile Tusnad, Romania
	16:30 – 16:50	*Coffee Break*	
	16:50 – 18:50	**Session: Bear Behavior – Chair: A. Zedrosser**	
68	16:50 – 17:10	Pigeon K, Côté SD, Stenhouse GB	Climate change and hibernation: Linking food and weather to denning behavior of grizzly bears
91	17:10 – 17:30	Zwijacz-Kozica T, Zięba F, Krzan P, Klimecki M, Selva N	Documented observation of female infanticide in brown bears: Predation or act of desperation

105	17:30 – 17:50	Bereczky L, Mihai P, Lajos B	Personality distinctiveness in juvenile brown bears – can behavior traits of juveniles predict later problematic behavior?
164	17:50 – 18:10	Naves J, Ramos D, Fernández-Gil A, Ruano A, Delibes M	Observations of winter aggregation and social behavior of brown bears in the Cantabrian Mountains (Spain)
177	18:10 – 18:30	Kermish-Well J, Massolo M, Stenhouse GB, Larsen TA, Galpern P, Musiani M	Bear foraging behaviour simplified: an approach using space-time statistics
187	18:30 – 18:50	Visintin A, Sigura M, Vezzaro S, Filacorda S	The energetic values of landscape components as a tool to describe the behavior of the brown bear (*Ursus arctos* L.), in relation to the ecological requirements
	18:50	**IBA Members Meeting**	

WEDNESDAY 8th October, 2014 – FIELD TRIPS

THURSDAY 9th October, 2014 @ Electra Palace Hotel, CONCURRENT SESSION I			
	08:00 – 09:00	**Session: Bear Physiology and Toxicology – Chair: A. Sergiel**	
62	08:00 – 08:20	Lazarus M, Sekovanić A, Orct T, Herceg Romanić S, Klinčić D, Reljić S, Kusak J, Huber Đ, Jurasović J	Five-year toxicological study on Croatian brown bears
171	08:20 – 08:40	Reljić S, Huber Đ, Prvanović Babić N, Beck A, Šoštarić-Zuckermann I-C, Huber D, Sergiel A, Majnarić D, Jauk M, Nielsen EB	The early gonadal activity in Croatian brown bears and it's management implications
176	08:40 – 09:00	Huber Đ, Kusak J, Reljić S	Wintering of brown bears in Croatia

	09:00 – 11:00	**Session: Population Genetics and Genomics in Bear Conservation – Chair: C. Nowak**	
195 Selected	09:00 – 09:20	Norman AJ, Street NR, Göran Spong G	SNP Genotyping of non-invasively collected samples: A new prospective for brown bear research
138 Selected	09:20 – 09:40	De Barba M, Miquel C, Lobreaux S, Boyer F, Swenson JE, Taberlet P	New prospectives for standardized bear genotyping using high throughput sequencing
21	09:40 – 10:00	Anijalg P, Keis M, Davison J, Tammeleht E, Saarma U	Brown bear phylogeography in Eurasia, and post LGM colonisation of North America
88	10:00 – 10:20	Paule L, Krajmerová D, Straka M, Ionescu O	Genetic differentiation of brown bear population from Eastern and Western Carpathians
70	10:20 – 10:40	Ciucci P, Gervasi V, Boitani L, Boulanger J, Paetkau D, Tosoni E	Estimating abundance of the remnant Apennine brown bear (*Ursus arctos marsicanus*) population using multiple noninvasive genetic data sources
190	10:40 – 11:00	Muñoz-Fuentes V, Nowak C, Frosch C, de Gabriel Hernando M, Domokos C, Dutsov A, Krambokoukis L, Karamanlidis AA	Genetic status and structure of brown bears in the Balkans
	11:00 – 11:20	*Coffee Break*	
	11:20 – 12:00	**Session: Bear Immobilization – Chair: S. Fatima**	
6	11:20 – 11:40	Fandos Esteruelas N, Huber N, Evans AL, Palomares F, Zedrosser A, Cattet M, Angel M, Swenson JE, Arnemo JM	Leukocyte coping capacity as a tool to assess capture and handling-induced stress in Scandinavian brown bears (*Ursus arctos*)

85	11:40 – 12:00	De Benedictis GM, Tubiana E, Di Pirro V, Latini R, Gentile L	Influence of stress on wild Marsican brown bear chemical immobilization
	12:00 – 13:00	**Session: Bear Activity – Chair: S. Fatima**	
82	12:00 – 12:20	Giannakopoulos A, Akriotis T, Dimitrakopoulos P, Theodorou K, Mertzanis Y	Spatio-temporal interactions in relation to the social behavior of brown bears in NW Greece
114	12:20 – 12:40	Soyumert A, Ertürk A, Tavşanoğlu Ç, Gürkan B	Activity patterns and distribution of brown bear in northwestern Anatolia
178	12:40 – 13:00	Ambarlı H	Daily activity and resting patterns of brown bears in Turkey by using camera traps and GPS-GSM collars
	13:00 – 14:30	*Lunch Time*	
	14:30 – 17:50	**Session: Methodological Innovations and Considerations**	
22	14:30 – 14:50	Tri AN, Edwards JW, Strager MP, Petty JT, Ryan CW, Carpenter CP, Ternent MA, Carr PC	Modeling urban black bear occurrence in the Mid-Atlantic region using boosted regression trees
118	14:50 – 15:10	Bonnet-Lebrun A-S, Karamanlidis AA, de Gabriel Hernando M, Gimenez O	Making the most out of different sources and qualities of data in species distribution modeling: an example on the distribution of brown bears (*Ursus arctos*, L.) in Greece
134	15:10 – 15:30	Karlsson PJ, Lo B, Yang GZ	Technologies for monitoring morbidity of free ranging bears
137	15:30 – 15:50	Sciullo L, Thiemann G, Lunn N	A methodological comparison of body condition in polar bears during the ice-free season in Western Hudson Bay
121	15:50 – 16:10	Piédallu B, Chapron G, Quenette P-Y, Gimenez O	Demography of the Pyrenean brown bear: accounting for heterogeneity in the detection process and small population size in a capture-recapture framework

160	16:10 – 16:30	Noyce KV, Garshelis DL	Capture heterogeneity in hair-trapping: Sources of bias unique to the method
	16:30 – 16:50	*Coffee Break*	
93	16:50 – 17:10	Jessen T, McDermid G, Paetkau D, Massolo A, Galpern P, Musiani M	Temporal features of tundra ecosystems best predict the distribution of barren-ground grizzly bears of the Canadian Southern Arctic
193	17:10 - 17:30	Doan-Crider D, Tri AN	The use of normalized burn ratio (Burn severity) maps to evaluate the recovery of key bear foods after wildfires in large, arid landscapes
188	17:30 – 17:50	Comand N, Comuzzo C, Ferfolja S, Vezzaro S, Filacorda S	Comparison and integration of different techniques for the estimation of the minimum number of the brown bear (*Ursus arctos* L.) in a peripheral and low density population
	18:00 – 20:00	**POSTER SESSION**	

THURSDAY 9th October, 2014 @ Electra Palace Hotel, CONCURRENT SESSION II			
	08:00 – 09:00	**Session: Bear Conservation and Community Participation - Chair: T. Knight**	
33	08:00 – 08:20	Knight T	Of bears and men: Is peaceful coexistence possible in a pastoral Pyrenean landscape?
53	08:20 – 08:40	Dorresteijn I, Milcu A, Hanspach J, Fischer J	Social drivers to human-bear coexistence in a rapidly changing system: a case-study from Transylvania

152	08:40 – 09:00	Laforest BJ, Hébert J, Obbard ME, Penn A, Thiemann GW	Insights into polar bear biology from interviews with elders and hunters in the northern Eeyou Istchee marine region, Québec, Canada
	09:00 – 11:00	**Session: Human – Bear Conflicts – Chair: M. Obbard**	
113	09:00 – 09:20	Can OE, D'Cruze N, Garshelis DL, Beecham J, Macdonald DW	A global snapshot of human-bear conflict: countries, experts and factors
143	09:20 – 09:40	Bautista León C, Selva N, Fernández N, Revilla E, Scharf AK, Karamanlidis AA, Rigg R, Jerina K, Shkvyria M, Huber Đ, Palazón S, Ciucci P, Groff C, Dutsov A, Kont R, Adamec M, Naves J	Patterns and correlates of brown bear damages in Europe
34	09:40 – 10:00	Obbard ME, Howe EJ, Wall LL, Allison B, Black R, Davis P, Dix-Gibson L, Gatt M, Hall MN	Relationships among food availability, harvest, and human–bear conflict at landscape scales in Ontario, Canada
145	10:00 – 10:20	Wu L, Lu Z, Song R, Bo H, Wang H, Wang D, Schaller GB	Does Pika eradication policy increase the human-brown bear conflicts in Sanjiangyuan NR, China?
99	10:20 – 10:40	Hechtel J	Bear attacks in Alaska, 1980-2010
155	10:40 – 11:00	Marquez R, Goldstein I	Conceptual framework and tools for the management of Andean bear-human conflicts
	11:00 – 11:20	*Coffee Break*	
	11:20 – 16:30	**Session: Bear Management – Chairs: SMJG Steyaert, K. Jerina**	

41	11:20 – 11:40	Leclerc M, Zedrosser A, Swenson JE, Pelletier F	Hunting as a potential selective pressure on the Scandinavian brown bear behavior
49	11:40 – 12:00	Steyaert SMJG, Jerina K, Kindberg J, Krofel M, Stergar M, Swenson JE, Zedrosser A	Behavioral correlates of supplementary feeding of wildlife: Can general conclusions be drawn?
50	12:00 – 12:20	Kavčič I, Adamič M, Kaczensky P, Krofel M, Jerina K	Is supplemental feeding with carrion an effective way to reduce human-bear conflicts?
119	12:20 – 12:40	Selva N, Berezowska-Cnota T, Hobson KA, Bojarska K, Elguero-Claramunt I, Teitelbaum C, Mueller T	Food for thought: Supplementary feeding of ungulates affects brown bear foraging
136	12:40 – 13:00	Brown L, Stenhouse GB, Hobson D, Webb NF, Cranston J	Translocations and relocations of conflict grizzly bears – Factors of removal success and potential impacts on fitness
	13:00 – 14:30	*Lunch Time*	
154	14:30 – 14:50	Morehouse AT, Boyce MS	The efficacy of intercept feeding in reducing spring grizzly bear-ranching conflicts
166	14:50 – 15:10	Haroldson MA, Whitman C, Gunther KA, Bjornlie DL, Thompson DJ, van Manen FT	What to do with offspring of conflict Bears: Genetic insights from the Greater Yellowstone Ecosystem
168	15:10 – 15:30	Jurj R, Sirbu G, Ionescu O, Ionescu G, Popa M, Cotovelea A	Relocating bears in Romania can be considered a measure of effectiveness of management to reduce human-bear conflicts?
35	15:30 – 15:50	Elvin SS	The Large Marine Ecosystem Approach to assessment and management of polar bear subpopulations

94	15:50 – 16:10	McLellan B, Mowat G, Hamilton T	Is legal grizzly bear hunting leading to their extirpation in British Columbia?
179	16:10 – 16:30	Finnegan L, Cranston J, Stenhouse GB	Caribou habitat restoration within grizzly bear range: integrated landscape management for species at risk
	16:30 – 16:50	*Coffee Break*	
	16:50 – 17:50	**Session: Reproductive Biology – Chair: N. Selva**	
17	16:50 – 17:10	Richardson ES, Davis CS, Stirling I, Derocher A, Lunn N, Malenfant R	Genetic mating system and sexual selection in polar bears (*Ursus maritimus*)
27	17:10 – 17:30	Gray CA, Hooker MJ, Chamberlain MJ	Denning ecology and reproductive biology of the American black bear (*Ursus americanus*) in an isolated population in Central Georgia, U.S.A
140	17:30 – 17:50	Clark JD, Laufenberg JS, Davidson M, Murrow JL	Connectivity among subpopulations of Louisiana black bear as estimated by genetic analyses and a step-selection function
	18:00 – 20:00	**POSTER SESSION**	

FRIDAY 10th October, 2014 @ Olympion Complex			
	08:00 – 11:00	**BSG Red List Session**	
	11:00 – 11:20	*Coffee Break*	
	11:20 – 15:30	**Session: What Works: Innovative Successes in Bear Conservation, Management, and Science – Chair: K. Noyce**	
196	11:20 – 11:40	Wilson SM, Krofel M	Facilitating brown bear recovery in North America and exploring emerging

Selected			opportunities for collaborations in Central Europe: Can a community-supported approach be transferable?
189	11:40 – 12:00	Flores Muriel LÁ, Gomez I, Restrepo H	Participatory biological monitoring of Andean bear, an alternative local community contribution to the research process and monitoring of species - Putumayo case
19	12:00 – 12:20	Stephan-LeBoeuf V	Successful American black bear rehabilitation near urban areas
97	12:20 – 12:40	LaRue M, Stapleton S, Atkinson S, Atwood T, Dyck M, Porter C	Automated methods for detecting and assessing abundance of polar bears from high-resolution satellite imagery
133	12:40 – 13:00	Larsen TA, Cranston J, Nielsen SE, Stenhouse GB	Do forest cutblock retention patches enhance grizzly bear habitat selection?
	13:00 – 14:30	*Lunch Time*	
120 Selected	14:30 – 14:50	Karamanlidis AA, Bonnet-Lebrun A-S, de Gabriel Hernando M, Frosch C, Georgiadis L, Gimenez O, Krambokoukis L, Muñoz-Fuentes V, Nowak C, Papakostas G, Skrbinšek T, Stefanidis K, Stronen AV	Monitoring power poles: a unique tool in the management and conservation of brown bears (*Ursus arctos*, L.) in Greece
100	14:50 – 15:10	Marenče M, Černe R, Jonozovič M, Jerina K	Monitoring of brown bear population trends and reproductive parameters using a network of permanent counting sites in Slovenia
156	15:10 – 15:30	Goldstein I, Marquez R	Occupancy monitoring of Andean bears at the National Natural Parks of Colombia

	15:30 -17:50	**Session: *Ex situ* conservation – Chair: M. Schneider**	
141	15:30 -15:50	Schneider M, Nogge G, Kolter L	Effects of spatial unpredictability of food availability on foraging behavior in captive Malayan sun bears
201	15:50 -16:10	Silver S, Thompson D	The role and status of managed bear programs within the Association of Zoos and Aquariums
95	16:10 – 16:30	Van Horn RC, Owen MA	Retrospective analyses of maternal investment in captive bears
	16:30 – 16:50	*Coffee Break*	
30	16:50 – 17:10	Sergiel A, Maślak R, Zedrosser A, Paśko Ł, Garshelis DL, Reljić S, Huber Đ	Fellatio in captive brown bears: evidence of long-term effects of suckling deprivation?
20	17:10 – 17:30	Curry E, Skogen M, Roth TL	Evaluating the use of a detection dog and volatile organic compound analysis for non-invasive pregnancy diagnosis in the polar bear (*Ursus maritimus*)
81	17:30 – 17:50	Field N, Robinson J	Ending bear bile farming in China: Solution based approach
	17:50 – 18:30	**Miscellaneous – Chair: A.A. Karamanlidis**	
66	17:50 – 18:10	Tirronen K, Panchenko D	Brown bear population in coastal ecosystems of White Sea on the Kola Peninsula
Invited	18:10 – 18:30	Dendrinos P	The rarest of the rare: the critically endangered Mediterranean monk seal
	20:30	**Closing Event**	

ORAL PRESENTATIONS

Session: Bears of the World

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POPULATION STATUS AND CONSERVATION CONCERNS OF BROWN BEARS IN ALBANIA

Trajçe A[1,2], Hoxha B[1], Trezhnjeva B[1], Mersini K[1,3]

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Brown bears (*Ursus arctos*) are widely distributed in Albania, mainly in the mountainous regions of North, East and South-East, forming an important part of the larger Dinaric-Pindos population. Proper monitoring and research on brown bears in Albania have been largely lacking in the past, thus information on their ecology and population status has been scarce, inaccurate and at best based on expert estimations. However, recent camera-trapping surveys, track-transects as well as questionnaire surveys have generated a good amount of knowledge on the status of brown bears in the country and have shed light on their main conservation concerns. Human-brown bear conflicts seem to be widespread in their distribution range and with reports of damage on crops, fruit trees, and big livestock and to a less extent on beehives. Human dimensions research indicates that, both city and rural people seem to have quite positive attitudes towards brown bears and there is high support for their long term preservation. One of the main conservation concerns for brown bears in Albania is illegal capturing for subsequent captive exhibitions in roadside restaurant and bars. The usual practice employed for capture is to kill female bears and take their cubs when on a young age. Active removal of reproductive females risks activating a "population sink" that seriously threatens the future survival of brown bears in the country.

The aim of this summary is to compile the reliable information on the status of brown bears in Albania, highlight the main gaps in knowledge, and inform adequate conservation actions that will help their long-term preservation in the country.

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BROWN BEAR IN THE CANTABRIAN MOUNTAINS (NW SPAIN). THE PARTIAL RECOVERY OF ONE OF THE MOST ENDANGERED EUROPEAN BEAR POPULATIONS

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During the twentieth century, brown bears in the Cantabrian Mountains (NW Spain) have been decreasing until the mid-90s. Bears split in two apparently isolated subpopulations, the western (WS) and the eastern subpopulations (ES). Since 1989, the unique number of females with cubs-of-the-year (FCOY) has been monitored yearly as a proxy of the population size. In the biennium 1993-1994, only 7 and 1 FCOY were detected in the WS and the ES, respectively. At that time, the trend changed and the population started to recover. In the biennium 2011-2012, 50 and 8 FCOY were detected in both subpopulations. From 1994 to 2012, the FCOY average rates of increase were 10.6% and 6.3% in the WS and ES, respectively. During this process, the bears have reoccupied just a small part of the range previous to 1994. The increase of bear numbers in both subpopulations has consisted mainly in an increase of the densities in the areas where bears survived after 1994. The distance between the closest breeding females from WS and ES (currently, 100 km) has hardly decreased, but the presence of wandering males between both subpopulations has increased, and a successful crossing event between a western male and an eastern female was first detected in 2008. The crucial factor for the population recovery has been the reduction of the illegal human caused mortality that was causing the bear decline. This has been the result of the awareness campaigns that have been ongoing from the late 80s. Conservation actions have included the law enforcement, the habitat protection of the bear range by regional and national parks and the Natura 2000 network, the coordination of the monitoring and the conservation plans of different administrations, and the integration of hunters and other local sectors in conservation programs. For the next years, we suggest to improve the ecological and social conditions to consolidate the recovery of the ES and the areas recently re-colonized by mature females, and to promote the connection between both subpopulations.

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ABUNDANCE, DENSITY, AND DISTRIBUTION OF GRIZZLY BEARS IN THE CABINET-YAAK ECOSYSTEM

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The threatened status of the grizzly bear (*Ursus arctos*) populations in the Cabinet-Yaak Ecosystem (CYE) of northern Montana and Idaho has remained unchanged since designation in 1975, yet no baseline population estimate was available to measure the effectiveness of conservation efforts. We used genetic detection data from hair corral, bear rub, and opportunistic sampling in traditional and spatial capture-recapture models to generate estimates of abundance and density of the Cabinet and Yaak grizzly bear populations. Using Huggins models to estimate the average number of bears present, we calculated mean bear residency on our sampling grid from telemetry data and used it to correct our super population estimates for lack of geographic closure. For our spatially-explicit modeling, we used the R programming package SCR_{bayes}. Estimated grizzly bear abundance in the CYE in 2012 was 48–50 bears which was approximately half the population recovery goal. At 4.3–4.8 grizzly bears/1,000 km^2, grizzly bear density in the CYE fell among the lowest values of interior North American populations. The sizes of the Cabinet and Yaak populations were similar: Cabinet: 22–24; Yaak: 18–22. Spatial models produced similar estimates of abundance and density with comparable precision without requiring radio-telemetry data to address issues related to geographic closure. The CYE consists of 2 populations that are demographically and reproductively isolated from each other. With parentage analysis, we document the first natural migrants to the critically small and interbred Cabinet population and to the Yaak population by bears born to parents in neighboring populations. These events support data from other sources suggesting that the expansion of neighboring populations may eventually help sustain the CYE populations.

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BROWN BEAR POPULATION IN COASTAL ECOSYSTEMS OF WHITE SEA ON THE KOLA PENINSULA

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The study of animal populations – a priority of basic research in ecology, practical significance from the standpoint of conservation and sustainable use of biological resources undoubtedly.

Brown bear population of the Kola Peninsula inhabit all forests and even penetrate along rivers into the forest tundra and tundra zones. According with official data number of bears here estimated about 500 individuals and average population density less than 0.2 animals per 1000 ha. This data based on some observation but not on the accurate survey or monitoring systems.

In our research we focused on the coastal population because of here the most various and rich biotopes of Peninsular. Our observations shown that on the sea shore bear density in 10 times higher than all round thus the reasons and ways of forming these concentrations became one of the main goals of our research.

In our research project we have used a field methods such as counts of animals and their footprints on routes along the shore line, observation (direct and forest camera) and collecting samples, also we used molecular-biological, parasitological methods in the Lab.

Range of seashore habitats includes: tundra, forest tundra, wetlands and some other. Various food sources attract bears on the coast: in spring time – young grass, during fall rich crops of berries (*Vaccinium vitis-idaea L., Vaccinium myrtillus L., Oxycoccum palustris, Empetrum nigrum L.*), carrion, shellfish and algae cast ashore by storms throughout all seasons. Moreover the introduced humpback salmon (*Oncorhynchus gorbuscha*) in the White Sea become numerous and available especially during spawning in rivers of Kola Peninsula. Thus this salmon can play significant role as a food source for bears and together with other sources can be a reason for bear concentrations.

This research is supported by the grant of the RFBR № 14-04-31796.

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GENETIC CENSUS OF A REGIONALLY-IMPORTANT POPULATION OF SYRIAN BEARS IN THE IRANIAN CAUCASUS REVEALS A SUBSTANTIALLY SMALLER POPULATION SIZE THAN WHAT IS PERCEIVED

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Wrong perception of species status by wildlife managers jeopardizes effective conservation and management of high-priority species. Brown bears (*Ursus arctos syriacus*) in many parts of their Asian range are highly endangered, but very few efforts have been made to study their population demographics which are critical first step for proper species conservation planning. In this pilot study, I used fecal-DNA analysis to obtain a reliable, baseline, population estimate of Syrian bears (*U. a. syriacus*) in Arasbaran Biosphere Reserve, north-western Iran (the Iranian Caucasus). I compared this genetic census to the reserve personnel's (i.e., wardens) perceived size of the local bear population derived from face-to-face interviews. I analyzed 106 fecal samples and identified 31 individual bears (19 males: 11 females: 1 unknown) using a panel of seven autosomal and one sex determination microsatellite loci. Despite the DNA-based estimation using rarefaction indices suggested a population of approximately 37 bears (range: 34-62) inhabited the ~800-km^2 study area during the research period, the reserve wardens considered the local bear population as "over-abundant", and gave a 4.4-fold higher expert estimate (mean: 163 individuals, range: 59-365). Given this perception, the local authority had no plans for monitoring and conservation of this bear population. I caution that wildlife managers must not simply rely on "assumed" number and/or unsupervised local knowledge of species of conservation-concern, unless a reliable initial population estimate has been established. This study demonstrates that pilot DNA-based population estimations provide valuable information for conservation of the lesser-known Syrian brown bears. Future monitoring of the Arasbaran bear population with genetic capture-mark-recapture techniques is recommended to provide more robust estimates of abundance and demographic characteristics of this regionally-important population.

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"INVISIBLE" BORDER - NEW DATA OLD PROBLEMS. A ROMANIAN-UKRAINIAN CASE STUDY

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Connectivity between Romania and Ukraine and the habitat management in the border region of historical Maramureș are key aspects for securing a healthy Carpathian brown bear population. In a framework of a cross border project, between 2011 and 2013 in the Romanian Northern part of the Eastern Carpathians, five brown bear individuals were equipped to provide information about habitats suitability and cross border movements. Using cage traps, one female and four males were captured, measured and collared with GPS-GSM collars programmed to register a GPS fix location at each 60 minutes. The received information was analyzed to identify the core areas for brown bears in the border region and to assess the need of securing key areas. Over 16,000 obtained fixes were used to map, using GIS tools, the core areas in the Romanian side of the border and the critical area for connectivity. During the monitoring activity one male bear was poached after 45 days of monitoring, indicating that poaching is still a threat to the bears in the area. Two collared males (one adult and one juvenile) have crossed the border to Ukraine by moving, in a short period, in the expected corridor areas. At the same time an analysis was conducted in order to evaluate the main threats and pressures that are affecting the conservation status of brown bear population and habitats in the project area. Poaching and lack of reliable information about the size of population are the main threats identified by different stakeholders. The results of the project are indicating two main important areas for connectivity between Romania and Ukraine and the need of improving the habitat suitability in order to avoid the appearance of ecological traps for brown bears.

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AVAILABILITY AND OCCUPANCY OF THE ANDEAN BEAR HABITAT (*TREMARCTOS ORNATUS*) IN NATIONAL NATURAL PARK TAMA, NORTE DE SANTANDER, COLOMBIA

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In Colombia the spectacled bear is categorized as Vulnerable. At the regional level, although the presence of this species in the National Park Tama located in northeastern Colombia is known, there have not been carried out specific research to obtain accurate and complete information on the status of the species and its habitat, so our aim is to evaluate the occupation, habitat availability and other environmental aspects of the Andean bear in order to know its actual status and generate local conservation strategies.

To evaluate the presence and occupation of the species, 30 quadrants, were plotted distributed over an area ranging from 300 m to 3,500 m. Each quadrant has a size of 9 km^2 and three linear transects of 1.8 km. The habitat sustainability index (HSI) was used to determine the availability and quality of habitat for the spectacled bear in the study area, characterizing the structure of the vegetation in all sampling sites, and a detailed list of the resources available was obtained. To record the presence we used 33 cameras trap which were distributed in different parts of the NNP Tama and have achieved the first photographic record of the species in the protected area.

As preliminary results, it has been conducted field work for a year and a half, getting 903 trails (634 feeders, 22 footprints, 63 marks, 61 stool samples, 85 tracks, 23 lairs on the ground, 6 nests, 9 samples of hair), which have a clearly variation in a spatial and temporal level, helping us to understand the habitat use by the Andean bear as well as its distribution. Furthermore, we have also identified 31 families and 28 plant species in the sampled localities of the park, which are used by the Andean bear and when compared with plant material found in excrement, allowed to identify key habitats for the maintenance of the species, however it has shown serious problems such as traces of plastic in the feces of the spectacled bear, herds of wild *Equus ferus caballus* within the protected area that are a serious problem for the conservation of the species and fauna, and others anthropogenic pressures that have been recorded,as well as other findings as preferential consumption of seeds or carnivorous diet in some specific sites.

Session: Bears and Infrastructure

Invited

TRANSPORTATION NETWORKS AND BEAR CONSERVATION: A REVIEW

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Among numerous anthropogenic impacts on terrestrial landscapes, expanding transportation networks represent increasingly greater challenges to bear conservation worldwide. Several studies have documented impacts of transportation networks, primarily roads and railways, on bear species and how those may be mitigated but no comprehensive review of available information is available. Given the increased relevance of transportation networks to bear conservation, our primary objective is to present a synthesis of the state of knowledge regarding this topic. We recognize 3 broad categories of potential impacts of transportation networks: 1) reduced habitat effectiveness; 2) increased vulnerability to mortality; and 3) landscape fragmentation. Reduction in habitat effectiveness can occur due to habitat loss, displacement, or avoidance. Research findings, however, are mixed, with responses ranging from displacement and avoidance to none to attraction. Studies show greater congruency with regard to vulnerability to mortality, both direct and indirect, which are well-documented for several bear species. Mortality due to vehicle collisions and increased vulnerability because of road access may result in population-level impacts and could have important implications for management. Probably the most insidious impact of transportation networks is landscape fragmentation, which is often further compounded by secondary effects, such as associated development. Two principal concerns of landscape fragmentation are reduced genetic and demographic connectivity, the latter representing one of the greatest global challenges for bear conservation. Demographic connectivity may be decreased by transportation routes ranging from highways to logging roads that create access for settlement. Many aspects of the 3 primary types of impacts from transportation networks can effectively be mitigated with road design, safe passage structures, and land use planning. Hindrances to mitigate impacts include lack of local biological data on bear landscape use, inadequacy of environmental assessment processes, limited funding for mitigation, inadequate legal frameworks to implement mitigation and landscape planning, and economic growth objectives. We discuss possible solutions by presenting several case studies of successful mitigation. We plan to use this presentation as a starting point for a dialogue and survey among bear managers worldwide to identify data gaps and what is needed to better address these conservation challenges.

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THE USE OF TELEMETRY TO MITIGATE A NEW HIGHWAY FUNCTIONING AS A DEADLY BARRIER FOR BROWN BEARS IN NW GREECE

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Along the 55km of the KA45 section of the Egnatia highway (NW Greece) cutting through bear habitat and an expanding brown bear population estimated at 219 individuals, there are few suitable wildlife crossings (underpasses) and a lack of tunnels and overpasses. Over a five year period (2009-2013) twenty one (21) deadly road accidents involving brown bears have been recorded. In order to improve the mitigation status of the highway, ten (10) bears (5M + 5F) partitioned into two samples (5+5) and over two monitoring periods (2011 & 2012) were radio tagged with GPS/GSM collars and were monitored over a two year period. For an overall of 16,977 locations, home ranges of eight out of ten bears (ranging from 10 km^2 to 262 km^2 MCP) were adjacent to or encompassed either the 55km operational section of the highway or the corridor of the 17 km section under construction. In order to identify the hot-spots with highest probability of bear crossings along the operational section, three categories of data were defined and scored according to their weighed value in relation to their importance as follows: tagged bears crossings (n=36, score 1), highway fence trespassing (n=383, score 2) and traffic fatalities cases (n=12, score 3). We used “Kernel density” method to identify and visualize the density of bear crossings over the highway section. For each point of the highway alignment and with a 100m increment between two successive points, a Kernel distribution value was attributed corresponding to bear crossings density. Based on this value we used “Hot-spot analysis – Getis-Ord (Gi)” method in order to identify the “hot-spot” highway sub-sections with the highest likelihood of bear crossings. High positive Gi*score values correspond to sub-sections with high risk of bear crossings and subsequent traffic fatalities. Results showed that Gi*score values >1.91 were all statistically significant ($p<0,05$). This outcome substantially contributed in identifying the high-risk highway sub-sections which have been addressed in priority by the highway construction company for the progressive replacement of the old highway fence with a new bear-proof fence over a total distance of 110 km.

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THE CONTRIBUTION OF TRANSPORT INFRASTRUCTURE TO BEAR HABITAT FRAGMENTATION IN SLOVAKIA

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[3]Carpathian Wildlife Society, Zvolen, Slovakia

Slovakia is the best location in the Western Carpathians for maintaining functioning communities of large carnivores. The development of transport infrastructure and traffic intensity in the last 20 years has brought a threat to the preservation of habitat permeability for bears. It is worth a mention that the viability of bear populations in neighboring countries, Poland and the Czech Republic is completely dependent on the Slovakian source population.

In this presentation we will point out the impact of transport on the population of bears in the Malá Fatra National Park and adjacent areas. This national park, with an area of 223 km^2 is located in North Western Slovakia and according to the yearly population estimates it harbors about 50-60 bears. The area is surrounded by first and second class roads with traffic intensity ranging from 6,500 up to 29,200 vehicles in any 24 hrs. From the west an electric double track railway 41 km in length passes through the entire southern foothills. An increase in the intensity of car traffic, especially international truck transport and other infrastructural development has limited the migration of bears to the neighboring mountains.

From 1997 till now, the causes of vehicle mortality of 30 bears have been analyzed. Another objective was to assess the functionality of the remaining bear migration corridors between the Malá Fatra Mountains and surrounding areas. For this purpose six bears were collared in the national park and their movements were analyzed with GPS – GSM telemetry in relation to the transportation network. Four out of six monitored bears occasionally crossed roads in the North Eastern portion of the park which has the lowest traffic intensity of about 6–7,000 cars in 24 hrs. The highest bear mortality has been documented on other road sections with traffic of more than 19,000 vehicles in 24 hrs. but these areas have no functional migration corridors. Traffic intensity around the national park is constantly increasing, so there is a real threat for further isolation of bears in this area.

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HIGHWAY-RELATED MOVEMENT OF AMERICAN BLACK BEAR (*URSUS AMERICANUS*) IN CENTRAL GEORGIA, U.S.A

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There are 3 geographically distinct populations of black bear (*Ursus americanus*) in the state of Georgia. The least abundant of these 3 is the Central Georgia Bear Population (CGBP). The CGBP is comprised of an estimated 150 animals inhabiting approximately 450 km^2 along the Ocmulgee River in Central Georgia. This area of predominantly forest land is almost completely surrounded by human development and highly fragmented agricultural land. The CGBP is therefore thought to be geographically and demographically isolated from any other bear population. Georgia State Route 96 (GA96), a high traffic volume 2-lane highway, bisects the area inhabited by the CGBP. Plans to widen and fence portions of GA96 include the use of wildlife underpasses to reduce bear-vehicle collisions while allowing bear movement across the highway. We used GPS tracking collars to monitor bear movement near and across GA96 during the pre-construction phase of the proposed highway widening project. A virtual fence was used to control the GPS collar location acquisition rate. Collared bears within 250m of GA96 were located every 5 minutes. We collared 63 bears (33M:30F) between May 2012 and August 2014. Bears exhibited considerable use of habitats directly adjacent to GA96, and movement parallel to the highway, but only 8 collared bears (5M:3F) crossed GA96. We are analyzing each bear's movement path using a dynamic Brownian Bridge Movement Model. The resulting probability distributions will be combined with GIS data to characterize habitat types and landscape features associated with crossing locations. This information will aid in the placement of wildlife crossing structures as well as characterize bear movement during the pre-construction phase of the widening project.

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GENE FLOW IN CARPATHIAN BROWN BEAR POPULATION BEFORE INFRASTRUCTURE DEVELOPMENT

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The brown bear is the most widely distributed of all the bear species. Across the Carpathians one of the largest and continuous population is located, certainly viable, and records the highest mean values of expected heterozygosity in the world.

The landscape composition becomes an important predictor of spatial genetic variation in brown bear populations. This study highlights the power of landscape genetics tool in detecting fine scale structuring within one large continuous population.

Various methods were applied: Mantel Test, Partial Mantel Test and MRM (Multiple regression on distance matrices) in order to determine the significance of landscape features: roads, human settlements, rivers, forest habitats, slope, aspect, brown bear densities, digital elevation. Aspect, slope, roads, and rivers showed a significant contribution to gene flow. Considering the next 2014–2022 period, the focal aim of the governmental program is to build new highways. If the program succeeds, highways for the first time will cross brown bear habitat, contributing to habitat fragmentation and possible loss of connectivity.

The core areas with the highest current intensities of gene flow must become focal points for long-term conservation being contact zones between new-formed populations. We have to increase efforts in order to create corridors that facilitate movement of brown bears in these areas.

Session: Bear Foraging Ecology

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TWO DIFFERENT OMNIVORES: WHY DO ASIATIC BLACK BEARS HAVE LARGER HOME RANGES THAN SYMPATRIC JAPANESE MACAQUE GROUPS?

Oi T

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Solitary Asiatic black bears (*Ursus thibetanus*) and group-living Japanese macaques (*Macaca fuscata*) live sympatrically in the cool temperate forests of Japan. The two species appear to utilize similar food sources, on the ground and in trees; in spring, they consume mainly young leaves and shoots. The proportion of consumed plant fibers decreases with the consumption of fruits, which both species prefer. Interspecific competition theory states that two species utilizing the same resource negatively influence each other with respect to survivorship and reproduction, and that their niches are in the process of separating. Thus, I ask how these large animals that have similar food preferences can be sympatric. The basal metabolic rate of a group of Japanese macaques, which have a standard group size, is 16-fold larger than that of a single adult male black bear. Therefore, a group of Japanese macaques should require more food than a single adult male black bear, assuming that the food sources of both species are similar. Furthermore, based on the theory that the home range size of an animal correlates with its energy requirement, the home range size of Japanese macaque groups should be much larger than that of an adult male black bear. However, the actual home range size of a Japanese macaque group is 63% that of an adult male black bear. This suggests that a black bear's actual food sources are different that those of Japanese macaques, and should be more patchy in distribution and more limited in abundance than the food of Japanese macaques. A detailed comparison of the two species' diets revealed that Japanese macaques can adapt to consuming fibrous foods more easily than can Asiatic black bears, and are more euryphagous, indicating that the survivorship of Japanese macaques is secured by more fallback foods. This idea is supported by an investigation of mastication and digestive organ morphology, and the abundance of pepsinogens. The idea of preferred and fallback foods is useful to discuss feeding adaptation of the two species, as well as their conservation.

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SEASONAL CHANGES IN HABITAT SELECTION BY ASIATIC BLACK BEARS IN AGED MODIFIED LANDSCAPE IN JAPAN

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Despite of massive occurrence of Asiatic black bears *Ursus thibetanus* in areas near human settlement in recent years in Japan, plausible causal mechanism for the increased events is still absent because of limited knowledge of relationships between bear habitat and anthropogenic landscape.

We studied to understand how black bears change their habitat selection along with shifting seasons to provide base line information to explore the causes for frequent use of areas near human settlement. GPS data was collected during 2008-2013 from 31 bears in the Central Japan Alps, and a resource selection function (RSF) was used to estimate habitat selection by bears based on the data of discriminated 6 groups (sex × 3 seasons; spring, summer, autumn). We focused on seasonal differences in habitat selection, because the frequent sightings of bears are known to be highly seasonal. Candidates of the environment variables were classified into the three; constraints, resources and terrain, and contrasted those habitat models among seasons.

Our results suggest Asiatic black bears significantly selected lowland forests which have been unmanaged for a long period that is supportive to the cause of frequent use on the periphery of human dominated lands during the season of frequent human-bear contacts. In addition, strong avoidance of the vast areas of aging over-planted artificial forests, in where canopy openings remarkably decreased, indicates that the large scale afforestation in the past are also responsible.

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STABLE ISOTOPES TO INVESTIGATE THE DIETS OF BEARS

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Stable isotope analysis is commonly used to investigate the diets of free-ranging carnivores, including bears. In particular, stable isotopes derived from the tissues of bears and their foods are often used to detect dietary specialists, to examine intrapopulation niche variation, and to estimate proportional dietary contributions. For this presentation, I will demonstrate the use of stable isotopes to investigate the diets of bears in Banff, Yosemite, and Yellowstone National Parks.

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GENETIC AND DIETARY DIVERGENCE IN A BROWN BEAR POPULATION ACROSS A COASTAL-INTERIOR TRANSITION ZONE

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The hypothesis that the consumption of a single food resource can promote genetic differentiation without the need for spatial separation or the cessation of occasional interbreeding relates to a fundamental debate on the drivers of genetic diversity. In the Stikine watershed in northwest British Columbia, salmon (*Oncorhynchus* spp.) availability varies along coastal–inland and elevational gradients and this region marks a transition from large-bodied coastal 'brown' bears (*Ursus arctos*) to smaller-bodied interior 'grizzly' bears, which have been assigned subspecific recognition. Our objectives were to: (1) evaluate whether this grizzly bear population was comprised of a single random-mating population, or whether there was evidence of assortative mating, (2) discern if this population exhibited trophic polymorphism resultant from marine and terrestrial-based diets, and (3) if there was evidence of both genetic structure and trophic polymorphism, determine if distinct genetic population segments corresponded with discrete intraspecific differences in dietary habits. We collected bear hair samples using hair snares systematically distributed across the study area to obtain genetic and stable isotope data. We used programs STRUCTURE and GENEPOP to examine genetic structure within this population, and MixSIAR to reconstruct bear diets and evaluate how isotopic variation was structured throughout this population. We identified two distinct genetic clusters, an inland and a coastal cluster, and we found differences ($P<0.001$) in allelic frequencies between clusters, providing evidence against a single, random mating population. Diet analyses revealed discrete intrapopulation dietary niches reflecting a salmon or terrestrial-based diet. We then applied a multivariate Bayesian ellipse-based model to discern whether distinct genetic clusters corresponded with discrete dietary niches, which revealed a subtle but consistent pattern of dietary niche differentiation between bears assigned to the coastal cluster consuming more salmon, whereas the interior cluster consumed a diet dominated by vegetation. Our results provide new insights into the ecological drivers of life history diversification and offer an alternative mechanism to the traditional concept that genetic divergence requires physical separation of populations.

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DOES SULFUR HELP TO MEASURE DIET FOR GRIZZLY BEARS?

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Stable isotope ratios of grizzly bear (*Ursus arctos*) hair collected from bears on the lower Stikine River, British Columbia (BC) were analyzed to: 1) test whether measuring δ34S improved the precision of the salmon (*Oncorhynchus* spp.) diet fraction estimate, 2) investigate whether measuring δ34S improves the separation of diet contributions of moose (*Alces alces*), marmot (*Marmota caligata*), and mountain goat (*Oreamnos americanus*), 3) examine the influence of collection date and length of hair on diet estimates. The addition of δ34S to mixing model analysis generated small improvement in the precision of salmon and terrestrial prey diet fractions. Although the δ34S signature for salmon appears precise and general among species and areas, sulfur measures for bears were strongly correlated with nitrogen and therefore added little new information to the mixing model regarding the consumption of salmon. Sulfur measures for terrestrial herbivores were similar and imprecise and so these data also added little new information to the mixing model. Data for δ34S did identify several bears that must have had unique diets because they had high δ15N and low δ34S or the reverse. The period of growth of individual hairs was uncertain because samples were collected in summer when bears were growing new hair so the year a hair was grown was uncertain. The salmon diet fraction increased with later hair collection dates as expected in this ecosystem. Bears that ate salmon had shorter hair but hair length was not related to isotope signature for bears that were detected in drainages that supported spawning salmon and those where salmon were absent. To be sure to capture an entire hair growth period, samples must be collected in late fall. Early spring sample are also likely to be from the previous year but the date when hair begins to grow in spring appears to vary. Choosing the longest hair available may reduce the risk of including samples grown during the present year.

Session: Population Ecology Studies

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NONINVASIVE GENETIC TRACKING OF ASIATIC BLACK BEARS (*URSUS THIBETANUS*) AT ITS RANGE EDGE IN IRAN

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The Iranian population of the Asiatic black bear, *Ursus thibetanus*, is the westernmost peripheral population of the species as well as one of the most threatened one. In the remote mountainous areas of the southeast Iran this bear suffers from critically low population size, pronounced decline and isolation. Unlike other populations in Asia, little data exist on this peripheral population in general and, in particular, its genetic status still is uninvestigated. Here we report the first genetic analysis of the Iranian black bear using mitochondrial and microsatellite markers via noninvasive samples (feces). Further, phylogenetic relationships among Asiatic black bear populations using published sequences and sequences in this study were assessed. The results reveal the absence of mtDNA variability in the studied population, yet all samples from 5 geographically separated areas had the same, unique haplotype. Also low levels of nuclear genetic diversity were found among Iranian black bears (H_E=0.56 across 7 microsatellite loci in overall samples), with lower levels of microsatellite differentiation (F_{st}=0.11) between black bears from the 2 source areas (northern vs. southern groups). The mitochondrial phylogeny from median-joining network, neighbor-joining tree and Bayesian phylogenetic analyses revealed that Iranian black bears are highly distinct from the other populations from East Asia. This result supports the validity of the Iranian black bear (*U. t. gedrosianus*) as a distinct subspecies and also supports the idea that they can be a single Evolutionary Significant Unit (ESU). Although preliminary, the results bring important new information on the genetic status of Iranian black bears and also provide a baseline for future monitoring of this endangered bear.

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A POPULATION VIABILITY ANALYSIS FOR THE LOUISIANA BLACK BEAR (*URSUS AMERICANUS LUTEOLUS*)

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In 1992, the U.S. Fish and Wildlife Service granted the Louisiana black bear threatened status under the U.S. Endangered Species Act, listing loss and fragmentation of habitat as the primary threats. The 1995 Recovery Plan outlines recovery goals designed to meet the objective of reducing threats to the Louisiana black bear metapopulation and the habitat supporting it. To meet that objective, the Recovery Plan requires 1) at least 2 viable subpopulations, 1 each in the Tensas and Atchafalaya River Basins, 2) movement corridors between the 2 viable subpopulations, and 3) long-term protection of the habitat supporting each viable subpopulation and interconnecting corridors. To address criteria 1, our objectives were 1) to estimate demographic rates of Louisiana black bear subpopulations, 2) to develop data-driven projection models to assess long-term persistence of individual subpopulations and the metapopulation in Louisiana, and 3) to determine how different assumptions about projection model structure and parameter values affect trajectories and estimates of long-term persistence. We collected data with non-invasive DNA sampling, live capture, winter den visits, and radio monitoring. Data collection took place from 2002 to 2013 in the 4 areas supporting breeding populations in Louisiana. We used DNA extracted from hair collected at baited, barbed-wire enclosures in 3 areas to determine individual identities for mark-recapture analyses to estimate apparent survival, per-capita recruitment, abundance, growth rate, and long-term viability. Live trapping and radio collaring occurred at 2 areas to estimate survival and reproductive rates. When sufficient data existed, a hierarchical modeling approach was used to separate estimates of process and sampling variation for individual demographic rates. All analyses were performed using Markov Chain Monte Carlo and Bayesian inference methods to allow explicit estimation of parameter uncertainty. We developed stochastic population projection models for each subpopulation based on demographic rates and variances estimated from subpopulation-specific data sources. We also developed models for each subpopulation that incorporated parameter uncertainty or alternative parameter values to evaluate the influence of those effects on our overall assessment of recovery. We report estimates of demographic rates, estimates of persistence probabilities, and an assessment of Louisiana black bear recovery in Louisiana.

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GENETICS OF POPULATION RECOVERY – SPATIO-TEMPORAL ANALYSES ON THE DEMOGRAPHIC AND GEOGRAPHIC EXPANSION OF THE FINNISH BROWN BEAR *URSUS ARCTOS*

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The brown bear in Finland was almost extirpated, except for a few areas in the far north and south east of the country, where bears may have survived. Conservation driven policies and management led to an increase in bear numbers in the 1970s from approximately 250 bears in 1978 to the latest estimate of about 2,000 bears today. The recovery of natural populations usually involves simultaneous or subsequent range expansion, accompanied by distinct patterns of the genetic structure. So far, these patterns have been investigated mainly with simulation studies and only a few studies have been conducted using empirical data. We assessed the Finnish brown bear population from 1996 (ca. 600 bears) to 2010 (ca. 1,900 bears) using 819 genotypes, analyzed annually and looked for patterns of expansion in the genetic make-up. As predicted by genetic theory the degree of population structure decreased as well as genetic variation and admixture increased. Also, the isolation-by-distance pattern shifted, pointing to higher genetic relatedness among bears at larger distances. Besides the recorded demographic expansion, the genetic groups identified in Finland shifted northwards by one degree latitude, which corresponds to a distance of about 110 km in the remarkable time of only 1.5 generations. Our research represents one of the first studies on the genetic tracking of population recovery accompanied by demographic as well as geographic expansion. Further, the results indicate a possibly quick response time of European brown bears to conservation actions, if populations are allowed to expand.

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COUNTING GRIZZLY BEARS MORE AFFORDABLY IN ALBERTA, CANADA

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We evaluated a less expensive approach to monitor population abundance while simultaneously estimating land use, climate change, and habitat effects on abundance. New spatial capture recapture (SCR) methods explicitly account for detection effort and covariates influencing abundance in space, offering flexibility in sample design and thus cost savings. In central Alberta, grizzly bears estimates in 2004 (n=53, CI:44-80), led to a ban on hunting. Simultaneously, timber harvest, mining, and recreation have also changed the distribution of roads and activities on the landscape. Biologists and managers would therefore like to know whether the population size has changed. Using retrospective subsampling of the 2004 data and simulations, we found that focusing sampling in areas with high animal densities decreased variance, while fine-scale configuration of traps had little influence on precision. Increased sampling of road-accessible areas and no sampling of costly helicopter-access-only areas provided accurate estimates with little loss of precision and potential cost reductions of ~$250,000. Where covariates strongly influence abundance, researchers can design spatial capture recapture studies for bears to obtain robust abundance estimates for reduced cost and gain insight into management options. This design and analysis approach can be used for any detection method or combination of methods identifying unique individuals. Finally, we discuss the design used to sample in summer of 2014 and rationale for retaining a subset of helicopter-access-only sites.

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MONITORING OF EFFECTIVE POPULATION SIZE IN A HUNTED POPULATION OF BROWN BEARS SHOWS EFFECTS OF DIFFERENT MANAGEMENT APPROACHES IN NEIGHBORING COUNTRIES

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Effective population size (N_e) is arguably one of the most elegant concepts in biology, conveniently summarizing both evolutionary potential of a population and its sensitivity to genetic stochasticity in a single parameter. While this parameter used to be very difficult to estimate in a natural population, new methodological developments over the recent years made it possible not only to estimate, but also to monitor effective population size as it changes through time. We collected tissue samples of brown bear mortality in Slovenia and Croatia from late 1990s until 2013 (n=1,527 individuals), genotyped them using 20 polymorphic microsatellite loci, and determined the age of each animal using tooth cementum rings. We applied several methods for estimating N_e and estimated this parameter for each year with a large enough sample size, from 2000 until 2013. Slovenia and Croatia used to be a part of the same country, share the same brown bear population and used to share similar management objectives. However, we observed that local N_e estimates started to diverge as the bear management in both countries started drifting apart. The differences can be explained by differences in brown bear management objectives and its effects on age/sex structure of mortality, demonstrating both the utility of N_e estimation for monitoring wild bear populations, as well as the effect that local management decisions can have on a bear population at the most fundamental, molecular level.

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KIN-RELATED SOCIAL ORGANIZATION AMONG FOOD-CONDITIONED BROWN BEARS IN BAILE TUSNAD, ROMANIA

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Kin-related social structures have been documented in many gregarious animals, even for solitary mammals as the bear. It may influence population dynamics by means of reproductive success and survival. The mechanism behind this demographic entity seems to be sex-biased dispersal: female philopatry and male dispersal among polygynous mammals. Still, it is not clarified if the aggregation of kin has a positive effect on the inclusive fitness of female bears. Former studies could indeed identify local clusters of genetically related individuals whereas other matrilines were dispersed. But matrilinear assemblages (e.g., females establishing their home range among related females) might only exist in habitats with sufficient food resources. Therefore one of the purposes of this survey was to analyze the kin-related social structure among food-conditioned (FC) bears in Baile Tusnad and find out if multigenerational clusters in such human-bear conflict areas where food resources are abundant exist. We set up 16 fixed hair traps on 23 km^2 and four cameras that were weekly baited and verified. In addition we collected feces from spring until December 2013. For genetic analyses we obtained a total of 89 hair samples (83 from hair taps, 3 captures, 3 dead bears) and 20 scat samples. Besides developing such a kin scheme, our objectives were to obtain a bear ID data base with sex and age profiles and to estimate the bear population size in the study area. Since the town B. Tusnad is located in the middle of an ecological corridor that connects the Western and the Eastern mountain range and is therefore frequently crossed by wildlife we validated the results to assess the function of the corridor.

Session: Bear Behavior

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CLIMATE CHANGE AND HIBERNATION: LINKING FOOD AND WEATHER TO DENNING BEHAVIOR OF GRIZZLY BEARS

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Climate change is altering the phenology of spring green-up and the onset of winter, possibly disrupting the synchrony of behavioral processes and the hibernation behavior of grizzly bears. Changes in the duration of hibernation may have negative consequences for the long-term conservation of grizzly bears (*Ursus arctos*) which are a threatened species in Alberta, Canada. Increased opportunity for human-bear conflicts, altered energy savings, and reduced cub survival and fitness may result from changes in hibernation behavior because females give birth and undergo lactation while in dens. Understanding the links amongst environmental conditions and the timing of hibernation is therefore necessary to make predictions regarding the potential impacts of climate change on hibernation. We investigated hibernation behavior of 15 male and 58 female grizzly bears between 1999 and 2011, and estimated food availability during autumn using a probability surface of berry productivity based on permanent plots established within the home-range of 13 individuals. Our objective was to determine the amount of variation in den entry and den exit dates that could be attributed to sex and reproductive status, weather-related environmental variables, and local food availability. Sex and reproductive status of grizzly bears explained 22% and 14% of the variation in den entry and den exit dates, respectively. High berry availability was associated with late den entry, but weather variables did not influence the timing of den entry. Bears denning at higher elevations emerged from dens later than bears denning at lower elevations, warm springs were associated with early den exit, and increased winter precipitation was associated with late den exit. Our results demonstrate that although the phenology of hibernation for grizzly bears depends on sex and reproductive status, different extrinsic factors trigger den entry and den exit. Den entry appears driven by food availability while den exit is linked to weather-related environmental conditions. This dichotomy in factors affecting den entry and exit has important implications for the long-term conservation of grizzly bears.

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DOCUMENTED OBSERVATION OF FEMALE INFANTICIDE IN BROWN BEARS: PREDATION OR ACT OF DESPERATION

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Infanticide in brown bears, although not a common phenomenon, has been well documented. In most cases when the perpetrator is known, it is an adult male, and the most frequent victims are cubs-of-the-year and yearlings. When only small part of the victim is consumed or it is not consumed at all, such event is usually considered as sexually selected infanticide. Cases of infanticide and intraspecific predation by adult females are quite rare – just a few cases of intraspecific killing were documented, most of them in North America. In the Polish Tatra Mountains, 5 cases of brown bear infanticide have been recorded so far. Most of them are poorly documented, but assumed to be done by adult males and associated with sexually selected infanticide. In March 2014 we observed and video-documented a female brown bear killing and eating an abandoned cub of the year. The cub probably fell down from a winter den site located in a cave on a steep slope. It was screaming and calling for two days, as it was unable to climb back to the den. Its calls could be heard in the entire valley, but without visible reaction from its mother, probably nursing rest of its litter. The cub hid itself into a hole in the snow. Near the place where the cub was trapped, other female accompanied by a yearling was observed playing around and feeding on forbs. The screams of the alone cub were apparently drawing her attention. Finally, on the second day, the female climbed to the place where the cub was, kill it, took to a concealed place and completely ate. We also documented the remains of the killed cub the day after in a field inspection. This case, in spite of being an obvious act of intraspecific predation, could also be interpreted as an act of desperation and caution. The female could kill the cub to stop it from making calls, which could attract adult males, and, this way, try to protect its own young.

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PERSONALITY DISTINCTIVENESS IN JUVENILE BROWN BEARS – CAN BEHAVIOR TRAITS OF JUVENILES PREDICT LATER PROBLEMATIC BEHAVIOR?

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Individual personality distinctiveness has been measured at 70 juvenile brown bears in the frame work of a rehabilitation center in the Romanian Carpathians. The personality profiles were defined based on clusters of behavior traits using a Principal Component Analysis. Ten profiles have been distinguished: “irritable-aggressive”, “focused”, “opportunistic-bold”, “self-confident”, “curious-confident”, playful-sociable”, “greedy-assertive”, “shy”, “lazy” and “absent minded”. The present study is an attempt to investigate the relations between individual behavioral phenotypes at 9 of these bears, and their relationships with the later habitat selection. We analyzed the habitat selection using the Manley selection ratios to find out whether there are identifiable patterns in how individuals with distinct personality profiles respond to environmental variables, including anthropogenic factors. We assumed that might be a certain degree of predictability in these patterns, and that some of them might predispose individuals to get involved in later conflict situations.

According to our results, the most important factors influencing habitat selection at bears are food availability and human disturbance, the animals facing a clear trade-off between them.

Considering the Manley selection ratios, a quiet big heterogeneity is observable among the bears, but a clear effect of the behavior traits that clustered different profiles was observable on the preference or avoidance of different environmental variables. Bears with profile combinations as “focused” or “confident” selected habitats with difficult accessibility to humans, whereas other combinations as “curiosity” or “lazy” led the bears closer to human proximities. Other profiles, as the “shy” and “absent minded”, selected habitats with high anthropogenic influence and spent much time in human dominated landscapes, but without getting involved in conflict situations.

Though this topic needs further investigations on a bigger sample size, our results test the presumption that some personality construction traits can induce the apparition of different surviving strategies in the same environmental conditions, some individuals being more prone to take risks than others.

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OBSERVATIONS OF WINTER AGGREGATION AND SOCIAL BEHAVIOR OF BROWN BEARS IN THE CANTABRIAN MOUNTAINS (SPAIN)

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Brown bears (*Ursus arctos*) are a prototypic solitary species of large carnivore, with a life cycle characterized by a spring mating season followed by an extended hyperphagia during summer and autumn, prior to a winter denning period in most populations. Although social organization is not well known, adult females extend bonds with dependent offspring for at least one year, while adults mate with relations lasting for hours or some days. Otherwise, some aggregations of individuals can take place around rich food resources, but relations are usually characterized by agonistic behavior of competing individuals.

We describe herein an aggregation event of several bears, seemingly adults, and their social behavior during one winter (December 2011-March 2012) in the Cantabrian Mountains. The bears were directly observed with spotting scopes during 56 of up 60 days of attempts in an area of 400 ha. At least 4 different bears were observed in 20 days (maximum 10 bears in a day). For a total of 176 bears/day observed, in 97 bears/day the individuals closely interacted among them, with frequent playing behavior and physical contact. Close interactions were recorded between two individuals (22 data), and among three (13 data), four (6 data) and five bears (1 data). No flights, chases or aggressions were observed, neither feeding activity was frequently recorded. One easily recognizable individual was observed during twelve days in 20 interactions with several individuals.

We do not know in the scientific literature of any other such an exceptional aggregation of brown bears, in this case in winter, i.e., outside the mating and hyperphagia periods. The frequent playful with virtual absence of aggressive behavior among individuals, seemingly adults, but not involved in mating activities, can led to new perspectives about the complex and diverse interactions in the sociability of this species or other solitary mammals. Genetic analyses of the samples gathered at the site can shed important insights about the numbers, their sex and relatedness of the involved individuals; which can be a significant proportion of the endangered Cantabrian population, currently estimated at around 200 bears.

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BEAR FORAGING BEHAVIOR SIMPLIFIED: AN APPROACH USING SPACE-TIME STATISTICS

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Direct and continuous observations of species such as bears in their natural environment can require extensive field work if at all possible. Wildlife collaring has advanced substantially in the past several decades allowing for the study of species' behavior remotely and with minimal field investment. Clustering of geographic positioning systems (GPS) data is widely accepted as an approach to identify potential kill sites of large predators such as wolves (*Canis lupus*), cougars (*Puma concolor*) and also grizzly bears. However, the majority of these studies have focused on obligate carnivores. This bias neglects to address the potential for multiple behaviors to be associated with clustering events, particularly true of omnivorous predators, like grizzly bears (*Ursus arctos*). We present an approach that groups hourly GPS points from collared grizzly bears based on a space-time permutation scan statistic (STPSS) that identifies locations of concentrated foraging, also including (but not limited to) kill sites. We then use a generalized linear modeling approach to indicate the probability of a cluster being a kill site, a site used for other foraging activities, or resting. We compared randomly picked bear locations to clusters built from GPS datasets of 9 grizzly bears from 2006-2012 in west-central Alberta. The clustering approach identified 88% of sampled kill sites with an accuracy of 16m (±12). Although this study focused on grizzly bears specifically, it can be applied more generally to any terrestrial mammal that exhibits clustering foraging patterns, provided the parameters are adjusted according to the species' biology. This approach has the opportunity to predict behaviors beyond that of predation events, such as bedding and grazing and could provide substantial insights into behavioral ecology and the resulting management decisions of other species.

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THE ENERGETIC VALUES OF LANDSCAPE COMPONENTS AS A TOOL TO DESCRIBE THE BEHAVIOR OF THE BROWN BEAR (*URSUS ARCTOS* L.), IN RELATION TO THE ECOLOGICAL REQUIREMENTS

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The aim of research was to study the brown bear presence in relation to the landscape pattern, expressed in terms of energy flows, through the quantification of the energetic values and meaning of the natural (biotic and a biotic) and human-related (road networks, settlements, etc.) landscape components. These values were correlated to the estimation of the energy requirements of the bears monitored with GPS techniques (n=4, males) and to their presence and behavior. The spatial model of energetic values for landscape components have been developed by GIS technology and in the respect to the ecological requirements of brown bear in the central and north east Alps (North of Italy, Slovenia and Austria). Data sources were public databases as Corine Land Cover project (UE), Carta della Natura Project (ISPRA) Digital Terrain Model. The spatial resolution utilized was 1 km^2 and the UTM grid was used. For each quadrant was calculated: habitat cover, geomorphology, human presence, brightness (solar radiation corrected for the tree cover) feeding allowance (food allowance index, IDA), climate (Modis), and energy values expressed as estimation of the potential cost of locomotion, thermoregulation, feeding, resting (output) and as potential energy of food allowance (input). For each animals tracked by telemetry were estimated the energy requirements in relation to the cost of basal metabolism, thermoregulation, locomotion, feeding for each utilized quadrants and compared to the utilized quadrants and in the respect to different level of utilization. The identification and development of landscape indexes, describing many environmental components with implications on animal energy requirements, has been coupled with a behavioral pattern analysis and the computation of animal energy outcomes and incomes. The obtained thematic maps showed the spatial distribution of these input and output: thought them it is possible make habitat characterizations showing potential satisfaction level in terms of ecological requirements for the Brown bear and obtain useful information for defining the habitat energetic suitability at the trans-regional scale. This study has revealed several emergent diurnal-nocturnal and seasonal energetic patterns in the use of landscape resources, and has allowed the implementation of some spatially explicit models for the estimation of energy inputs and outputs; the cost of thermoregulation and locomotion (output) and the potential allowance of energy (input), seems to influence the use of landscape and bear behavior. The future development of this research through the use of other individual location datasets (also belonging to different geographical contexts) may allow refining the approach and identifying more precisely the key spatial variables to be measured in terms of energy, as well as to apply this approach to more sophisticated models like IBMs (Individual Based Models).

Session: Bear Physiology and Toxicology

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FIVE-YEAR TOXICOLOGICAL STUDY ON CROATIAN BROWN BEARS

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Environmental pollutants, both organic and inorganic, can have adverse effects on living organisms, as they persist in air, water, and soil and can accumulate in an individual and the food chain. The longevity, abundant food intake, and trophic position of brown bears (*Ursus arctos*) make this species a good bio indicator for pollution. Information gained through monitoring studies are relevant for humans residing in the monitored areas, those consuming bear's meat, as well as for the bear population, since the pollutants measured in bear tissue reflect the environmental load. Until now, the Dinara-Pindos bear population has not been studied with regard to toxic metals, organochlorine pesticides (OCPs), and polychlorinated biphenyls (PCBs). Tissue sampling (muscle, liver, kidney cortex, fat) was undertaken from hunted and accidentally killed animals (roads, railways) between 2009 and 2013 according to the Brown Bear Management Plan for Croatia. Distribution of cadmium, lead, and mercury across the tissues of 371 bears was examined, as well as the impact of sex, age, and season on the respective metal levels. Seventeen PCB congeners and OCPs including hexachlorobenzene (HCB), hexachlorocyclohexane (HCH), dichlorodiphenyltrichloroethane (DDT) and its metabolites 1,1-dichloro-2,2-bis(p-dichlorodiphenyl)ethylene (DDE) and 1,1-dichloro-2,2-bis(p-chlorophenyl)ethane (DDD) were analysed in fat tissue of 32 bears.

Female bears had higher cadmium and mercury tissue concentrations than male. The age-dependency of cadmium and lead in all of the bear tissues pointed to their accumulative property. Animals sampled in fall had higher muscle and hepatic mercury concentrations than the ones sampled in spring (Hg fall/spring: muscle 0.0033/0.0016 μg/g; liver 0.053/0.028 μg/g wet mass). Among OCPs, the dominant compounds were γ-HCH and HCB followed by β-HCH and DDE. PCB-153 and PCB-180 were the dominant congeners followed by PCB-138. In general, the measured concentrations of organic pollutants were low and differed between sexes. Regarding the maximum levels of cadmium and lead allowed in meat, liver and kidney for consumption, bear meat (median: Cd 0.0068, Pb 0.0040 μg/g wet mass) can be considered safe for human consumption but liver (median: Cd 0.954, Pb 0.424 μg/g wet mass) and kidney (median: Cd 14.1, Pb 0.972 μg/g wet mass) should be avoided.

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THE EARLY GONADAL ACTIVITY IN CROATIAN BROWN BEARS AND ITS MANAGEMENT IMPLICATIONS

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The aim of the study was to get insight in the age span of brown bear reproductive activity by morphometric and histological examination of gonads, and to test the management implications of findings by using two-sex matrix modeling. The reproductive span of the bear's life is one of the critical parameters for population dynamics, with the age of the first reproduction as the important single factor. For brown bears in Croatia, as a standard, we use the age of four years as average for the first reproduction. In this pilot study, we examined testicles and ovaries of 30 hunted or traffic-killed bears (23 males, 7 females) in Croatia in 2012-2014 period. We measured length, width and mass of each gonad and by histological inspection determined its activity and maturity. Average length of mature testes was 6.52 cm, width 3.16 cm and mass 63.5 g. Juvenile and old inactive testes in average were smaller then active ones: 16.8 g vs. 49.8 g, respectively. Average length of ovaries was 2.36 cm and width 1.7 cm. We calculated correlation index between total testicles mass and body mass of each bear. In sexually active bears index was in average 0.85 (range 0.45-1.34), in two young bears 0.42 (range 0.39-0.45) and 0.31 in one old bear (of 325 kg body mass) with inactive testicles. Histological findings discovered inactivity of the testicles in the second year, but the first signs of gonadal activity and maturity were present in the third year of a male's life, which implicates potential reproductive activity in the nearby mating season. Results from a previous study revealed that ovaries from 2 females held in captivity were active in their third year as well. If the animals from 3rd-year age class were included as reproductive in the matrix model, results showed that increase in recruitment to effective/reproductive population size for Croatian management system could be 12.8-16% for males and 10.9-11.4% for females. Accounting the maturity of gonads to all other characteristic that can influence the reproductive success, can help answering the question how large can be the „effective population size" and how much mortality, hunting in particular, can be compensated.

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WINTERING OF BROWN BEARS IN CROATIA

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Here we illustrate the variability and complexity of winter bear behavior in Croatia. Out of 41 radio-collared bears since 1981 we tracked 17 ones (9 males, 8 females) during 24 bear winters. Three female dens were maternal. Some bears (at least 5) used more than one den in the same winter and some (at least 4) left the den and returned to the same one in the same winter. Adjacent to 10 dens (mean 16 m, range 2 to 30 m) we found open nesting sites ("sun bed") which those bears used during daytime in some winter days. Three bears (all males) spent winter in an open nest, while all other were in the rock cavities (19) or under the tree roots (2). None of the bears used the same den site twice during our study. For 18 bears radio monitored over whole winter (1314 den days) the mean denning time was 73 days (range 28 to 184 days). The total number of documented bear den-days for all 24 bear-winters was 1,389. Over the months it was distributed as follows: November 17, December 285, January 440, February 325, March 206, April 98, May 39, and June 4 den-days. The overall activity (active vs. passive in %) was clearly lower in the winter months: Jan 10, Feb 4, Mar 15, Apr 39, May 64, Jun 55, Jul 49, Aug 54, Sep 58, Oct 50, Nov 51 and Dec 20%. Although we do notice the decrease of the average number of days with snow cover over the past 3 decades, as well as higher average winter temperatures, the change in bear winter behavior could not be noticed on our sample. However, the elements of bear hibernation are present while bears exhibit the remarkable adaptability to any given environmental conditions.

Session: Population Genetics and Genomics in Bear Conservation

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SNP GENOTYPING OF NON-INVASIVELY COLLECTED SAMPLES: A NEW PROSPECTIVE FOR BROWN BEAR RESEARCH

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Along with a recently increased capacity to explore research questions using genetics, it is becoming ever more important to develop sampling methods that minimize disturbance to animals. There are several hurdles one must overcome for non-invasive sampling regimes to work for population studies. Here, I address two of these and present a way in which they can be overcome. The first is that, due to costs and logistics, it is often difficult to collect enough samples to be representative of a population. For many years, Sweden has been employing a form of citizen science to overcome this problem that has been largely successful. The second is that non-invasively collected samples are most often found in the environment and therefore suffer from degradation due to UV rays and other climatic factors. Feces are additionally prone to contamination by prey species and inhibitors leading to erroneous results. Here, I present a SNP genotyping approach used on feces with reliable results. Finally, as SNPs have only recently been used in population genetics studies, I will present some analyses using SNPs from the south Swedish brown bear population.

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NEW PROSPECTIVES FOR STANDARDIZED BEAR GENOTYPING USING HIGH THROUGHPUT SEQUENCING

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Individual identification based on microsatellite genotyping and molecular sexing using DNA extracted from various types of biological samples has played a major role in bear research during the past 20 years. Molecular individual identification has been the basis for demographic, genetic, and ecological studies for many bear species worldwide, including applications for population estimation and monitoring, movement tracking, pedigree reconstruction, assessing genetic diversity, structure and gene flow, and forensics. This information contributed to increase our knowledge of bear biology and has been key for bear conservation and management.

Currently, microsatellite and sex marker genotyping is performed by scoring alleles for several loci on electropherograms resulting from running PCR products on a capillary sequencer. However, with the recent advent of high throughput sequencing (HTS), capillary sequencers will likely be soon replaced by newer technologies. We present a new genotyping approach based on the use of HTS. With the next-generation genotyping method, multilocus genotypes are scored by analyzing directly the sequence of the different alleles. This feature provides a greater accuracy of allele determination compared to the current method, because alleles are unambiguously identified by their sequences. This will also permit to easily share genotype data generated in different labs without the need of calibrating allele base-pair sizes, which will represent an important advantage for effective monitoring of bear populations across countries and the creation of transboundary databases. In addition, due to the ability of HTS to produce huge amount of sequence data, large sample sizes could be processed for many markers in a single sequencing run, allowing to reduce time and costs of large scale projects and analyses requiring a greater number of loci than just for individual identification. We will present the technical basis of the next-generation genotyping method and will discuss aspects of its implementation comparing it with the traditional method. In addition, we will provide results of the application of the method on brown bear fecal and hair samples that were analyzed with a first set of newly developed tetranucleotide microsatellite loci and sex markers.

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BROWN BEAR PHYLOGEOGRAPHY IN EURASIA, AND POST LGM COLONIZATION OF NORTH AMERICA

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Climate fluctuations during the Late Pleistocene (123-12 thousand years ago; kya) significantly reshaped the distribution and structure of animal populations in the Northern Hemisphere, and the footprints of this remain apparent in contemporary populations. The phylogeographic processes related to large-scale climate change differed somewhat between species, reflecting factors such as feeding habits, dispersal ability, etc. The brown bear (*Ursus arctos*) has served as one of the main mammalian model species for understanding large-scale phylogeographic processes related to past climate change. Moreover, to develop effective conservation strategies for contemporary brown bear populations, it is of considerable importance to have a comprehensive picture of its genetic variation, as this can reveal the historic and current processes acting on populations. Using sequences of complete mitochondrial genomes, our aims were to investigate the matrilineal phylogeographical structure, ancient migration patterns and lineage coalescence times in a large and continuous population of brown bears in Eurasia, and relate it with the colonization of North America. We analysed 109 brown bear mitogenomes across Eurasia, and by including many additional sequences available in public databases reconstructed major events that started ca. 40 thousand years ago (kya). At that time the ancestral brown bear population resided in a refuge area, most likely in eastern Siberia. About 35 kya bears divided into two large populations. From one of these, bears later colonized North-America and Kamchatka. From the other, several major migrations took place in Eurasia ca. 28-14 kya. All these events will be discussed in the context of past climate changes.

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GENETIC DIFFERENTIATION OF BROWN BEAR POPULATION FROM EASTERN AND WESTERN CARPATHIANS

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Originally abundant brown bear population in the territory of Slovakia was diminished towards the end of the 19th century due to systematic hunting and trapping diminished. During the between-war period the population size estimate of brown bears in Slovakia was about 30–40 individuals. In 1932 the entire protection of brown bear was introduced and since that time the population size has started to increase. In 1960, the size of brown bear population was about 400 individuals and hunting of a limited number of brown bears started. Regardless hunting, the size of the brown bear population is still growing and the expert estimates represent at present about 1000 individuals.

In contrast, the Eastern Carpathian population (Romania) is more abundant and has never dropped below 800 individuals. Around 1990, the population size estimate was about 6000 individuals.

The aim of this study was to estimate the degree of genetic differentiation between the Eastern and Western Carpathian (i.e., coming from Romania and Slovakia) population of brown bears. Tissue samples from legally culled brown bears in Romania and Slovakia served as experimental material. Fragmentation analysis was performed on 13 nuclear microsatellites.

The documented level of genetic differentiation between the Western and Eastern Carpathian populations reflects the isolation which lasted almost 100 years. Furthermore, the easternmost brown bear population in Slovakia exhibits more resemblance to Romanian brown bears than to those from the Western Carpathians. The East Slovakian population and its counterpart in southeastern Poland are not connected with the Western Carpathian population in both countries.

Within the core Western Carpathian population, a split in two parts has been found, probably due to human caused isolation along the Váh River (dam, industrial zones, and human settlements). Most probably, this divergence started already in the between-war period, when the population size was at its minimum and building the industrial barriers did not help to improve its connectivity, either.

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ESTIMATING ABUNDANCE OF THE REMNANT APENNINE BROWN BEAR (*URSUS ARCTOS MARSICANUS*) POPULATION USING MULTIPLE NONINVASIVE GENETIC DATA SOURCES

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Brown bears in the Apennines (*Ursus arctos marsicanus*), central Italy, survive in a remnant and long isolated population, and represent one of the 4 very small bear populations in southern and western Europe in a critical conservation status. Despite protection afforded by national and regional authorities for Apennine bears since 1923, when the Abruzzo National Park was first established, no range expansion has been observed and population trends remain basically unknown due to high degree of uncertainty of the estimates of abundance produced in the past decades. In 2008 we produced a first formal estimate of population size, depicting 40 (95% CI: 37–52) bears in the core distribution, comprising the Abruzzo Lazio and Molise national Park and its surrounding areas (PNALM). Building on this previous experience, we repeated the survey in 2011 within the UE Life Arctos project (LIFE09NAT/IT/000160; http://www.life-arctos.it), using a DNA-based mark-recapture and multiple data source approach based on an entirely noninvasive sampling design (hair snagging, rub tree sampling, opportunistic sampling at buckthorn sites, and incidental sampling). By combining data from these noninvasive sampling methods, we used Huggins closed population models in Program MARK to estimate the size of the bear population, including cubs. Competing models were evaluated using the sample size adjusted Akaike's Information Criterion (AIC_c) of model fit. From 1 June to 30 September 2011 we cumulatively collected 679 bear hair samples (159 by hair snagging, 278 at rub trees, 139 at buckthorn sites, and 67 from incidental sampling). Of 529 analysed samples, 426 yielded high-confidence scores using 13 markers (plus amelogenin for gender), with an overall success rate of 80.5%. We produced a final superpopulation size estimate of 51 (95% CI: 47–66) bears (CV = 7.9%), corresponding to a closure corrected density of 39.7 (95% CI = 36.6– 51.4) bears/1000 km^2. Although the population seems to have increased (λ = 1.084) by contrasting the 2008 and the 2011 point estimates, we discuss reasons why we strongly suggest a cautionary interpretation of this conclusion. However, our results do provide conclusive evidence that the Apennine brown bear population has not been declining in recent years (i.e., 2004–2011).

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GENETIC STATUS AND STRUCTURE OF BROWN BEARS IN THE BALKANS

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In contrast to most other European regions, the Balkan Peninsula still hosts relatively large and viable brown bear populations. Interestingly, three traditionally defined populations, namely the Dinaric-Pindos, Carpathian and Eastern Balkan populations all meet in this region. However, no study has yet comprehensively examined the genetic population structure and allelic diversity of the species here. We collected genetic data for 475 brown bears genotyped for 9 microsatellite loci based on non-invasively collected material and tissue or blood samples from Romania (eastern and southern Carpathian Mountains), Bulgaria (Stara Planina, Rhodope Mountains and Rila Mountains), Serbia (Zlatibor Mountains), FYROM (Former Yugoslavian Republic of Macedonia; Korab Mountain Range, Stogovo, Buseva Planina) and Greece (Varnous Mountains and Pindos Mountain Range). We divided the individuals in groups based on geographic origin (mountain ranges) and sampling coordinates, and examined population structure. We found that bears belonging to each of these three traditionally defined major populations were all significantly differentiated from each other. Interestingly, we also found significant differentiation within each population between groups of bears sampled in different mountain ranges, but found no significant differentiation between groups of bears sampled within the same mountain range. The degree of differentiation between groups within populations was smaller than between groups across populations and, in general, the degree of differentiation between each group increased as a function of the distance separating the groups. While being significantly differentiated from each other, the Carpathian and Eastern Balkan populations were more similar to each other than to the Dinaric-Pindos population. We detected some degree of admixture in regions where these three populations meet, indicating at least minor reproductive connection among them. Some uncertainty remained as to the status of samples from Serbia and FYROM, indicating that further sampling effort will be required in these regions to clarify their status.

Session: Bear Immobilization

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LEUKOCYTE COPING CAPACITY AS A TOOL TO ASSESS CAPTURE AND HANDLING-INDUCED STRESS IN SCANDINAVIAN BROWN BEARS (*URSUS ARCTOS*)

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Brown bears (*Ursus arctos*) are routinely captured and handled for research and management purposes in Scandinavia. The techniques used are potentially stressful for the animals and may have detrimental and long-lasting consequences, however, it is difficult to assess their physiological impact. Here, we report the use of the Leukocyte Coping Capacity (LCC) technique to quantify the stress of capture and handling in brown bears. We collected venous blood samples and recorded a range of physiological variables to evaluate the effects of capture and the added impact of surgical implantation or removal of transmitters and sensors. We studied 24 brown bears, including 19 that had abdominal surgery. LCC values demonstrated that solitary animals and females were more stressed at the time of capture than animals in family groups and males. Surgery had no impact on LCC levels. Although further evaluation of this technique is required, our preliminary results support the use of the LCC technique as a quantitative measure of stress.

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INFLUENCE OF STRESS ON WILD MARSICAN BROWN BEAR CHEMICAL IMMOBILIZATION

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Capture of wild bears with leg holding snares causes fear, anxiety, excitement, muscular activity and resistance to holding which in turn elicit in an acute stress response: neuro-hormonal responses are then activated, but these may interfere with anesthetics efficacy and safety.

Hormonal and physiological parameters have been used to evaluate stress level in bears after chemical immobilization; to our knowledge however, behavioral indicators prior to drug injection have never been used to evaluate it.

The aim of this study was to evaluate if stress induced using Aldrich snare's restraint influenced anesthetics requirements for chemical immobilization and physiological parameters.

Data sheets collected during 43 adult Marsican brown bear (*Ursus arctos marsicanus*) captures (27 males and 16 females) in the Abruzzo, Lazio and Molise National Park (Italy) were reviewed.

Before chemical immobilization, a stress score (0-4) was assigned to each bear by an experienced veterinarian (LG) based on the behavioral reactions to leg-holding snare entrapment.

A medetomidine-ketamine combination was administered intramuscularly by remote injection: supplemental doses were injected until a safe approach to the animal was possible. Dose used, induction time (time from injection to recumbency), approach time (time from injection to safe handling) and physiological parameters collected within 15 ± 5 minutes of chemical immobilization were analyzed by Spearman correlation test.

Stress score showed a positive correlation with the total dose of medetomidine (r=0.0030) and ketamine used (r=0.0008): more stressed bears required greater dosages then less stressed animals.

Stress score positively correlated with rectal temperature (r=0.015) and heart rate (r=0.044).

Time to approach was correlated to stress only in female, not in male bears. Other slight differences were observed between male and female bears.

This is the first study evaluating the level of stress induced by physical restraint in Marsican brown bears and it showed that stress influenced not only physiological parameters but also anesthetics needs, thus the an aesthetic protocol should be tailored to the bear's stress state.

Session: Bear Activity

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SPATIO-TEMPORAL INTERACTIONS IN RELATION TO THE SOCIAL BEHAVIOR OF BROWN BEARS IN NW GREECE

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Ranging patterns have been used to study wildlife social systems, where home range overlap can indicate the degree of social interactions for many species. Few studies have examined the seasonal social behavior of the brown bear in detail in order to better understand the spatial ecology of this species. Greece hosts the southernmost brown bear population in Europe, estimated at 350-400 ind. and its range over the species western distribution nucleus (Pindos mountain range) reaching below the 39° parallel. We investigated the spatial and temporal interactions of twenty (20) GPS/GSM-tagged individuals (14 males and 6 females) of a brown bear (*Ursus arctos*) sub-population of the western nucleus located in two areas (Grevena and Trikala) of the northeastern Pindos range in Greece. We calculated the home range overlap for the 95 Minimum Convex Polygon, Fixed Kernel Method and Core Area 50 methods among simultaneously GPS-collared bear dyads as well as the proportion of locations that were temporally associated in home range overlap areas within 24 h for the 100 Minimum Convex Polygon, MCP95, FKM and CA50 methods using simple ratio association indices. In addition, we calculated the distances among simultaneous dyads of temporal associations recorded in home range overlap areas (MCP100). The home ranges overlapped extensively, even for home range core areas. Male bear dyads overlapped by over 50% in all seasons in core areas, compared to female male bear dyads, which only overlapped by over 50% in spring. Temporal interaction analysis showed that adult male pairs were closer in autumn than female-male pairs, which were closer in spring. Social interactions between bears were variable, showing a certain degree of seasonality.

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ACTIVITY PATTERNS AND DISTRIBUTION OF BROWN BEAR IN NORTHWESTERN ANATOLIA

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Northwestern Anatolian forests host one of the largest brown bear (*Ursus arctos*) populations in Turkey. As the largest carnivore mammal in Turkey, the species needs for further conservation effort to sustain their viable populations. We conducted a long-term camera-trapping survey in Western Black Sea Region of Turkey (an area ~7,500 km^2 in size) to investigate the ecology and distribution of brown bear population in the region. We obtained a total of 579 records belonging to the species in 31,063 camera-trap/days and a ratio of 57.4% positive camera-trap stations between 2007 and 2010. The analyses of the occurrence data showed that brown bears use a wide elevation range in the region, as being recorded at every 100 m intervals from 500 m to 1700 m a.s.l. Brown bears of the region had high crepuscular activity (42.2%), and the annual activity pattern reaches its peak between August and October. The main hibernation period of the species in the study region falls between January and February, and this result differs from the global data as the hibernation period for brown bear is between November and March. The use of forest roads, the habitat use in different seasons and at northern and southern aspects of the study region, and the distribution patterns in relation to the boundaries of the protected areas were also analysed. The study reveals the importance of local data to understand the activity patterns of brown bear, and contribute to fill the gaps in ecological information on brown bear populations in Turkey.

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DAILY ACTIVITY AND RESTING PATTERNS OF BROWN BEARS IN TURKEY BY USING CAMERA TRAPS AND GPS-GSM COLLARS

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Brown bears are known mostly as nocturnal or crepuscular species. This study aimed to determine daily activity and resting patterns of brown bears in Artvin, Turkey by using camera traps and Followit Tellus GPS-GSM collars integrated with activity logger.

I used 10 of 22 camera trap stations every year between 2008 and 2011 in 450 km^2 area located in the northeastern part of Turkey. In addition, I obtained 12 or 30 activity-inactivity data from six brown bears (4M-2F) fitted with GPS-GSM collars and monitored them from 36 to 603 days between 2010 and 2012. I assumed that both X and Y activity data in activity logger equal to or smaller than two reflected inactivity (resting) and both larger than two reflected activity. Besides, I assumed bears as inactive when either X or Y was below 10, while the other value was less than two. All data were pooled into four hour intervals to reveal daily activity and resting patterns of individual bears. I analyzed both time of bear images and activity in six time periods in a day with descriptive statistics.

Activity data loggers indicated that bears were mainly nocturnal and mostly active (mean %=57.65) rather than inactive (mean %=42.35) during a day. The most active bear was a sub-adult male, followed by male bears. Camera trap photos (n=352) also revealed that bears were mainly nocturnal and showed crepuscular behavior (04.00 to 07.59 and 16:00 to 19.59). Bears had the least active periods during daylight hours (8:00 to 16:00), whereas activity data loggers produced disparate results for individually tracked bears. Activity loggers implied that bears can rest during any time period in 24-hours, even at the midnight when bears are supposed to be mostly active; both physical activity and resting may alternate within the same time window. However, camera trapping may represent higher bear activity in the evenings and underestimate all bears' noon activities.

Session: Methodological Innovations and Considerations

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MODELING URBAN BLACK BEAR OCCURRENCE IN THE MID-ATLANTIC REGION USING BOOSTED REGRESSION TREES

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There exists a paucity of information on how black bears use urban and suburban habitats. We used boosted regression trees to create predictive models of bear occurrence in urban and suburban habitats for New Jersey and Pennsylvania. We randomly selected 2 subsets of 40,000 locations each from GPS collared black bears in New Jersey and Pennsylvania. We built two models of black bear occurrence: (1) State College and Johnstown, Pennsylvania, (2) Scranton/Wilkes-Barre, Pennsylvania and northwestern New Jersey. We found that the probability of bear occurrence was highest in Johnstown and State College study areas when bears were: (1) 50–150 m from the nearest road, (2) 50–250 m from edge forest, and (3) <3.5 km from the edge of the urban area. We found that the probability of bear occurrence was highest (in order of importance) in New Jersey and Scranton/Wilkes-Barre study areas when bears were: (1) 50–200 m from the nearest road, (2) 0–200 m from edge forest, and (3) 0–3 km from the edge of the urban area. After the initial peaks, probability of occurrence for distance to roads and distance to edge forest declined but became variable as distance values increased. Our results provide managers with a map of where urban bears are likely to occur and where to direct management efforts.

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MAKING THE MOST OUT OF DIFFERENT SOURCES AND QUALITIES OF DATA IN SPECIES DISTRIBUTION MODELING: AN EXAMPLE ON THE DISTRIBUTION OF BROWN BEARS (*URSUS ARCTOS*, L.) IN GREECE

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The monitoring of big carnivores' populations is difficult because these are often discrete, solitary, and occur in low densities in very large areas. However, information about the distribution of these species is crucial in the context of human-carnivores conflicts with the perspective to map potential problematic interactions.

Inference about distribution is traditionally done by developing species distribution models, inferring relationships between the detection of the species and some habitat variables, in order to project the species' probability of presence over a bigger area.

Here, we focused on the brown bear (*Ursus arctos*) in Greece and used two main sources of indices of bear's presence to derive a spatial representation of its distribution: a systematic monitoring of barbed-wire fitted power poles, on which hairs and marks are collected; and opportunistic presence indices collected by non-scientists over the whole country. We built species distribution models for both datasets, using methods to correct of the different bias inherent to each of them. The main challenge we will attempt to address is the combination of the outcomes of these different distribution models applied to heterogeneous datasets. In particular, the integration of citizen-science data is a difficulty because, if the quantity of data it can produce is an advantage, their quality is questionable: these are presence-only data and they suffer from observer bias, in particular spatial variation in the sampling effort.

We will discuss the reliability of the distribution map we obtain for brown bears in Greece, as well as the relevance of the methods used to correct for bias in the systematic and opportunistic data.

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TECHNOLOGIES FOR MONITORING MORBIDITY OF FREE RANGING BEARS

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Mammals, and in particular large carnivores, are currently facing global declines. Apex predators such as bears (Ursidae) are particularly vulnerable owing to their position in the food chain and complex habitat requirements, making them useful as environmental sentinels. These species not only reflect but also impact on ecosystem health, with local extirpation often resulting in cascading effects.

In animals with long generation times, population level monitoring may be ineffective at highlighting declines and drivers of declines before drastic effects are felt. Long term individual based monitoring, via remote sensing, is therefore vital and must incorporate all deviations from normal health (i.e., morbidity). It is these, sometimes subtle changes, which currently go undetected, despite studies in domestic animals having clearly demonstrated their potential population effects.

Live capture, for tissue sampling and body measurements, remains the cornerstone for bear health monitoring programs. These methods are inherently biased and evaluation of the associated risks is so far equivocal. Morbidity remains a challenge to monitor, and reliable sensing technologies are currently lacking. However, in the current ecological climate its importance is increasing. Not only for assessing direct environmental effects, but also the intervention strategies we employ against them.

This work aims to review current morbidity monitoring in free ranging bears, identify unmet challenges and discuss potential ways forward. Based on the literature, we have investigated how previous field research has assessed morbidity over varying time-scales. We identify and highlight a number of technical approaches that may aid current systems.

Existing field technologies can be optimized to evaluate morbidity, but research questions need to be formulated from a health perspective. They may also be supplemented by technologies to enable quantitative biometrics such as detailed motion analysis. Novel technologies including sensors, data retrieval and power scavenging techniques should be identified and their use in wildlife developed in tandem with the human field. A unified platform and open community approach is advocated for rapid development, evaluation and ease of access. Health oriented research questions in conjunction with fit for purpose technologies will aid our ability to monitor morbidity and health in bears and other large carnivores.

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A METHODOLOGICAL COMPARISON OF BODY CONDITION IN POLAR BEARS DURING THE ICE-FREE SEASON IN WESTERN HUDSON BAY

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Much of polar bear (*Ursus maritimus*) life history is dependent on the sea ice habitat. In areas where sea ice melts completely in summer and reforms in fall, such as in Hudson Bay, sea ice freeze-up and break-up patterns are particularly important. In western Hudson Bay, polar bears spend 8 months on the sea ice foraging on marine mammals. Fat stores amassed during this period provide energy during the open-water (or fasting) period of approximately 4 months. In western Hudson Bay, ice melt has been occurring progressively earlier, and the decrease in time spent foraging on the sea ice has resulted in bears coming on shore with less overall body fat (i.e., a reduced body condition), further intensified in pregnant denning adult females fasting for 8 months. Body condition of polar bears has been assessed using various tools including morphometric measurements, fatness index, lipid content of adipose tissue, body composition models and, to a lesser degree, bioelectrical impedance analysis (BIA). We compared multiple techniques used to assess body condition for 157 free-ranging polar bears, as part of long-term population studies, near Churchill, Manitoba during the on-shore period, 2012-2014. We focused on the potential utility of BIA in future body condition assessments. Total body fat (BIA) was significantly correlated with adipose tissue lipid content, energy density and fatness index but not with skull width. Body condition across all measures typically increased across age class, with adult females having significantly greater body fat and energy stores relative to adult males, consistent with intense periods of foraging that occur prior to the fasting period to prepare for gestation, parturition, and lactation. There was seasonal variation in adult female body condition across all measures; females had higher body fat in the fall compared to spring, and body fat decreased with increasing number of cubs. Our findings suggest that fat reserves may decline both with increasing length of fasts and energy expended on offspring. Although its utility in the field has limitations, BIA appears to provide an accurate measure of body condition in polar bears and may be useful in assessing overall health across subpopulations.

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DEMOGRAPHY OF THE PYRENEAN BROWN BEAR: ACCOUNTING FOR HETEROGENEITY IN THE DETECTION PROCESS AND SMALL POPULATION SIZE IN A CAPTURE-RECAPTURE FRAMEWORK

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Despite its numbers slowly increasing in the past eight years, the Pyrenean brown bear population remains among the smallest ones in Europe, with a minimal size in 2013 of 25 individuals split in two main population cores. Recent studies have emphasized the importance of reinforcements of both cores in order to improve the short- and long-term population viability. Here, we focused on demographic rates and population size that are notoriously difficult to estimate in small populations.

First, by using mark-recapture data gathered between 2008 and 2013, we aimed at accounting for heterogeneity in the observation process related to the various and complementary tracking protocols that are performed on the field by the members of the French and Spanish Brown Bear Network. To do so, we established the efficiency of all the monitoring methods (systematic vs. opportunistic, camera traps vs. itineraries, etc…) as measured by method-specific detection probabilities. If ignored, heterogeneity in the observation process led to biased population size estimates.

Second, by using demographic parameters that were estimated for brown bear populations in Italy and Austria sharing ecological similarities, we performed a mark-recapture analysis in a Bayesian framework and incorporated this information in informative priors. We discuss the information provided by the use of informative priors compared to uninformative ones, and the consequences for population viability projections.

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CAPTURE HETEROGENEITY IN HAIR-TRAPPING: SOURCES OF BIAS UNIQUE TO THE METHOD

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DNA-based capture-mark-recapture (CMR), using hair collected from barbed-wire hair traps, has become the standard for estimating bear population size where logistics and budgets allow. Whereas CMR estimators can account for some capture heterogeneity, the study design should nonetheless attempt to identify and minimize likely sources of heterogeneity where possible. We conducted a CMR study to estimate black bear population size in a 300 km^2 study area in Minnesota, U.S.A. We specifically sought to examine population change since the 1980–1990s, when we had estimated abundance on the same study area through physical trapping and camera trapping. Hence it was important to consider potential forms of bias that may have differed in each technique. We used a high density of hair traps on a grid (1/2.56 km^2), checked at six 10-day trapping sessions during late May – early August, 2012. We constructed hair traps with 2 parallel barbed wire strands, instead of the more typical single strand, hoping not to miss capture of large males, which might step over a single wire. We examined data for evidence of capture heterogeneity due to molt and barbed wire position, sources specific to hair trapping but rarely discussed. Nearly two thirds of barb clusters (1–11 adjacent barbs) with hair occurred on the lower wire of traps, 16% on upper, and 22% included hair on both (n=2784 total barbs, 1,642 total clusters of barbs). The number of sites with hair was consistent but the number of barbs and clusters of adjacent barbs that snagged hair at each site declined through the study, as did the relative frequency of clusters involving both wires, suggesting that hair was harder to snag during later sessions, coinciding with the progression of the molt. Samples from both males and females were more common on lower than on upper wires, but relative to each other, male hair was more common on upper, and female hair on lower wires, suggesting that 2-strand designs may better capture population diversity than single-strand designs. We discuss other characteristics of this data set with implications for obtaining CMR estimates that are comparable among different capture techniques.

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TEMPORAL FEATURES OF TUNDRA ECOSYSTEMS BEST PREDICT THE DISTRIBUTION OF BARREN-GROUND GRIZZLY BEARS OF THE CANADIAN SOUTHERN ARCTIC

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Grizzly bears inhabiting the barren-grounds of the Canadian Southern Arctic are listed as a species of 'Special Concern' by the Committee on the Status of Endangered Wildlife in Canada because of their vulnerability to population declines and human disturbance. We report initial findings of a multi-year, DNA based hair snare program and remote camera survey in a 30,000 km^2 study area encompassing all 4 recently constructed diamond mines in the Northwest Territories. Microsatellite analysis of 1,902 hair samples collected in 2012 identified 112 individual bears (72 female, 40 male), with approximately 5,000 more samples to be analyzed by August 2014. During 2012 and 2013, significantly more bears were found in close proximity of mining operations that have been conducted for almost twice as long. Our results indicate that static landscape features such as diamond mines are having little effect on grizzly bear distributions despite occasional human-bear interactions; on the other hand, temporal variation of resources is key. Occupancy models that incorporate data from our remote cameras which track plant phenology and the presence of various prey species (e.g., barren-ground caribou) will be generated to identify spatial and temporal characteristics of tundra ecosystems most critical to grizzly bears.

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THE USE OF NORMALIZED BURN RATIO (BURN SEVERITY) MAPS TO EVALUATE THE RECOVERY OF KEY BEAR FOODS AFTER WILDFIRES IN LARGE, ARID LANDSCAPES

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In heterogeneous environments, the role of food as a driving mechanism in bear populations is influenced by the temporal and spatial variations caused by temperature gradients and fluctuations in rainfall. However, recent increases of stochastic events caused by climate change appear to be dramatically amplifying these variables in heterogeneous habitats, and will likely begin to affect homogenous environments, resulting in corresponding population responses by bears. Recent historic wildfires in Coahuila, Mexico and Texas, U.S.A, have spurred the need to develop rapid assessment tools and predictive models that will help bear managers monitor and manage for the recovery of habitats and critical bear foods that are important for bear reproduction, survival, and movements.

Spatial data such as Differenced Normalized Burn Ratio (dNBR), or burn severity, maps have been used as a tool for rapid and low-cost pre- and post-fire assessment. The dNBR index provides a scale of change caused by fire, where burned areas are classified as high, moderate, low, and unburned. Initial assessments provide a practical and rapid method to target monitoring and recovery needs; however, extended assessment, or validation, is more representative of burn severity than the Normalized Difference Vegetation Index.

In 2003 (Doan-Crider) developed an index for quantifying autumn bear foods by combining digestible energy values for each species and calculating total digestible energy per unit area of canopy coverage for each species. Digestible energy values for food items produced within the same year were then combined to produce final maps of annual calories/m^2. We refined this model with predictive machine learning techniques (Boosted Regression Trees) provide a more robust prediction of calories on the landscape.

For this project, we demonstrate how the combination of these two indices can be used to test for digestible energy production between burn severity levels, estimate losses of primary productivity, monitor recovery, and help predict bear population responses and movements.

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COMPARISON AND INTEGRATION OF DIFFERENT TECHNIQUES FOR THE ESTIMATION OF THE MINIMUM NUMBER OF THE BROWN BEAR (*URSUS ARCTOS* L.) IN A PERIPHERAL AND LOW DENSITY POPULATION

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The north east of the alps (Friuli Venezia Giulia region) represents a peripheral area of the presence of the Dinaric population (for the north Dinaric population, 400-450 individual estimated) of the Brown Bear and in the last years some individuals from Trentino population (40-45 individuals estimated) have started to move to east and to use this areas. From 2004 to the 2013 in mountains areas of the Friuli Venezia Giulia has been studied (2,000 km^2) the presence of the Brown Bear with different techniques: the genetic sampling (by opportunistic and systematic methods), photo interpretation and behavioral analysis and radiotelemetry. The genetic samplings have been obtained by the hair traps (50 permanent hair traps plus 70 temporary and moving hair traps) and by opportunistic sampling. The success of the single hair traps have been studied in relation to the geomorphology and habitat characteristics and in respect to the year and season. The photos and videos (over 1,000 samples considered) have been recorded, by infrared cameras (University of Udine and Regional Forestry Service, Hunters n=50), on the site of genetic monitoring and near the places of presence, like site of depredation or along the path. The video and photo has been analysed by Image J program to calculate some indexes derived from some measures of the head, body and color; the measures and indexes have been successively analyzed by multivariate analysis to distinguish different animals. The videos have been also analyzed to classify different behavior of the single animals. The classification with photo interpretation have been compared to classification obtained with genotyping. The success of the hair traps depends from the localization and habitat characteristics, with an evident effect of the year and season. The genetic analysis has detected the presence, from 2004, of 20 different genotypes (4 from Trentino 16 from the Slovenian population, 3 of them studied by telemetry), 15 of them in the last 3 years and 8 in the 2013; instead the analysis of photos and videos and behavior pattern has permitted to estimate the presence at least of 25 different individuals (11 in 2003). This fact confirmed that sometimes the hair traps are not useful because of the repeated use from the same individuals. Over the 70% of the hair sampling (without any screening with photo and behavior analysis) obtained with the traps, comes from only 5 individuals. The phototrapping integrated to the hair traps can be useful to correct the minimum number of individuals and reduce the quantity of sampling to analyze. The choice of the location and distribution of the hair traps, integrated with photocameras and telemetry data, can reduce the research effort and can give some useful information on the ecology of the species.

Session: Bear Conservation and Community Participation

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OF BEARS AND MEN: IS PEACEFUL COEXISTENCE POSSIBLE IN A PASTORAL PYRENEAN LANDSCAPE?

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Transhumant pastoralism has molded the Pyrenean landscape for thousands of years. Ancient forests have ceded their dominance to verdant pastures that, today, symbolize the 'nature' of the mountains; 'wild' life has ceded its historical presence to domesticated livestock. Now, however, the Pyrenean Mountains are undergoing an anthropogenic process of rewilding: after decades of conservation and two (re)introduction programs, the autochthonous brown bear population, now extinct, has been replaced with bears of Slovenian origin.

This process is not without contention. Bears, like other apex predators in their 'natural' habitat, are considered beneficial to the overall health of the ecosystem. Furthermore, brown bears are a protected species in Europe, and their conservation is assured under the Habitat's Directive. Conservationists and environmentalists argue that Pyrenean pastoralism has always coexisted with large predators, and should, therefore, willingly (re)adapt its methods and practices to revalorize and reinvigorate a broader return to a once-present, but suppressed, level of biological and cultural diversity. On the other hand, far from imagining a more resilient natural and cultural landscape, pastoralists view these imposed changes as a threat to biodiversity, and worse, to their livelihood and identity.

Discussions about bio-cultural diversity often focus on the 'bio', subtly obfuscating the 'cultural' implications which are inevitable within the intensely anthropic European landscape context. As an anthropologist, I draw upon my multi-species ethnographic fieldwork in the French Pyrenees to explore these complex and conflicting interspecific relationships, framed, as they are, by the classic nature-culture dualism.

My research seeks ways to better understand such bio-cultural opposition in order to identify possible ways of bridging this 'Great Divide', and to ameliorate conflicts involving large predators; in particular, human-bear relationships. My fieldwork suggests fundamental disconnects between global, international, and local environmental policy making and implementation. This is exacerbated by a lack of consideration for the differing perceptions the interacting human and nonhuman actors have of 'culture', 'nature', and 'wild nature'.

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SOCIAL DRIVERS TO HUMAN-BEAR COEXISTENCE IN A RAPIDLY CHANGING SYSTEM: A CASE-STUDY FROM TRANSYLVANIA

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One of the major challenges for brown bear (*Ursus arctos*) conservation in human-dominated landscapes is to achieve coexistence between bears and humans over sustained periods of time. In the cultural landscapes of Transylvania, Romania, humans and bears have shared the landscape for centuries. Our previous research revealed that humans and bears coexisted relatively peacefully, provided that bear damages remained low and suitable bear habitat remained available. However, rapid socio-economic changes may potentially disrupt this long history of coexistence both from an ecological and social perspective. In this study we aimed to identify the social drivers that could either erode or maintain human-bear coexistence in Transylvania. We used an integrated approach combining quantitative questionnaires to gain a broad overview on coexistence dynamics with qualitative interviews to deepen our understanding. We conducted 250 questionnaires and recorded 70 interviews with local inhabitants of variable professional background. People were asked about their perception on current coexistence and future coexistence. A large proportion of the interviewees perceived coexistence to be relatively peaceful. Their opinion on coexistence is discussed in relation to their attitudes towards bears, experience with bears, cultural values, and bear management. Our findings highlight the importance of social research on human-bear coexistence.

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INSIGHTS INTO POLAR BEAR BIOLOGY FROM INTERVIEWS WITH ELDERS AND HUNTERS IN THE NORTHERN EEYOU ISTCHEE MARINE REGION, QUÉBEC, CANADA

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Polar bears are important socio-cultural symbols in the communities of the Eeyou Istchee marine region in north-western Québec, Canada. Cree communities in this region are not active polar bear hunters, but encounter polar bears when fishing, trapping, or waterfowl hunting during the ice-free season. Reduced annual sea ice cover in Hudson Bay has led to declines in body condition in the local Southern Hudson Bay subpopulation of polar bears, as well as population declines in the neighboring Western Hudson Bay subpopulation. In June 2012, we conducted semi-directed interviews (n=15) with local elders and hunters on the subject of polar bear biology and climate change in three communities in the northern Eeyou Istchee marine region (Wemindji, Chisasibi, and Whapmagoostui). The interview transcripts were coded thematically and analyzed using both qualitative and quantitative methods. We compared the results of these interviews with scientific findings in the literature, and comment on the patterns of convergence and divergence in the data. Through the interviews, important insights into polar bear distribution, terrestrial habitat use, denning, and foraging patterns were revealed. The participants were unanimous in their recognition of a warming climate and prolonged ice-free season in the area in recent years. However, significant differences were noted between communities in some regards, including the prevalence of problem polar bears in the vicinity of the community, and the views of community members on the conservation status of polar bears in the region. Participants in this study also identified future research priorities pertinent to the communities, and provided comments on the methods employed by polar bear biologists. Our results provide unique insights into the opportunities and challenges of combining Traditional Ecological Knowledge with wildlife science in the context of a rapidly changing Arctic environment.

Session: Human – Bear Conflicts

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A GLOBAL SNAPSHOT OF HUMAN-BEAR CONFLICT: COUNTRIES, EXPERTS AND FACTORS

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Human-bear conflicts cause economic losses, injuries and even fatalities to people. Particularly in Asia and South America, conflict causes hardship for individuals and affects rural economies. Real or perceived threats to people can prompt retaliation against bears, which may threaten the future of small, isolated bear populations. To take a snapshot of human-bear conflict and its management worldwide, we conducted a survey of bear experts (n=104), countries (n=54) and reviewed human-bear conflict management plans (n=50) as well as relevant peer reviewed articles (n=172). Our study revealed that human-bear conflict is managed in about one-third of present bear range. Researchers and managers involved in human-bear conflict reported a globally increasing trend, with serious negative impacts on bears in some areas. Trends in, and severity of, conflicts and their impact on bear conservation appeared to be similar across four continents. However, the main drivers of conflict and conflict types differed amongst bear species. Through our critical review of human-bear conflict management plans and articles, we identified ten general mitigation actions (what we called the toolbox of conflict management) to aid current efforts to reduce conflict management. With the exception of North America and few countries in Europe, wildlife agencies have limited capacity and resources; therefore there is a need to improve the toolbox of conflict management by innovative and cost-effective solutions. We identified economic instruments; community involvement; welfare aspect of conflict; effectiveness of educational initiatives and improving conflict management plans (particularly in evaluation and adaptive management) as the five key factors that should be considered in future conflict management initiatives. Conflicts will continue for as long as bears and people co-occur and, in fact, conflicts are apt to escalate in the future with increasing numbers of people living in proximity to bears. The effective solution of human-bear conflict in areas where conflict is a threat to the viability of bears needs to be holistic and should be tailored to the needs of people as well as bears.

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PATTERNS AND CORRELATES OF BROWN BEAR DAMAGES IN EUROPE

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We investigated brown bear (*Ursus arctos*) damages at a continental scale in order to examine differences between bear populations and to assess factors associated with damage occurrence. We hypothesized that damage occurrence is affected by (1) geographical variables, such as latitude, as they influence bear ecology and biology; (2) landscape features, such as proportion of forest cover or human density, and; (3) factors related to population management, e.g., bear hunting. Information on bear damages to human property was collected for 18 European bear population segments (hereafter study areas). We used the number of compensated claims as an

approximation to the number of incidents. For each study area, the most recent 6-year period was used to calculate the annual mean of incidents divided by the estimated bear population (damage frequency), and the number of livestock predated and/or beehives destroyed per incident (damage magnitude). We analyzed the relationship between the number of incidents each year (total and of different types) and the estimated number of bears, landscape features, geographical patterns and management factors for each study area. Overall, 45% of bear damage was to livestock, 34% to apiculture and 10% to agriculture. However, variation among studied areas was high; e.g., in Southeastern Poland 97% were damages to beehives, in the Pyrenees 86% were damages to livestock, and in Slovenia 56% to agriculture. Damage frequency for the total number of incidents also varied considerably, ranging from 0.05 in Estonia to 8 in the Pyrenees (bears in the Pyrenees damage properties 160 times more than bears in Estonia). Damage magnitude ranged from 6 to 1 (mean±SD for all areas: 3.2±1.67) for predated sheep, and from 7 to 2 (mean±SD for all areas: 3.6±1.53) for destroyed beehives. The number of incidents was not strongly related to estimated numbers of bears, geographical or management variables. However, landscape variables had an important effect on damage occurrence. We discuss the potential influence of the tested variables within each hypothesis for each damage typology.

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RELATIONSHIPS AMONG FOOD AVAILABILITY, HARVEST, AND HUMAN–BEAR CONFLICT AT LANDSCAPE SCALES IN ONTARIO, CANADA

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Managers of American black bears (*Ursus americanus*) must maintain populations in order to ensure viability and opportunities for sport harvest, yet minimize human–bear conflict (HBC). Harvest is a cost-effective management tool in most jurisdictions, and intuitively it seems that with fewer bears, there should be fewer conflicts. Therefore, managers may attempt to achieve both objectives by manipulating the harvest. Because data describing harvest and HBC are frequently collected, managers sometimes infer changes in population status from trends in harvest and HBC. However, evidence that higher harvests reduce HBC is lacking, and changes in harvest metrics and the frequency of HBC may be independent of bear density. Understanding relationships among food availability, hunter effort, harvest, and HBC could help managers avoid making invalid inferences about population status from data describing harvest and HBC, and evaluate whether management actions are having intended results. We investigated relationships among food availability, HBC, and harvest at landscape scales in Ontario, Canada, 2004–2011. We hypothesized that HBC and harvest would be negatively correlated with food availability that HBC would be negatively correlated with prior harvest, and that harvest would be positively correlated with number of hunters. We used Spearman rank correlation to test hypotheses. HBC was negatively correlated with food availability across Ontario, and in the 2 administrative regions where food availability varied synchronously. Total harvest and the proportion of females in the harvest were negatively correlated with food availability across Ontario and in one region. HBC was not correlated with prior harvests, providing no evidence that higher harvests reduced subsequent HBC. Given the variation in natural foods, harvest is unlikely to prevent elevated levels of HBC in years of food shortage unless it maintains bears at low densities—an objective that conflicts with maintaining viable populations and providing opportunities for sport harvest.

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DOES PIKA ERADICATION POLICY INCREASE THE HUMAN-BROWN BEAR CONFLICTS IN SANJIANGYUAN NR, CHINA?

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Brown bears (*Ursus arctos*) are the largest carnivores on Tibetan plateau. Human-brown bear conflicts such as house damaging and livestock killing have become serious problems in the past decade. The previous studies on human-brown bear conflicts in Sanjiangyuan Nature Reserve suggest that pika eradication policy of Chinese government cause starvation to bears, which is the main cause of the increasing conflicts. But there are few studies of bears in this high elevation area, understanding ecological process of them will be the first step in reducing the conflicts and making a conservation plan.

We conducted sign surveys and community-based interviews since 2009. 3 bears were captured and tracked with GPS collars for 3 years, which was the first time to collar brown bears in China. Depending on bear activity intensity, we also designed strip transects for prey survey since 2011. In addition, 12 electric fences were set for a pilot houses-protection experiment.

GPS collar data suggests male bear had ~7,000 km^2 and female bears had ~2,000 km^2 annual home range area, which is really large compare to other studies. The peaks of house damaging occurred in May and Aug, when local people moving to summer range and leaving their food storage unguarded. Food habits are shifty in different seasons, in summer, 27% feces contained human-related food and the main natural food is marmot and pika. The total biomass of pika in our study area is much greater than the bears' feeding need, and there is no significant correlation between bear activities and pika density. For the bears, the net energy gained from breaking into houses is nearly 70 times as much as digging for marmots. Binary logistic regression shows that conflicts are significantly correlated to the efforts people paid to looking after their house.

The study indicates that brown bears are more likely to seek human-related food because it's more efficient and there is no evidence shows the increasing conflicts are related to pika eradication policy. Therefore measurements should be taken to take good care of houses, as building electric fences to partially reduced human-brown bear conflicts.

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BEAR ATTACKS IN ALASKA, 1980-2010

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During the 30 year period from 1980-2010 152 bear attacks by grizzly, black and polar bears resulted in 162 injuries and 17 fatalities. The state of Alaska is largest state in the US with an area of 586,000 mi^2 and a human population of approximately 731,000. There are an estimated 35,000 brown/grizzly bears, 150-200,000 black bears and 3-5000 polar bears that also live in Alaska. Brown/grizzly, black, and polar bears were responsible for 88%, 9% and 1% of attacks respectively. Of the 17 fatalities, 82% (n=14) resulted from brown/grizzly attacks, 12% (n=2) from black bear attacks, and 6% (n=1) from a polar bear attack. Two major classes of serious bear attacks are defensive, where a bear attacks to protect itself, its cubs or a food cache, and predatory where a bear attacks humans as prey. I will summarize information on the attacks by the 3 different species of Alaskan bears comparing types of attacks, the circumstances surrounding the events, and the most common factors that contributed to the incidents.

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CONCEPTUAL FRAMEWORK AND TOOLS FOR THE MANAGEMENT OF ANDEAN BEAR-HUMAN CONFLICTS

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Carnivore-human conflict has been identified as a key factor for the conservation of carnivore populations. The Andean bear-human conflict is not an exception, with and increment in the awareness and effort to manage the conflict in many countries.

In 2009, Wildlife Conservation Society, The Ministry of the Environment and the Colombia Park System organized a national workshop "Principles of Andean Bear Humans Conflict Resolution". A framework for the resolution of conflicts was developed based on the document "Principles of Conflict Resolution between Humans and Bears" developed by the Conflict Expert Team of the Bear Specialist Group.

As a result of the workshop, The National Institutional Round Table for the Management of Conflicts was summoned headed by the Ministry of the Environment, with the goal of developing the tools and legal norms to manage the conflict in Colombia.

WCS as member of the roundtable took the task to develop several of the tools required to manage the conflict. WCS developed the "Manual for the Identification of Predation of Domestic Animals by Carnivores", and the "Guide for the Diagnostic of the Conflict Landscape".

The manual focus on the identification of the cause of death and the identification of the predator species. The guide focus on the characterization of the conflict landscape in relation to the risk of conflict of the human activities of the site. Both the manual and the guide were tested by local environmental authorities at 2 different localities with Andean bear- human conflicts reports. The tools and the results of the pilot studies will be presented.

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HUNTING AS A POTENTIAL SELECTIVE PRESSURE ON THE SCANDINAVIAN BROWN BEAR BEHAVIOR

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Recent evidence suggests that human activities impose selective pressures which may shape the traits of species and have the potential to lead to faster changes than natural selection. Humans can act directly as a selective pressure when harvesting wild populations. Several studies have focused on the effects of commercial fisheries and trophy hunting on morphological or life-history traits. However, few studies have investigated the behavioral effects of harvesting. We show that hunting may have ecological and evolutionary implications on the behavior of brown bears in Scandinavia. Indeed, brown bears reduce their movement rates during daylight hours in the hunting season. Furthermore, hunters have the potential to exert a selective pressure on bears by harvesting, consciously or not, individuals that display a particular behavioral type. Using GAMM, our results show that bears that are shot have higher movement rate than bears that survive the hunting season. Ongoing analyses explore whether hunters also exert a selective pressure on bear habitat selection pattern. If movement rate and habitat selection are heritable, evolution of behaviors caused by hunting is likely to occur. Behavioral evolution caused by human harvesting might reduce the genetic variability present in a population, which can limit the potential responses to new selective pressures.

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BEHAVIORAL CORRELATES OF SUPPLEMENTARY FEEDING OF WILDLIFE: CAN GENERAL CONCLUSIONS BE DRAWN?

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Supplementary feeding (SF) is a common, but controversial, tool in wildlife management and/or conservation, because SF can benefit both humans and wildlife (e.g., increased wildlife densities), but with certain downsides (e.g., increased disease transmission or life history changes). In 'conflict rich' species, SF is often used to lure animals away from human facilities (i.e., diversionary feeding), but has been criticized, because SF may stimulate 'nuisance' behavior (i.e., increased tolerance for humans and selection for human facilities). We tested three hypotheses to evaluate the general functionality of SF as a management tool in such a 'conflict rich' species, the brown bear (*Ursus arctos*); i.e., Hypothesis (H) 1 - SF stimulates nuisance behavior, H2 – diversionary feeding is an efficient management tool, and H3 - individual variation dilutes general patterns in SF site selection. We tested our hypotheses in two populations (i.e., Sweden and Slovenia) with very different environments (density of bears, humans, and history and intensity of SF) to control for contingencies and to detect general patterns in SF selection and its behavioral correlates. We quantified the behavior of individual GPS-marked brown bears (N_{Sweden} = 24, 54 bear-years, $N_{Slovenia}$ = 33, 43 bear-years) with respect to SF site selection and selection for certain terrain characteristics (e.g., vegetation density) and human-related variables (i.e., distance to houses, settlements, roads), and used mixed-effect regression models to identify general relationships between SF site selection and selection for terrain characteristics or human-related variables. We found that selection for SF sites was not related with selection for landscape characteristics. Individual variance explained 39 and 41% of the total variance in SF selection in Sweden and Slovenia, respectively. SF neither stimulated nuisance behavior nor was an efficient tool to lure bears away from people. Our results add to the growing body of evidence that individual variance is an important component of behavioral ecology and should be considered in wildlife management and conservation.

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IS SUPPLEMENTAL FEEDING WITH CARRION AN EFFECTIVE WAY TO REDUCE HUMAN-BEAR CONFLICTS?

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Supplemental feeding is often believed to be a successful tool for reducing human–bear (*Ursus arctos*) conflicts, especially in Europe. However, effectiveness of this measure is poorly understood and there is growing concern for potential negative side-effects. This is particularly true for supplemental feeding using livestock carrion. Carrion feeding is considered especially effective in reducing livestock depredations by diverting bears from pastures and meeting their protein needs.

In Slovenia, year-round supplementary feeding of bears with livestock carrion and maize was intensive and in some areas practiced for over 100 years. However, in 2004 the use of livestock carrion was banned in accordance with European Union regulations. This provided an opportunity to study the effects of carrion feeding on livestock depredations by bears. We used sheep for model species as they represented 97% of all depredation events by brown bears in Slovenia. We analysed whether bears selectively used carrion feeding stations over maize feeding stations (i.e., indicating that carrion might be more effective in diverting bears from sheep pastures) during 1994–2011, and compared the annual frequency and seasonal distribution of sheep depredations 5 years before and after the ban on livestock carrion feeding during 1999–2009.

We found no support that bears selected carrion feeding sites over feeding sites with maize. When controlled for changes in bear and sheep numbers, there was no indication that the ban on carrion feeding increased sheep depredations. Moreover, complementary data indicated that natural protein sources (e.g., invertebrates) were considerably more important than livestock carrion and that use of carrion peaked in spring, when sheep are rarely outdoors and thus unavailable for depredation.

Because of the observed lack of effectiveness, high costs, and potential negative side-effects, we discourage supplemental feeding with livestock carrion to reduce livestock depredation.

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FOOD FOR THOUGHT: SUPPLEMENTARY FEEDING OF UNGULATES AFFECTS BROWN BEAR FORAGING

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Supplementary feeding of ungulates is still one of the main paradigms of game management in Europe. However, our understanding of its ecological effects on non-target species, such as the brown bear *Ursus arctos*, and its conservation implications is still very limited. In this study, we aimed at assessing the magnitude of ungulate supplementary feeding practices and its potential effects on brown bear foraging patterns. The study was carried out in the Bieszczady Mountains (SE Poland), in the northeastern Carpathians in 2010-2012. We conducted an inventory of ungulate feeding sites in 2010 and assessed their use by brown bears through continuous monitoring of 8 sites with automatic cameras year-round. We also related the movement of snow-tracked bears (ca. 230 km) in relation to the distribution of feeding sites. Finally, we conducted stable isotope analyses ($\delta^{13}C$ and $\delta^{15}N$) of bear hair samples and potential bear foods (n=350) to assess the contribution of supplementary food, dominated by corn and beetroots, to bear assimilated diet. In the core research area (four forest districts, ca 700 km^2), a total of 148 feeding sites were inventoried. The mean nearest neighbor distance between all inventoried feeding sites was about 1.17 km. The State Forest Administration provided in these four forest districts 544 and 702 tons during the hunting seasons 2010/2011 and 2011/2012, respectively. This means that a minimum of 781-1008 kg/km^2 of artificial food are provided every year. Snow-tracking data indicate that bears encountered a feeding site every 2 km travelled, suggesting a strong influence on winter bear movements. Main consumers of supplementary food were, in order, jays *Garrulus glandarius*, red deer *Cervus elaphus*, wild boar *Sus scrofa* and pigeons *Columba spp*. Brown bears were the fifth more frequent consumer and were recorded in 11‰ of the pictures taken at feeding sites. Most observations corresponded to solitary bears (82.7%). Stable isotope analysis indicated a higher contribution of natural foods to bear diet than of supplementary food. We discuss the effects of supplementary feeding on bear ecology and behavior, and the potential role of feeding sites as ecological traps.

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TRANSLOCATIONS AND RELOCATIONS OF CONFLICT GRIZZLY BEARS – FACTORS OF REMOVAL SUCCESS AND POTENTIAL IMPACTS ON FITNESS

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Where populations of grizzly bears are in decline the preservation of individuals is a primary management concern. In these areas non-lethal management removals of animals involved in human-bear conflicts are often chosen over euthanasia as a management response. Translocations and relocations of conflict grizzly bears in North America have previously shown a low success record with individuals commonly homing, re-offending, and/or showing low survival and reproductive success. Reasons for low success rates have received little attention and are poorly understood.

We investigated factors affecting removal success by examining 10 years of radio-collar data obtained from 50 grizzly bear translocation and relocation events in Alberta, Canada. We explored relationships between translocation and relocation outcomes and the bear's age, gender, conflict history, and the season of removal. We also drew connections between the energy budgets and movements of translocated and relocated bears by using straight-line movements between telemetry locations, and compared these with ecologically appropriate control groups.

The overall success rate of translocations and relocations of conflict grizzly bears was 30.5%. We found success to be 29 times more likely if a bear was moved outside rather than within its population unit of origin, and that this was age, and gender independent. We observed statistically non-significant trends indicating that spring time translocations were more likely to be successful than translocations following summer and fall conflict events, and that translocations were more likely to be successful when the conflict did not involve anthropogenic resource use. Translocations and relocations had a negative impact on the energy budget of grizzly bears based on significantly delayed den entry dates and increased movement rates compared to local grizzly bears.

We believe that managers should consider these findings when making decisions on the non-lethal management removal of grizzly bears involved in conflict situations.

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THE EFFICACY OF INTERCEPT FEEDING IN REDUCING SPRING GRIZZLY BEAR-RANCHING CONFLICTS

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The propensity for conflict between grizzly bears and agricultural activities is high in southwestern Alberta where bear-ranching conflicts are common. To reduce spring grizzly bear agricultural conflicts, road-killed ungulate carcasses were slung via helicopter to 12 high-elevation feeding sites (typically 7 deer per site) during March and April 1998-2013 in an attempt to keep bears off lower elevation private lands where cattle are calving. We evaluate the program's efficacy by tracking changes in spring grizzly bear livestock conflict relative to total grizzly bear conflict reports, identifying the proportion and sex ratio of the grizzly bear population using the intercept feeding sites, and by summarizing the program costs. At each station WD40 was used to elicit a rub response from visiting grizzly bears to collect hair. Using nuclear DNA extracted from hair follicles we identified individual bears and gender for grizzly bears; these genetic data are integrated into a larger regional monitoring program tracking changes in grizzly bear population. Over the last 15 years we document an increase in both total grizzly bear agricultural conflicts and spring conflicts despite the intercept feeding program. Bears using the intercept feeding sites are different individuals than those detected at spring conflict sites. However, few individuals (18) relative to the regional total minimum number of bears (122) were detected at intercept feeding sites, and use was male biased (15 males vs. 3 females). A regional population study indicates that the grizzly bear population has increased. While the intercept feeding program might act as a supplemental food source acting to increase the total grizzly bear population and potential for conflict, this is unlikely because so few bears use the intercept feeding sites. Our results show that while intercept feeding might be effective at preventing conflict for some individual bears, it may be ineffective as a management tool because few bears use the sites and overall conflicts are increasing. As an experiment the provincial government has temporarily suspended the intercept feeding program for two years and we will continue to monitor conflicts and offending bears to evaluate the consequences of suspending the program.

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WHAT TO DO WITH OFFSPRING OF CONFLICT BEARS: GENETIC INSIGHTS FROM THE GREATER YELLOWSTONE ECOSYSTEM

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Management of human-bear conflicts is one of the greatest challenges for bear managers throughout the world. When female bears with offspring are involved in human-bear conflicts, managers face a dilemma. Translocation of offspring with the conflict mothers may increase the likelihood that nuisance behaviors are passed on to the next generation as reproductive females typically return to their established ranges with their offspring. Alternately, when management decisions involve removal of females, additional removal of dependent offspring is often not supported by the public nor may it be desirable if the conservation need is high. One option is to transport older offspring (i.e., yearlings) to new locales separately from their conflict mother. The rationale is that learning plays an important role in the development of individual foraging patterns and that separating offspring would reduce exposure to undesirable behavior. However, an important question is whether offspring separated from conflict mothers ultimately contribute to the population. We examined this question using data from grizzly bears (*Ursus arctos*) in the Greater Yellowstone Ecosystem (GYE). During the late 1960s– early 1970s, open garbage pits in Yellowstone National Park (YNP) and surrounding communities, where grizzly bears had fed for decades, were closed to reduce dependence of bears on anthropogenic foods. The immediate effect was a substantial increase in management removals and subsequent concern about population status. Early studies indicated an urgent need to reduce female mortalities. Thus, maintaining female offspring in the ecosystem was important. Researchers and managers in the GYE began separating offspring from conflict females in the early 1980s. We used individual life history information and genetic analysis of parentage to examine the fate and population contributions of >25 yearlings that were transported and released separately from their conflict mothers. Our findings indicate that 2 such female offspring were particularly important to the population and likely made a substantial contribution to the southern expansion of occupied range. We conclude that, under certain conservations scenarios, separating yearling bears from mothers can be a viable and successful management option.

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RELOCATING BEARS IN ROMANIA CAN BE CONSIDERED A MEASURE OF EFFECTIVENESS OF MANAGEMENT TO REDUCE HUMAN - BEAR CONFLICTS?

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Romania holds a population of 6,000 bears, and the optimum population number is 4,000 bears, situation that causes annual human-bear many direct conflicts, sometimes lead to human victims.

The question is, which is the main cause that brings direct bear-human conflicts and what to do with these bears that cause conflicts?

This household waste collection platforms in Brasov, has been identified from the period 1980-1990, when they were identified 5-10 bears. The climax was reached in 2006, when they were identified 42 bears the same night in Brasov.

The situation began to be dramatic when in 2004, in Brasov, one bear killed 2 people and seriously injured 9 people. The local authorities, have decided to implement a joint action plan, the main measure to reduce conflicts is to relocate all bears that are entering the city.

From 2004 till 2013 a number of 102 bears have been relocated in 14 different places in the Romanian Carpathians, at the distances between 30 and 400 km.

Meanwhile we recorded a number of 37 direct events of conflicts between humans and bears of which 6 people were killed and 31 people were injured in this area.

Relocating bears was done differently:

- female bear with cubs less than one year, were separated, and the cubs were moved to a rehabilitation Center for orphaned bears Harghita and females were relocated at distances of over 200 km from Brasov .
- Subadult bears were relocated directly in their natural habitat at distances ranging interests 30 and 300 km from Brasov.
- adult females with cubs aged 1-2 years were relocated together in natural habitats at distances of 100-200 km from the town of Brasov.

Conclusions after 10 years experience of resettlement actions bears and monitoring, is that this management tool is effective only in isolated cases (20-30%), when the bears were able to find their place in natural habitats, without causing conflicts and without being shot or killed by other bears.

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THE LARGE MARINE ECOSYSTEM APPROACH TO ASSESSMENT AND MANAGEMENT OF POLAR BEAR SUBPOPULATIONS

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As an apex predator dependent on sea ice as habitat for catching prey, polar bears (*Ursus maritimus*) are threatened in terms of survival rates due to the loss of sea ice in relation to climate change. Current management plans have made modest progress in providing adequate assessment and management of the 19 polar bear subpopulations in the five nations containing the subpopulations: Canada, Russia, Greenland, Norway, and the U.S.A. Polar bears are distributed across Large Marine Ecosystems (LMEs) where changes in ice cover are affecting their survival. This study describes the utility of the LME approach as transboundary ecosystem-based adaptive management to sustain polar bear subpopulations during climate change. The LME approach offers the means through which transboundary issues can be assessed, prioritized, and addressed through an evaluation of five modules: productivity, fish and fisheries and marine mammals, pollution and ecosystem health, socioeconomics, and governance. Historically, the Global Environment Facility (GEF) has provided funds to eligible countries for the execution of the LME approach to assessment and management of marine resources. Through the GEF project cycle, the five polar bear nations (with one GEF-eligible country, Russia) may appropriate and involve co-financing regimes to achieve collaborative and integrated management. This study demonstrates that an analysis via the LME modules may provide a means of diagnostic evaluation and strategic planning for transboundary polar bear conservation in Arctic LMEs.

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IS LEGAL GRIZZLY BEAR HUNTING LEADING TO THEIR EXTIRPATION IN BRITISH COLUMBIA?

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Grizzly bears are found across approximately 800,000 km^2 of British Columbia (BC) and represent about one quarter (≈15,000) of these bears in North American. Many population units are legally hunted in BC and there have been numerous suggestions that the hunt is unsustainable and populations are in decline and will even be extirpated due to hunting. Because of these concerns, the European Union banned the importation of hunted bears from BC in 2002. We test the hypothesis that overharvest is leading to declines and extirpation by using: 1) recent data on vital rates from Banff, Yellowstone, Northern Continental Divide Ecosystem, and the Flathead drainage in harvest models, 2: age and sex of bears killed since 1980 (n=11,087), and 3) recent DNA-based mark-recapture estimates. Based on vital rate information available in 1984, the total (reported plus estimated unreported) human-caused mortality rate targets currently varies between 4 and 6% for hunted populations. Newer estimates of natural mortality and reproductive rates in models suggest that a human caused mortality rate of between 5.7 and 8.6% is generally sustainable. The average age of males killed by hunters has increased significantly from 7.4 in the 1980s to 8.4 in the 2000s, sex ratio of kill has gone from 65 to 68% males in the same time period, and the slope of the weighted regression of kill sex ratio with age shows an increasing proportion of the kill being males in older ages than in younger ages and this slope steepened in the 2000s from the 1980s or 1990s. Harvest data for each of the 41 hunted population units suggests that 2 may be of concern, but inventories have been done in or next to these. The 26 inventories in hunted population units have found an average of 32 bears/1000 km^2, which is higher than many unhunted, largely protected areas in North America. These results do not support the overharvest leading to extinction hypotheses. The issue of hunting grizzly bears in BC appears much more an ethical question than one of sustainability.

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CARIBOU HABITAT RESTORATION WITHIN GRIZZLY BEAR RANGE: INTEGRATED LANDSCAPE MANAGEMENT FOR SPECIES AT RISK

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Caribou and grizzly bears co-occur across part of their range in western Canada. In Alberta, both species are considered species at risk, however only caribou are protected at the federal level. Following this, there is considerable focus upon restoring habitat (seismic lines, pipelines, pipeline right of ways, cutblocks, and roads) within caribou ranges to mitigate the effects of habitat fragmentation and associated increased rates of predation upon caribou. This habitat restoration may reduce habitat for grizzly bears, which have been shown to select for disturbed areas in managed landscapes. In Alberta the dominant disturbance types are seismic cutlines, and these are the focus of many restoration activities in caribou ranges. Recent research has demonstrated that grizzly bears select for seismic lines in some seasons. In comparison caribou avoid seismic lines in the winter and summer seasons. It is unclear whether this pattern remains at all stages of re-vegetation. Such information will be vital to understand where habitat restoration activities should be focused for caribou, and to understand how caribou predators, including grizzly bears, use these disturbed areas. We used GPS location data and remote sensing measurements of vegetation height derived from LiDAR to assess caribou and grizzly bear habitat selection and movement rates in relation to seismic lines at different stages of re-vegetation. Our habitat selection analysis found a weak pattern of avoidance of seismic lines by caribou, and, similar to previous research, selection of areas <100m from seismic lines by grizzly bears. However, when we included vegetation height into our analysis we found no relationship with animal occurrence and re-vegetation stage. Conversely our analysis of movement rates revealed that adult male bears were moving at higher rates when vegetation height of seismic lines are < 1.5m. Increased predation is the proximate cause of caribou declines. Focusing restoration efforts on seismic lines in areas with a high probability of use by caribou and that are at vegetation heights that facilitate predator movement, is likely to decrease introgression of predators, including grizzly bears, into caribou ranges, and help to maintain both caribou and grizzly bears in Alberta into the future.

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GENETIC MATING SYSTEM AND SEXUAL SELECTION IN POLAR BEARS (*URSUS MARITIMUS*)

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Mating systems play an important role in evolutionary processes yet studies of mating systems among solitary sexually dimorphic species remain uncommon. Herein, we describe the genetic mating system and quantify selection on male and female phenotypic traits in polar bears (*Ursus maritimus*) using a multi-generational pedigree from the western Hudson Bay polar bear population. We used 25 microsatellite markers to test for parentage among 2,229 offspring born from 1975-2005. Maternity was assigned to 1,665 cubs (75%) with ≥95% confidence. Paternity was assigned to 873 cubs (39%), 152 without and 723 with a known mother (≥95% confidence). Among 212 polytocous litters, for which at least one cub was assigned a father, we detected 14 (6.6%) cases of multiple paternity. Minimum estimates of male lifetime reproductive and mating success ranged from 0-13 cubs (2.37±2.74) and 0-9 mates (1.68±1.89) respectively. The opportunity for sexual selection was greater in males (I_m=1.34) than in females (I_m=0.50) and selection gradient analysis indicated differential selection on adult body size between the sexes. We discuss how density, estrus asynchrony and the operational sex ratio influence patterns of lifetime reproductive success and sexual selection in the polar bear.

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DENNING ECOLOGY AND REPRODUCTIVE BIOLOGY OF THE AMERICAN BLACK BEAR (*URSUS AMERICANUS*) IN AN ISOLATED POPULATION IN CENTRAL GEORGIA, U.S.A

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The American black bear population (*Ursus americanus*) in central Georgia has become geographically isolated from the larger, more continuous northern and southern Georgia black bear populations due to habitat fragmentation and human encroachment. In addition, a lack of suitable habitat corridors for dispersal and connectivity to other bear populations has resulted in reproductive isolation. Using non-invasive genetic sampling, a companion study has estimated as few as 150 bears in the population. Winter dens are necessary habitat requirements for black bears and are essential to cub survival and thus, population growth and viability. Female black bears in Central Georgia rely solely on ground dens since cavities in trees and the ground are generally absent from the landscape. Thirty-four female black bears were captured, immobilized, and fitted with GPS and VHF collars during the summers of 2012 and 2013. From December to mid- February, we identified female den sites using GPS data acquisition and triangulation. Den visits were conducted to confirm locations and reproductive status. We found that females initiated and terminated denning later relative to other published studies. After den emergence, we measured microhabitat characteristics of the site including nest composition, canopy cover, and plant obstruction. Ten of the 16 dens surveyed in 2013 were sites of parturition. Parturient females chose a nest associated with a downed tree (40%) more frequently than nests with standing trees (30%), nests with no tree association (20%), and slash piles (10%). Spatial coordinates of dens will be combined with land-cover habitat layers to evaluate macrohabitat characteristics associated with dens. To examine survival rates of cubs of the year, each female with offspring was tracked 3 times between May and August to visually confirm the number of cubs present. In comparison to other eastern black bear populations, average litter sizes (1.85 cubs/den) were lower. Survival rates of cubs of the year after the summer of 2013 were 78.5%. The black bear population in central Georgia has unique restrictions in habitat availability and isolation, but understanding of their reproductive trends will provide insight for future conservation management techniques.

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CONNECTIVITY AMONG SUBPOPULATIONS OF LOUISIANA BLACK BEAR AS ESTIMATED BY GENETIC ANALYSES AND A STEP-SELECTION FUNCTION

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The Louisiana black bear once ranged throughout Louisiana, southern Mississippi, and eastern Texas and occurred in the bottomland hardwoods of the Lower Mississippi Alluvial Valley. In 1992, the USFWS granted the Louisiana black bear threatened status under the U.S. Endangered Species Act listing loss and fragmentation of habitat as the primary threats. Criteria for delisting under the 1995 Recovery Plan include the establishment and protection of immigration and emigration corridors. Our objectives were to estimate movement parameters and genetic structure of black bear subpopulations within Louisiana. We used data collected from GPS radio collared bears to perform a step selection function analysis to estimate movement paths and dispersal rates. Additionally, we collected data with non-invasive DNA sampling and live capture to estimate interchange and structure between 4 subpopulations in Louisiana (Tensas River Basin-TRB, Upper Atchafalaya River Basin-UARB, Three Rivers Complex-TRC, and Lower Atchafalaya River Basin-LARB) White River National Wildlife Refuge, Arkansas. We obtained 5,400 fixes for 8 females and 30,832 for 23 males from April 2010 to October 2012 and generated a step selection function based on distance to roads, distance to natural cover types, and distance to agricultural land. Our genetic analysis indicates that bears from the UARB dispersed to the TRC and bred with reintroduced bears there. Moreover, our DNA data indicate that some bears dispersed from the TRC to the TRB. Circumstantial evidence suggests that these dispersals are most likely males. The genetic results are supported by our step-selection models with high levels of potential interchange for males between TRB, TRC, and, to a lesser extent, UARB. The potential for dispersal by females was much lower. We conclude that contemporary interchange of male bears between the Tensas and Atchafalaya River Basins via the TRC (a recently reintroduced subpopulation) has occurred. However, for female interchange and demographic rescue to be effective, linkages between subpopulations would probably have to be permanently occupied. Thus, the establishment of satellite populations of bears between the subpopulations to be linked in Louisiana may be a more effective measure than the establishment of long corridors without a population presence in between.

Session: What Works: Innovative Successes in Bear Conservation, Management, and Science

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FACILITATING BROWN BEAR RECOVERY IN NORTH AMERICA AND EXPLORING EMERGING OPPORTUNITIES FOR COLLABORATIONS IN CENTRAL EUROPE: CAN A COMMUNITY-SUPPORTED APPROACH BE TRANSFERABLE?

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Since carnivores such as brown bears (*Ursus arctos*) use a variety of habitats, it is arguable that population recovery is governed to an extent, by the choices people make, their behaviors and practices, and ultimately where people choose to allow bears to live given adequate habitat quality. We describe an applied research and conservation effort that seeks to build a prototype for human-bear coexistence 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 activities for nearly twelve years. 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 demonstrate that reported and verified human-bear conflicts have been reduced by 93% from 2003-2013 and that there is a downward trend in grizzly bear mortality for this same period while the bear population increased and recolonized former habitats. 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 are now beginning a formal collaboration in Slovenia that began with an IBA-Travel Exchange grant to explore potential applications of this North American work to Central Europe. With partners from Austria, Croatia, Italy and Slovenia we have recently secured a European Commission LIFE grant and are now beginning a formal collaboration to address human-bear conflicts in northern Dinaric Mountains and facilitate brown bear recovery in the eastern Alps. We will discuss this emerging collaboration and offer some initial plans for this emerging partnership.

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PARTICIPATORY BIOLOGICAL MONITORING OF ANDEAN BEAR, AN ALTERNATIVE LOCAL COMMUNITY CONTRIBUTION TO THE RESEARCH PROCESS AND MONITORING OF SPECIES - PUTUMAYO CASE

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This project takes place in an Andean fringe, which includes ecosystems ranging from the Amazonian foothills until Paramo in the department of Putumayo Southern Colombia. In a total of twelve sessions, which included 1 year labor (2012-2013) a group of 15 people between peasants communities and indigenous (Ingas and Kametsa), ex- hunters and women of the community, all ages in a variety of different techniques bears monitoring and equipment management. The techniques include the use of an analogue mapping, field orientation, GPS handling, field data collection in digital and analog formats, using digital cameras and optics including binoculars handling, use and disposal of camera traps and adapting trails for monitoring populations of Andean Bear. Within this project a group of friends of bears in the region also was settled, an elaborated radio program was carried out with the community and an education program PRAE was developed with the schools in the area where Andean Bear was includes as key species and the impacts of climate change on their habitat.

As results that stand out are the identification of three areas with the presence of bears, which included Paramo vegetation, Andean forest and Andean forest (own ecosystem of the area), collecting 145 total Andean bear geo-referencing points during the past three years including casual, seasonal and permanent places of presence of the specie in the region, development of educational materials articulated to the school curricula, development of a manual on community - zoo fauna monitoring mast, installation of 12 camera traps, identifying 6 permanent trails of bears in the region, a 12 sessions radio program about bears conservation and finally stablish a bear group of friends, besides a well-trained 15 people in the biological monitoring of Andean Bear.

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SUCCESSFUL AMERICAN BLACK BEAR REHABILITATION NEAR URBAN AREAS

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The American Black Bear can be successfully rehabilitated at facilities near urban areas. Essential to success are opportunities to socialize with other cubs, good body weight and condition at time of release, release into sustainable habitat, and low potential for human interactions during the first thirty (30) days post-release.

At Idaho Black Bear Rehab, Inc. (IBBR), additional methods include a variety of enclosure designs, customization of dietary and medical protocols, remote observation tools, and cub-appropriate caregiver techniques.

Based on data recovered over the past twenty-five (25) years, IBBR bears have documented survival rates up to six (6) years post release. Radio collar tracking and post-mortem retrieval of ear tags document that few IBBR bears (< .015) have become involved in nuisance situations within 30 days post release, and (< .02) within 31 days to 1 year post release. Most bears (> .96) are successfully released.

Despite release success, differing ideas in management policies can impede the effectiveness of black bear rehabilitation. Ethical and science-based protocols for rehabilitation should be incorporated into regulations and management plans. Consistent standards need to be developed to define nuisance activity with appropriate response methodology. Agencies should integrate the fluid nature and adaptive needs of rehabilitation when drafting policies and procedures. Black bear rehabilitators should contribute to black bear management policies as they affect black bear rehabilitation.

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AUTOMATED METHODS FOR DETECTING AND ASSESSING ABUNDANCE OF POLAR BEARS FROM HIGH-RESOLUTION SATELLITE IMAGERY

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Developing efficient and cost-effective techniques for monitoring Arctic wildlife is a priority, given the urgency to understand the ecological impacts of a rapidly changing environment. We previously found that during the ice-free season, we could visually discern and accurately count polar bears on land using very high-resolution satellite imagery (VHR; 0.6 m pixel size). However, automated techniques will be necessary to expand this potential monitoring tool to broader scales. Here we report advances in that regard. We procured VHR imagery from Rowley Island in northern Foxe Basin, Canada. We used verified locations of polar bears from our previous research there and calculated average spectral reflectance from a subset of these bears (n = 48). We then used the spectral data to mask the remainder of the image and determined the number of previously identified bears that were captured with our automated method. We repeated this process with different subsets of imagery to assess variability in detection and strengthen inference. Reflectance values (range 0-1) of polar bears averaged 0.75 (SD: 0.08; range: 0.61-0.90). Approximately 95% of the image was eliminated for searching using this method, and about 90% of known bear locations were identified as such. Bears with reflectance values beyond two standard deviations were not captured (n=6), indicating that a combination of automated detection and manual review using reference imagery will be required to obtain more reliable counts. However, on a broad scale, the automated detection rate reported here may be sufficient. Our results suggest that VHR imagery can be a particularly useful tool at larger geographic scales and in regions where less is known about bears to obtain coarse information on their abundance and distribution, and trends in these parameters related to climate change.

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DO FOREST CUTBLOCK RETENTION PATCHES ENHANCE GRIZZLY BEAR HABITAT SELECTION?

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Emulating patterns of natural disturbance has become a more common forest management practice in North America. Part of this shift in harvest design emphasizes structural retention, the process of leaving green trees, snags, and coarse woody debris behind in cutblocks, as a means to maintain interior and old growth dependent species, and more generally to support biodiversity. Grizzly bears are designated as threatened in Alberta, Canada, and may benefit from such forestry practices, particularly since recovery strategies to date have been focused on improving survival by reducing human-caused mortality risk associated with roads, with little attention towards habitat enhancements associated with food resources and cover. Research in Alberta suggests that there is a positive relationship between habitat quality and the amount edge habitat, presumably because of the increase in food close to cover. Although green tree retention may produce the desired edge effect leading to improved habitat conditions for grizzly bears, potential benefits remain untested. Our objectives were therefore to: 1) map tree retention patches within forestry cutblocks; 2) estimate population level resource selection by grizzly bears to the amount, size, and variation in size of retention patches within cutblocks; and 3) examine variation in resource selection relative to seasonality and gender. We used a cutblock database of digitized green tree retention patches and a LiDAR-based mapping where digitized patches were not available to define retention patches and compared these to GPS locations of collared grizzly bears (2005-2013) in west-central Alberta. Using a two-stage modeling approach to resource selection, individual models for each bear were estimated describing the selection of cutblocks to the amount, size, and variation in size of retention patches. Second, we obtained population level estimates of selection by averaging coefficients using a meta-analytical procedure. Lastly, we tested for differences in selection associated with seasonality and gender. We found that grizzly bears consistently selected for cutblocks with greater heterogeneity in the size of retention patches. Management actions that promote variation in patch retention size should benefit grizzly bears as well as biodiversity.

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MONITORING POWER POLES: A UNIQUE TOOL IN THE MANAGEMENT AND CONSERVATION OF BROWN BEARS (*URSUS ARCTOS*, L.) IN GREECE

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Marking and rubbing on poles of the telephone and electricity network is a ubiquitous behavior of brown bears (*Ursus arctos*) in Greece, where the species is considered endangered. In 2002 a long-term project was initiated based on the monitoring of power poles. In the preparatory phase of the project (2002–2004), we inspected >4,500 poles and evaluated their suitability as hair-sampling stations. More than 300 power poles were selected as sampling stations in 7 study areas in the country and were visited monthly from 2007–2009. More than 9,500 visits to the sampling stations were carried out and >3,500 hair samples collected. We present an overview of the main results of nine studies, based on the monitoring of power poles; these studies are:

1) A study that evaluated the suitability of monitoring power poles to detect brown bear presence
2) A study that evaluated the suitability of power poles to genetically monitoring bears
3) A study using power poles to monitor a bear population threatened by highway construction
4) A study assessing the genetic status and evaluating the conservation status of brown bears in FYR Macedonia
5) A study using power poles and genetic analysis to evaluate the genetic status of brown bears in Greece
6) A study using power poles and genetic analysis to estimate the size of the brown bear population in Greece

7) A study using power poles and presence – absence data to estimate brown bear distribution in Greece

8) A study using power poles to understand the rubbing and marking behavior of bears

9) A study using power poles, genetic analysis and data from neighboring countries to evaluate the genetic status and structure of brown bears in the Balkans.

We discuss the advantages and disadvantages of using power pole sampling to monitor brown bears in Greece and propose concrete changes in the monitoring protocol of the species in the country. Finally, we present new opportunities in the use of this methodology by linking it to stable isotope and cortisol analysis.

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MONITORING OF BROWN BEAR POPULATION TRENDS AND REPRODUCTIVE PARAMETERS USING A NETWORK OF PERMANENT COUNTING SITES IN SLOVENIA

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Understanding of population parameters (population size, sex ratio, fecundity/mortality, and spatial distribution) and their temporal dynamics is one of conservation and management foundations for any animal species. Specific behavioral and ecological characteristic make brown bear *Ursus arctos* a difficult species to study. Before recently genetic sampling become the main method for monitoring of brown bear in Slovenia, monitoring that based on direct observation at feeding sites was developed in order to follow several - from management perspective important - parameters of population (e.g., trends of size and reproductive parameters).

Monitoring was established within a previous Life project Conservation of large carnivores in Slovenia – Phase I (*Ursus arctos*) in Slovenia (LIFE02NAT/SLO/8585) in 2004. Three times per year at full moon in spring, late summer and autumn the bears are simultaneously counted from dusk until midnight at all permanent counting sites at the same day. The counting is performed on supplemental feeding places maintained for ungulates and bears, that were selected to be at least 2 km away from human settlements (to avoid habituation of bears) and at least 3 km away from other counting places to diminish double-counting of the same bears. In this way, a minimum number of bears is determined, population trends, and valuable reproduction data is obtained (number of females with cubs, number of cubs per female). There are differences of sex and age structure of observed bears between different seasons during the year due to biological characteristic of brown bear. The method, has the advantages of being a cost-effective way to gain an insight into the relative dynamics of population size, reproduction and population range, and enables direct inclusion of hunters (as one of the most important interest groups) into brown bear management. The net of 167 permanent counting sites covers Slovenian part of Dinaric Mountains where live majority of bears in Slovenia. In the next Life project Population level management and conservation of brown bears in northern Dinaric Mountains and Alps (LIFE13 NAT/SI/000550) the same monitoring will be started also in the neighboring country Croatia. On this way will be established the trans-boundary monitoring of the brown bear population in the northern Dinaric Mountains.

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OCCUPANCY MONITORING OF ANDEAN BEARS AT THE NATIONAL NATURAL PARKS OF COLOMBIA

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In 2009, WCS and the Parks System of Colombia started a collaboration for de development of the Andean Bear National Monitoring Program. The goal was the development of a monitoring program that will have the statistical power to detect changes in the population of the Andean bear in the protected areas. The program has to include the sampling design that will suit different protected areas sizes, have an adequate statistical power, include all the protocols from the field to the analysis and interpretation of the data.

In 2010, after a complete year of program development, we started a 4-month pilot at the Chingaza National Natural Park. The pilot was successful and we were able to develop a design that was able to detect a 20% reduction of the occupancy of the area of interest over a 4-year period with 0.8 statistical power, and 0.2 significance. The whole design can be adapted to any park size changing the number of sampling units and replicates within the sampling units.

Since 2010, occupancy monitoring was started at another 3 national parks (Doña Juana-Cascabel, Hermosas, Purace, Tama) in Colombia. Moreover, the methodology is been used as part of the GEF Project “Advancing Landscape Approaches in Ecuador's National Protected Area System to Improve Conservation of Globally Endangered Wildlife” in Ecuador, to monitor Andean bear in at the Cotacachi-Cayapas, Llanganates and Podocarpus National Parks, and to monitor Andean Bears at the Machupicchu Historic Sanctuary and Choquequirao Regional Park in Peru. The second sampling at Chingaza is being executed in May-June 2014.

Due to the easy implementation and the quality and usefulness of the of information occupancy monitoring based on Andean bear presence sign can become a useful tool for the conservation of the species.

Session: *Ex situ* Conservation

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EFFECTS OF SPATIAL UNPREDICTABILITY OF FOOD AVAILABILITY ON FORAGING BEHAVIOR IN CAPTIVE MALAYAN SUN BEARS

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Bears in the wild spend large proportions of time in foraging activities. Though being carnivores, most of the ursid species are ecologically opportunistic omnivores. In order to meet their nutritional requirements, they have to select energy rich plant parts and search for animal matters high in protein. During most of the year these resources are widely distributed and not easily available. Consequently, most of their active time is allocated to foraging, which consists of a wide repertoire of explorative and manipulative behaviors that are necessary to find and process the food prior to consumption. Compared to conditions in the wild, captive bears have easy access to food high in energy. As its temporal and spatial availability is highly predictable, locomotor activity is low. Both factors together promote obesity. Feeding enrichment has been documented to increase foraging behavior and is particularly important for species with extended foraging activities as they are found in ursids. But in general these procedures have no long-term effects and result in habituation. As can be expected by the predictions of the optimal foraging theory, foraging activities are low as long as the availability of food is predictable. To quantify the effect of spatial unpredictability, two feeding methods have been designed to stimulate functional foraging behavior in the long term in captive Malayan sun bears kept on a restrictive diet in order to reduce weight. To examine if habituation occurs, the most effective method was tested for 12 consecutive days. Activities of four adult sun bears at the Cologne zoo were recorded by focal animal recording of foraging behaviors and time sampling of activities for a total of 360 hours. Implementing unpredictability significantly increased the time the bears spent foraging and led to a higher diversity of foraging behaviors. The effects lasted throughout the entire day and no habituation occurred in the course of 12 consecutive days. Despite the restrictive diet, intraspecific aggression was constantly low. The study shows how functional species-typical behavior in captive bears can be stimulated in the long-term by simulating natural patterns of food availability.

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THE ROLE AND STATUS OF MANAGED BEAR PROGRAMS WITHIN THE ASSOCIATION OF ZOOS AND AQUARIUMS

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The status and conservation contribution of zoo populations to bear conservation is largely unknown in the bear research community. The status and decision making process by which captive bear populations are managed in zoos has the potential to exert significant influence on bear conservation in general. The Association of Zoos and Aquariums (AZA), manages captive populations of all eight species of bears exhibited in North American zoological parks. This presentation will outline the different categories of management for each species population in zoos, as well as outline the status and challenges facing each population.

We will present the strategies for managing these populations, as well as the rational for arriving at these strategies. The status of collaborative efforts between field programs, non-AZA managed populations, and ex-situ populations within range countries will also be presented. We will outline the different strategies designed to affect conservation of wild bear populations through our exhibits. Finally, the potential for future actions for sustaining (or in some cases not sustaining) captive populations and increasing the conservation effectiveness of zoo exhibits will be discussed.

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RETROSPECTIVE ANALYSES OF MATERNAL INVESTMENT IN CAPTIVE BEARS

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As bears become more dependent on conservation efforts we should consider whether past evolution may affect management outcomes. Evolutionary theory predicts that individuals alter their investment in offspring to maximize their own fitness. One way females may do this is by shifting the sex ratio of their offspring. In mammals, females likely to produce good quality offspring may produce more sons. Because adjustments in maternal investment are more pronounced in long-lived, iteroparous species evolving in variable environments, we expect to see sex ratio adjustment among bears. Here we evaluated data from captive-born litters of seven bear species. Considering only cubs of known sex, the proportion of males in litters was not statistically different from 50% among Andean bears (53.6% of 343 cubs in 224 litters, t=1.24, p=0.22), Asiatic black bears (53% male of 310 cubs in 194 litters, t=1.14, p=0.26), brown bears (48.7% male of 248 cubs in 124 litters, t=-0.38, p=0.71), giant pandas (52.1% of 283 cubs in 212 litters, t=0.66, p=0.51), and polar bears (48.9% of 675 cubs in 588 litters, t=-0.67, p=0.5). However, there were unexpected and contrasting sex ratios among sloth bears (58.5% of 208 cubs in 145 litters, t=2.36, p=0.02) and sun bears (39.1% of 133 cubs in 124 litters, t=7.92, p=<0.01). In addition, female provenance may influence cub sex ratio in some species but not others as the difference in preponderance of males in litters of captive-born versus wild-born females varied from biologically trivial in polar bears (a difference of 0.3% in proportion male) to relatively large differences in sun bears (9.2%) and Asiatic black bears (10.4%). These results suggest that in some species the offspring sex ratio may be affected not only by conditions earlier in females' lives, but also by species' evolutionary histories. Practically speaking, skewed sex ratios pose challenges for captive breeding programs faced with genetic management of small populations. We continue to seek additional data and conduct more analyses incorporating variables such as location of birth, maternal age, parity, and rearing conditions, and to look at other indications of changes in maternal investment, such as litter size and neonatal survival.

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FELLATIO IN CAPTIVE BROWN BEARS: EVIDENCE OF LONG-TERM EFFECTS OF SUCKLING DEPRIVATION?

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Little is known of sexual-oriented behaviors unrelated to reproduction in non-human mammals. Fellatio has been observed in a number of mammals, including bears, but the role and cause of this behavior remains unclear. Male brown bears and American black bears may lick the partner's vulva during sexual activities. Masturbation with auto-fellatio has been observed in captive sloth bears, which had been taken from the wild as young cubs and deprived of maternal contact. Auto-fellatio has also been noted in a captive male brown bear orphaned as a cub. We observed regular and persistent fellatio in two captive male brown bears, both orphaned as cubs. We employed 20 video records to investigate the mechanisms and determinants of this behavior. Acts lasted, on average, 168 seconds, and occurred multiple times per day across all seasons (except during denning). The roles of the males, one as the provider and the other as receiver of fellatio, never changed during 6 years of observation, at which time the bears were 10 years old, and were housed with an adult female (with whom they had no sexual interactions). The humming vocalizations used by suckling bear cubs, were clearly audible during 18 acts, suggesting that the providing bear retained infantile behavior. To our knowledge, this constitutes the first study of this behavior in bears. Bear cubs are known to suckle their mother for milk, bonding, and comfort for at least the first year of their life. Orphaned bear cubs may suck their own or their sibling's body parts, such as paws or ears, and body parts of a human caregiver as a substitute for nipples. Forced early-weaning and subsequent deprivation of proper and sufficient stimulation of suckling reflex can result in teat-searching behavior persisting into adulthood. Our data suggest that the fellatio behavior may have emerged from frustrated suckling reflex in individuals orphaned as cubs. These observations raise the unsettling possibility that wild bears that become orphaned (e.g., in human conflict situations) while still nursing may survive on their own in the wild yet suffer lifelong behavioral problems that cannot readily be observed by field biologists.

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EVALUATING THE USE OF A DETECTION DOG AND VOLATILE ORGANIC COMPOUND ANALYSIS FOR NON-INVASIVE PREGNANCY DIAGNOSIS IN THE POLAR BEAR (*URSUS MARITIMUS*)

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There is mounting evidence that domestic canines can be trained to detect odor signatures characteristic of specific physiological conditions. It is likely that the dogs are recognizing volatile organic compounds (VOCs) present in the biological sample. There are growing reports describing VOCs in the fecal matrix, but data are scarce on the use of sniffer dogs for biomedical diagnostics outside of cancer research. The aims of this study were to investigate the reliability of a trained detection dog for non-invasive pregnancy detection in polar bears and to characterize the VOCs present in pregnant versus pseudo-pregnant polar bear feces.

In 2013, a two-year old beagle was taught to identify fecal samples originating from pregnant polar bears at 30-45 days pre-parturition. All samples (n=303) were chosen retrospectively and were collected non-invasively from captive bears (n=27) in North American zoos from 2008-2013. Training was based on positive reinforcement and the dog was conditioned to demonstrate positive identification with a specific behavior. Following training, a double-blind trial was performed. A total of 42 samples (6 pregnant, 36 not pregnant) to which the dog had never been exposed were assessed. The dog's sensitivity and specificity were 66.67% and 97.22%, respectively, resulting in a 92.9% overall reliability in diagnosing pregnancy.

To identify VOCs present in polar bear feces, headspace GC-MS was performed on 40 samples originating from pregnant (n=5) or pseudo-pregnant (n=5) females. Samples contained 292.63±14.70 compounds and 2,705 different compounds were identified across all samples; however, only 221 were common to at least 8 samples. There was no compound unique to pregnant bears, nor was any compound present in significantly higher concentrations in the pregnant versus pseudo-pregnant samples ($P>0.05$).

The results of these preliminary investigations indicate that a trained detection dog may be useful for non-invasively diagnosing pregnancy in polar bears. However, it is likely the dog has identified a scent signature involving numerous compounds instead of a pregnancy-specific VOC. Alternatively, the dog could be detecting a compound that is beyond the range of sensitivity of the GC-MS analysis. Further investigations are warranted to define the window that pregnancy is detectable post-estrus and pre-parturition.

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ENDING BEAR BILE FARMING IN CHINA: SOLUTION BASED APPROACH

Field N, Robinson J

Animals Asia

Across Asia, up to 20,000 bears are cruelly farmed for their bile, despite the herbal and synthetic alternatives that exist. Animals Asia is devoted to end the practice of bear bile farming. Our strategy has taken a multi-faceted approach including five key components; reducing demand, education & raising public awareness, political negotiation & policy change, monitoring trade and our bear sanctuaries.

Since 1994 Animals Asia has rescued 403 bears in China and Vietnam. Bears rescued are mainly Asiatic black bears (*Ursus thibetanus*), with the additional rescue of a number of brown bears (*Ursus arctos*) and sun bears (*Ursus malayanus*). The bears vary in age from 2 month old cubs to those who have been held captive on farms for up to 30 years. The impact of bear bile farming on the health and welfare of bears has been well documented by Animals Asia, and work in this area continues.

Animals Asia's End Bear Bile Farming campaign has the ongoing and ultimate aims targeting the principle authorities in China that have the power to develop policy change and ultimately announce the end of the bear bile farming industry in China. The organization has approached this from different angles but, in early 2014, embarked on an unprecedented project to illustrate a solution, with the intended outcome that ending bear farming can be achieved where the needs of farmers, bears and the government can be addressed.

There are currently approximately 70 bear farms containing up to 17,000 bears across China. Animals Asia has embarked on a collaboration with a bear bile farm in Nanning, Guangxi Province to convert the facility to a sanctuary. This collaboration will ultimately demonstrate a realistic and convincing model to show that it is possible to work together with the industry to end bear bile farming in a solution based approach.

This venture would be a model in conveying the overall message to the public (satisfying the purpose of domestic and international pressure), and delivering the idea to other farms and policy-making authorities.

This challenging project encompasses logistical, financial, political and welfare considerations for the organization. An important and significant step forward in ending bear bile farming, this paper will explore the approach, successes and challenges encountered by Animals Asia.

POSTER PRESENTATIONS

4

ON MODELING CONTEXT-BASED VOCALIZATION AMONG BROWN BEARS

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Bears have captured our imagination throughout centuries. Ancient Finnish and Lappish myths and legends are probably one reason why these powerful animals are still held in great respect today in these areas and referred to as the King of the Forests. The focus of this paper is on context-based communication among brown bears – especially on bear vocalization and body language in certain situations. We introduce a context-based schema for brown bear communication research, which is based on the sensing, processing and actuating (SPA) architecture. In sensing phase, data will be collected with web cameras, audio devices and by human perception. We are monitoring bears in the park-like Predator Center in Kuusamo which is located in the in north-eastern Finland. Collected voice signals can be processed in MATLAB environment with the Signal Processing Toolbox. The analyzed voice signals can be classified by means of spectral features and numerical information. Certain contexts or situations can be associated with (a) numerical or spectral information, (b) voice samples and (c) video sequences showing bear's body language. In actuating phase, different users can retrieve context-sensitive bear vocalization information from a multimedia database. Our system is in its early stage of implementation. Close monitoring, information collecting and signal analysis give us more precise information on bears' behavior. Bears are not only wandering by themselves around forests but they are also communicating with each other and – when needed – for humans as well. The behavioral and communication schema of the bear seems to be very goal oriented and situation specific. If we can recognize context-dependent vocalization schemas, we will be able to create an ABC of a bear vocalization. The ABC will be part of our bear portal and can be used by scientists, authorities, teachers, students, hikers and especially citizens living in bear-rich areas. It is often believed that bears behave in an unpredictable way. However, as with all mammals, bears' behavior is governed by a combination of genetic programming and social and environmental factors. Once we understand bears' behavior and communication better the coexistence between bears and us will be smoother.

9

STATUS OF ASIATIC BLACK BEAR IN WESTERNMOST GLOBAL DISTRIBUTION, HORMOZGAN PROVINCE, SOUTHERN IRAN

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Iran is the westernmost distribution extent of the critically endangered subspecies of the Asiatic black bear (ABB); the Baluchistan black bear (*Ursus thibetanus gedrosianus*). Surveys in Hormozgan province, were organized to better understand the distribution status, Diet and threats of this elusive species during 2009 to 2012. Despite severe field conditions, remoteness and sometimes insecure regions; camera-trapping, scat analysis and interview with local people were among the activities of this study. Through field survey and camera trapping, we obtained invaluable information on distribution and habitats of ABB in Hormozgan Province including new habitat that increase westernmost distribution of this species. 26 food items, including 15 plants, 5 vertebrate, 3 invertebrate and 3 others (Garbage and wax) identified in collected scats. The most common foods were date palm (55% of scats), wasps (27.5%) and fruits of Jujube tree (20%) and only a small portion of the bear diet (3%) is consisted of livestock. Based on interview surveys (n=35), two kinds of conflict exist in the study area; depredation on livestock (goat, sheep and rarely cow) and the use of cultivated fruits (date palm, orange, apple, grape and watermelon). Although raiding orchards, especially date palm are in large scale, but depredation on livestock is the main cause of conflict and negative attitude toward carnivores and primitive system of animal husbandry (without shepherd and poor corralling structures) is the main cause of it. Based on our surveys and collaboration with the local communities, awareness-raising, education and direct compensation schemes were selected as the human-focused and physical barriers, electric fences and habitat management as the Bear-focused methods for reduction of the conflict. Additionally, for conservation of Asiatic black bear in Hormozgan province the first reserve has been proposed and the first edition of Strategic Planning (based on the IUCN Guidelines) was published in June 2013.

10

STABLE ISOTOPES REVEAL RAILWAY-ASSOCIATED BEHAVIOR IN A THREATENED GRIZZLY BEAR POPULATION

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Train collision is the primary cause of mortality for threatened grizzly bears (*Ursus arctos*) in Banff National Park. We investigated the use of stable isotope analysis as a tool for identifying bears that use the railway in Banff. Rail-associated bears had higher δ^{15}N and δ^{34}S values than bears sampled away from the rail, but similar δ^{13}C values. Because elevated δ^{15}N values are indicative of higher animal protein consumption, rail-associated bears likely preyed on ungulates that foraged along the rail or scavenged on train-killed animals. The higher δ^{34}S values in bear hair could have resulted from bears consuming sulfur pellets spilled on the rail (while consuming grains) or through the uptake of sulfur in the plants bears or animals consumed. Similar δ^{13}C values suggest that the two types of bears had generally similar plant-based diets. Results from this study suggest that stable isotopes analysis could be used as a non-invasive, affordable, and efficient technique to identify and monitor bears that forage on the railway in Banff and potentially other transportation corridors worldwide.

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DENNING ECOLOGY OF HIMALAYAN BROWN BEARS IN TUNDAH WILDLIFE SANCTUARY, DISTRICT CHAMBA, HIMACHAL PRADESH, INDIA

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There is very little information on denning ecology of Himalayan brown bears (*Ursus arctos isabellinus*). I studied den use and den characteristics of Himalayan brown bears in sun-alpine and alpine areas of Tundah wildlife sanctuary along Pir Panjal range during 2012 and 2013 (May to November). A total of 13 natural rock caves were identified and all were located between the elevations of 10,200 to 13,800 feet. Brown bear denning in these natural caves were less vulnerable to human disturbance. Bears entered these natural dens as early as 2nd week of November and emerged as late as 1st week of May (Personal observations and by nomadic shepherds). Measurements of dens, entrance aspect, elevation, slope, distance from resting place of herders, nearby vegetation were also recorded. Two sub adult brown bears were sighted and photographed and found sleeping at the entrance of natural rock den at the elevation of 13,562 feet. It is for the first time that all 13 natural dens were video graphed, examined and monitored in remote and rugged mountainous area. Brown bears presence was confirmed by occurrence of plenty of scats inside all natural dens. Four dens were found to have remains of rare alpine herb *Selinum vaginatum* (Family Apiaceae) locally called (Bhutkesi) known to have aphrodisiac effect might have consumed by bears before undergoing hibernation. My study suggests that Himalayan brown bears were more selective for den site and denned at higher elevation on steep slopes and no excavated dens were recorded. This finding aims that, in a shrinking brown bear habitat in Himalayan region, certain areas still remains as critical sites for Himalayan brown bear denning and reproduction, which needs to be further documented and protected for long term management and conservation of the species.

12

STATUS AND DISTRIBUTION OF HIMALAYAN BROWN BEARS IN DISTRICT CHAMBA, HIMACHAL PRADESH, INDIA

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The status and distribution of Himalayan brown bears (*Ursus arctos isabellinus*) was studied in Chamba district(Area 6,528 km^2) including five wildlife sanctuaries and Pir-Panjal and Dhauldhar range falling in chamba district from 2007-2012 (140 days in six years). The information was gathered through field surveys, direct sighting, videography, informal interviews with nomadic shepherds and from primary and secondary data. The line transects were placed (22 in Kugti, 16 in Tundah, 12 in Khaziyar Kalatop, 12 in Gamgul Sihabehi, 9 in Sachutaun Nalla wildlife sanctuaries and a total 180 km survey walk were carried out along rugged mountainous Pir-Panjal and Dhauladhar range. Line transects were 4-6 km long and type of signs included direct sighting, (GPS Locations), scats, digging signs and damage to crops were recorded. Brown bear presence was confirmed in 4 wildlife sanctuaries and highest density and encounter rate was reported from Chadola dhar (Tundah wildlife sanctuary) where 9 adult individuals were sighted in a single day. Fragmented population of brown bears along the Pir-Panjal range were documented and 7 potential habitats were also identified outside protected areas in the district. In Chamba district out of 5 wildlife sanctuaries, Kugti and Tundah are the only sanctuary where fragmented population of brown bears has been identified and confirmed. The sizes of their population do not exceed 22 in Kugti, 18 in Tundah wildlife sanctuary and 30 along the Pir-Panjal and Dhauldhar range. The study also reveals its presence in Pangi and Churah valley. Increasing number of livestock especially sheep and goat and increasing dependency on natural resources, particularly sub-alpine and alpine pastures are key threats and actions like effective management of fragmented potential habitats need special attention.

13

ROLE OF PARTICIPATORY RURAL ASSESSMENT METHODS IN CONSERVATION OF THE ASIATIC BLACK BEAR

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Local communities have an effective role in conservation science, therefore their understanding and participation has begun one of the major parts of the Strategic planning of Asiatic black bear (ABB) conservation in Hormozgan province. This paper tended to explain how using "Participatory Rural Assessment" (PRA) methods influence and leads ABB conservation in its westernmost global distribution, where there is not even a protected area for the specie.

Choosing the mentioned methodology was so efficient that change the early assumption on how the project will run. In common approaches of conservation planning, in Iran, the role of local people is usually considered as the target group with the need of education and those whose actions have a great influence on the future of the team programs, which are mostly out comers in the region. In these projects implementations of the plan located in a range of complete cooperation to less collaboration of local people. Knowing such existent pathology lead the project of "Asiatic black bear conservation in Hormozgan province" team to choose PRA approach to gather the most possible participation of the local people not only in the implementation of the conservation plan but also as decision makers whose their points of view will be affective on the arrangements of the plan phases. In PRA methods local people and community will know the problem and play as not only the main stakeholders but also as a part of the conservation planner team. In this case the project besides of doing the ordinary needs assessment had the local point of view as a deep and realistic facts that could lead the planning to have the active participation of the local people during planning, Implementation and supervision of the conservation of ABB in its westernmost global distribution.

With the assist of PRA methods, the first Strategic Planning for species conservation in Iran was published in June 2013 (Based on IUCN guidelines) for conservation of the ABB in Hormozgan Province as a realistic, flexible and maximum possible participation plan.

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OCCUPANCY AND HABITAT USE OF SLOTH BEAR (*MELURSUS URSINUS*) IN MUKUNDARA HILLS TIGER RESERVE, RAJASTHAN, INDIA

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Mukundara Hills Tiger Reserve (MHTR) is located in Kota, South-eastern Rajasthan in India with an area of 729 km^2 and harbors a sizeable sloth bear population (*Melursus ursinus*). The landscape is mostly patchy, fragmented, degraded and interspersed with crop fields and 23 human habitations. Study was undertaken from April 2011 to May 2013 to study sloth bear occupancy and habitat use in MHTR. Direct encounter and sign survey along trail roads was used for presence absence survey. Habitat type and activity was measured whenever bear were sighted. Vegetation count was also carried out during the survey for measuring the habitat suitability for sloth bears in MHTR. All locations of scats, tracks, or other bear signs were plotted on Arc map using a Garmin GPS.

Bears occupied mainly the dense forest adjoining the villages, six dens of sloth bear were identified; occurrence of sloth bear den in the study area reflected the favorable habitat for bears. Sloth bears were encountered 54 times during the survey. Data collected from the 132 sample plots indicated that the available habitat was mixed forest (53%), scrub land (15.1%), open land (15.1%) land near water (11.3%) and whereas crop represented nil available habitat type. Occurrence of bear sign was high in mixed forest, followed by land near water bodies, open land, scrub; agricultural fields received the nil use.

Presently in MHTR, although the forests are highly disturbed and degraded, they still support a sizeable population (n=42) of sloth bears that can be compared with bear population in other protected areas of India, Nepal and Sri Lanka. Study area forms a large contiguous patch of forest, connecting the fragmented forests of Rajasthan with Madhya Pradesh therefore needs to be quantified and mapped on broad scale land use maps so that necessary steps could be taken to protect and restore such habitats.

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BROWN BEAR – HUMAN ENCOUNTERS IN PYRENEES, FRANCE

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Collect information about bear-human encounters is a prerequisite to communicate with the public about attitude to adopt when meeting a bear and to stimulate their acceptance. 523 events of brown bear visual observations and encounters were recorded between 1996-2013 in Pyrenees Mountains, France. They were analysed in respect to time of day, season, year, type of habitat, kind of observer, number of observers, kind of bear (adult male or female, subadult, female with cubs of the year, undetermined), the distance to the bear, duration of encounter, and the reaction of the bear when it detects human presence. Most often bears were observed during summer at dawn by hikers, professionals of bear monitoring and shepherds. There is a strong variability of bear encounter rate per year related to some individuals. We observed also an inter-individual variability of yearly observation rates among individuals recognizable with collar or ear tags. 83.7% of encounters included 1 or 2 persons, and bears are either in forest (44.2%) or alpine pasture (48.5%). The duration of encounters is positively correlated with distance to humans. When bears detected human presence, for 79.2% of the cases they fled or slowly withdrew. For 16.7% they behaved indifferent and for 2.1% curious. 2.1% of bear reactions corresponded to aggressive behavior with bluff charges. All these last events occurred with females with cubs of the year surprised at short range. These results bring elements of knowledge in the debate on the dangerousness of the brown bear.

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EVALUATION OF FACTORS EFFECTING CORTISOL CONCENTRATION IN BLACK BEARS

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Identifying causes of stress in wildlife populations is a fundamental issue for wildlife conservation and management. Recent studies of captive and free-ranging wildlife demonstrate that cortisol concentration derived from hair provides an integrative measure of past hypothalamic pituitary adrenal activity. Cortisol levels, however, can be influenced by a variety of factors including age, sex, social status, and nutritional stress. Thus, for cortisol concentration to serve as a useful indicator for evaluating HPA activity as a proxy to stress experienced by free-ranging bears, we must understand how different factors influence cortisol concentrations in wild populations. Our objective was to evaluate the relative influence diet, sex, and ecoregion on black bear (*Ursus americanus*) hair cortisol concentration. We used an archive collection of black bear hair collected in 2000 from east-central British Columbia that had already been subject to DNA analysis for species, sex, and individual identification. From the archive collection we randomly selected 30 female and 30 male bears from two adjoining ecoregions that vary in black bear to grizzly bear (*U. arctos*) ratios. We subjected these samples (n=120) to stable isotope analysis (carbon and nitrogen) for diet estimation and cortisol concentration analysis to assay past HPA activity. Isotope values were distributed across a narrow range and indicated that black bear diet was dominated by vegetation ($\bar{x}$ = 98% [96–100% CI]). Cortisol concentration varied overall by sex, although sex had low explanatory power (R^2 = 0.07). Cortisol concentration did not vary by diet or ecoregion despite the ratio of black bears to brown bears being greater in the mountains (2:1) compared to the plateau (15:1). Cortisol concentration was more variable among males, ranging from 0.5 to 35.1 pg/mg ($\bar{x}$ = 7.4 ± 6.3 SD) compared to females, which ranged from 0.6 to 10.7 pg/mg ($\bar{x}$ = 4.5 ± 2.2 SD). These data suggest cortisol concentration in black bears is more strongly influenced by intraspecific interactions than by nutrition or interspecific interactions. To understand the role of social interactions in cortisol concentration in black bears, future studies should evaluate cortisol concentration among individuals of known sex, age-class, and social status.

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AN INTEGRATED AND TRANSVERSAL APPROACH TO FORM GOOD KEEPERS OF NATURE

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Friuli Venezia Giulia is an important cross-border area of the north Italy where a few bears (only males for now) arrived spontaneously from Slovenia and Trentino - Alto Adige. The mountain area of the region is not much infrastructured and populated so meetings between bears and humans are just quite rare. This is the reason why is still possible to "detecte" and modulate the effect of cultural perception for the conservation of Large carnivores. "The Village of the Bears", a non-profit association working for wildlife conservation, with the University of Udine (section of wildlife management), the Prealpi Giulie regional nature park, and other partners belonging to the field of communications and dissemination, has developed a pilot method to "prepare" all potentially involved communities to consider Brown bear as a personal, essential and cultural value. In the project, currently in progress, actions have been designed in such a way to find application on the field with analogue phase of "Brown bear colonization". The approach involves directly the entire population, practically divided in stakeholders categories as breeders, beekeepers, students, researchers, tourists, tourism operator and public administrations. For each of them, have been discussed and now utilized several and different communication tools to get information about the level of knowledge concerning ecology, biology and ethology of this specie, and especially about how to understand how everyone 1) could benefit from Brown bear presence 2) can be essential for the sustainable presence of the bears and 3) can transfer and encourage these important and interior value to future generations. For every category a lot of ambitious, both short and long period, results are expected. Only if these values will be understood and internalized from everybody, we will be quite sure that Brown bear will find the possibility to live together with people through tractable solutions. In the first part of the project, we have noticed a widespread incorrect and negative perception regard this animal and no interest in how everyone can contribute to nature conservation. A ray of sunshine comes from the constant and increasing participation of people to our activity.

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REGIONAL DIFFERENCES IN CARBON STABLE ISOTOPE RATIOS OF WILD BEARS IN JAPAN

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Stable isotope ratio analysis is a common method of investigating the feeding habits of animals because carbon and nitrogen stable isotope ratios of body parts reflect those of various foods. In the case of bears, because $\delta^{13}C$ and $\delta^{15}N$ values differ between native foods foraged in the mountains versus anthropogenic foods such as corn (a C4 plant, with high $\delta^{13}C$ value, that is one of the most seriously damaged by bears) and garbage (high $\delta^{15}N$ value), this method can be useful to clarify the extent of damage inflicted by bears. However, because of the different $\delta^{13}C$ and $\delta^{15}N$ values found across the region, it is necessary to clarify the food materials that affect these specific values or the mechanism that influenced the difference rates. In the Ashio area, in central Japan, Asiatic black bear (*Ursus thibetanus*) show slightly higher $\delta^{13}C$ values than in other areas, even though there are no corn farms around the area. We collected bear scat samples, analyzed stable isotope ratios, and compared the food habits to other areas around the region. Characteristically, the bears in Ashio consumed ants a lot around the summer, and so we analyzed the carbon stable isotope ratios of ants from the area. Ants in Ashio have relatively higher $\delta^{13}C$ value than ants from other regions. Bears also consumed Japanese silver grass *Miscanthus sinensis* that were C4 plants in the spring. We also analyzed the $\delta^{13}C$ value of herbivore insects that were not consumed by bears, and found that they also had high $\delta^{13}C$ values. Consequently, we estimate that there are two reasons that bears in the Ashio area have a high $\delta^{13}C$ value. First, bears consume Japanese silver grass, which were C4 plants in spring. Second, bears consume many ants that in turn consume herbivore insects that feed on C4 plants. The Ashio area is a specific region where abundant Japanese silver grass has been planted to prevent erosion. For these reasons, the bears in the Ashio area may have different $\delta^{13}C$ values compared with other bears in Japan.

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SERIAL TRANS-RECTAL ULTRASONOGRAPHY FOR MONITORING THE REPRODUCTIVE CYCLE OF ASIATIC BLACK BEAR (*URSUS THIBETANUS USSURICUS*)

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This study evaluated the structural changes of the reproductive tract using serial transrectal ultrasonography for the monitoring of reproductive cycle in Asiatic black bears. In addition, the ultrasonographic observations were compared to vaginal cytology and hormonal analysis (plasma progesterone and estradiol). Blood collection for hormonal analysis, vaginal cytology, and transrectal ultrasonography were performed in two bears (Bear 1 and 2) from June 2011 to August 2013 without mating, and in a bear (Bear 3) from April to December 2012 allowing natural mating. Serial ultrasonographic observations showed cyclic changes of ovarian structures (e.g., emergence of small follicles, growth and ovulation of dominant follicles and corpus luteum (CL) formation) during the reproductive cycle in the three bears. The diameter of uterine horns remained similar size throughout reproductive cycle in Bear 1 and 2, while it remained similar size form April until October, but showed an enlargement containing fetuses on December in Bear 3. The ultrasonographic observations were accordingly consistent with the data obtained by vaginal cytology and progesterone analysis during the reproductive cycle: The average 4.0 (± 0.4) dominant follicles (7.4 ± 0.2 mm in diameter) were observed during estrous stage (May–August) based on the vaginal cytology (superficial epithelial cells > 90%). In addition, detection of the average 2.6 (± 0.2) CL (8.9 ± 0.2 mm in diameter) was associated with the increased plasma progesterone concentrations (mean and ranges: 3.0 ± 0.4 and 0.9 to 7.7 ng/ml, respectively) between June and December (near hibernation). In conclusion, a serial transrectal ultrasonography can be used to determine the reproductive cycle based on changes in ovarian structures in the Asiatic black bear.

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MOVEMENTS, ACTIVITY PATTERNS AND HOME RANGE OF A MALE BROWN BEAR (*URSUS ARCTOS*, L.) IN TARA NATIONAL PARK, WESTERN SERBIA

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The Alps-Dinaric-Pindos (ADP) brown bear (*Ursus arctos*) population is considered to be one of the largest populations remaining in Europe; despite its international importance for large-scale bear conservation, detailed and accurate information about the conservation status of some of its sub-populations is still missing. Serbia is located in the geographic center of the ADP bear population, and is of special importance because it connects this population to bear populations in south Eastern Europe. We present the results of the first tracking study in the Tara National Park in western Serbia, where an adult male (named "Miloje") was fitted with a satellite collar. Movements and activity patterns of the bear were documented from April 2007 to January 2008, for a total of 273 days (5,409 valid fixes were collected). Average daily movements were 6.58 ± 4.28 SD km. The longest daily range was recorded in June (22.99 km) and the shortest in January (0.05 km). The largest home range was recorded in May (2980.9 km^2) and total home range was 4,567.50 km^2. During the tracking period, "Miloje" moved throughout the entire western range of the species in Serbia, but also from the Tara National Park into Bosnia & Herzegovina, highlighting the necessity for international coordination in the conservation of bears in the region. Based on the results of the study and their significance for brown bear conservation in Serbia, we propose the continuation and increase of research, monitoring and management efforts for the brown bear sub-population in western Serbia. We also propose concrete management and conservation actions at a national level.

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THROUGH THE EYES OF BEAR: TOWARD AN INCREASE OF UMWELT KNOWLEDGE*

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In the framework of the temporary exhibition "bear: myth and reality" planned from October 2013 till August 2014 in the Natural History Museum of Toulouse (NHMT), a living counterpart consisted to fit a terrestrial animal borne video system (GPS camera collar) on a wild female bear, in Slovenia. The objective was to show to the public of the Museum a short film on the "umwelt" of a bear in the wild. This knowledge-sharing is one of the missions of a Museum and is important for its nature awareness campaign. For this purpose, a 30 minutes-film is in display since April 2014 on a giant screen at the Museum and is also available on the web (www.museum.toulouse.fr). The second aim was to test the animal borne video system as a valuable tool to increase the scientific knowledge of the umwelt of bear, in terms of fine scale habitat use and detailed activity budgets during the daily phase.

From a technical perspective, the animal borne video system we used (Lotek, Canada) consists of a collar equipped with a GPS transmitter, and a video camera with a clock to be scheduled for the release of shots (5 min every hour, 12 h per day) during October 2013. The video camera lies on the front part of the neck. Although the highest activity level in bears occurs during the night in Europe, this video sampling was scheduled for the public and gave priority to diurnal phases.

20h of video embedding 264 shots of 5mn-duration were collected. A detailed analysis clarified some aspects of motor activity, diurnal budget and habitat use. Since the size of video shots was positively correlated with the global activity by minute, we used this proxy to address activity patterns.

Original findings such as the variability of activity level, the postural diversity of diurnal resting and the diversity of habitat used are presented and discussed. Although restricted to diurnal phase, these videos provide valuable data, in particular on feeding activity and interactions with anthropic environment, which we plan to share via internet with the entire scientific community.

* Communication presented during the Video Session

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TRADITIONAL ECOLOGICAL KNOWLEDGE AND SCIENCE: A TRANSFORMATIVE LEARNING FRAMEWORK FOR BEAR CONSERVATION IN THE ANDES OF ECUADOR

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Involvement of people in biodiversity practice is widely promoted through co-management to garner local support for conservation, and to incorporate local and indigenous knowledge in conservation practice. However, the concept of traditional ecological knowledge (TEK) is often epistemologically confused and separated from learning that takes place between residents and scientists in the conservation research process. This paper proposes a theoretical framework of Transformative Learning Theory that allows the combination of science and TEK in a conservation research process and illustrates its application with a case of participatory research in a high Andean indigenous Kichwa community of Ecuador, characterized by livestock conflicts with Andean bear conservation agenda. Based on a decade of personal scientific work and qualitative interview data, this paper applies learning theory to understand a combined science of action through the lens of those that participated in a conservation research process of an endangered species.

We address the following questions:

1) How did a collaborative research process for species conservation facilitate learning among participants in the case of Oyacachi: TEK holders and scientists?

2) Under what circumstances and what are the factors that facilitate or hinder learning in a participatory research process for bear conservation?

3) How do we structure these kinds of learning/experiences? (Theory and Practice)

Research design and analysis were carried out using a qualitative approach and a combination of participatory-action-research (PAR) methodology with ethnographic research methods. Our findings illustrate three types of learning, the factors that facilitate or hinder these different types of learning and the outcomes of the participatory conservation research process, and how those changed the knowledge, perceptions and behavior of participants towards the conservation of bears in the area and the role of the community and the scientists in bear conservation. Based on learning theory and the case analysis, the paper argues for adding participatory-action-research (PAR) and ethnographic methodologies to conservation research design in order to facilitate mutual learning and the effective inclusion of TEK and community in conservation science and practice.

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POTENTIAL EFFECTS OF INFANTICIDE RISK ON FEMALE AMERICAN BLACK BEAR SPACE USE

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Social dominance and intraspecific predation have been documented in bear (*Ursus* spp.) populations. Male bears may increase their fitness by killing unrelated offspring to bring a female into reproductive condition sooner. The ideal despotic distribution model and sex hypothesis of sexual segregation predict adult female American black bears (*Ursus americanus*) will avoid areas occupied by adult males to reduce risk of infanticide. Home range selection and movement patterns are important aspects of black bear ecology that may be influenced by multiple factors, including risk from other bears. To address the hypothesis that females with cubs exhibit behavior to reduce the risk of infanticide, we compared adult female and adult male locations in Michigan's Upper Peninsula, U.S.A. We predicted that females with cubs would occupy smaller core areas and home ranges than females without cubs, would occupy core areas and home ranges that had lesser probability of male use than females without cubs, would move shorter distances each day than females without cubs, and would move shorter distances at times of day when males move greater distances. We calculated distance to nearest road and land cover class for each male location. We will estimate probabilistic male use of the study area using generalized linear mixed models (GLMMs). We estimated adult female core areas (50% isopleths) and home ranges (95% isopleths) using fixed kernel density estimators with the solve-the-equation (STE) technique. We will compare probabilistic male use for each female reproductive status (with or without cubs) and isopleth (core area or home range) type using GLMMs. We will compare female core area and home range size by reproductive status using GLMMs. We will compare sex, reproductive status, and diel period by daily movements using GLMMs. If the study results suggest female bear movements and space use are consistent with risk avoidance behavior to reduce infanticide, additional studies to document the extent of infanticide may be warranted.

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HIBERNATION PERIODS FOR BROWN BEAR IN SOUTHWESTERN RUSSIA (RUSSIA, BRYANSK REGION)

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The Bryansk region is situated in the central part of eastern European plain (51º40’ - 54º05’ N. and 31º10’ - 35º20’ E.). Most of the region belongs to the coniferous forest subzone. The climate is subcontinental, and the average air temperature is +5.2°C. An isolated bear population has formed in the Bryansk Region, numbering about 45-50 individuals.

On average winter begins on November 20 (the stable period when the maximum air temperature does not rise above freezing). The earliest onset of winter recorded was October 31, 1991, and the latest was January 24, 2007. The average length of winter is 104 days. The shortest winter was in 2012 (61 days), while the longest was in 1995 (146 days).

Bears begin to hibernate from November 10 to January 15. Sometimes, notwithstanding negative temperature readings, bears don’t go into their dens until really freezing temperatures or snowfall. In 25 years of observation, bears usually began to hibernate from November 10-20, but there were several years when this occurred in December and even January. In the past few years (2008-2014) anomalous winters have become more frequent, during which the stable period when the maximum air temperature does not rise above freezing occurred in December and January. In this case, the duration of winter ranges from 61-88 days. In 2008-2010, bear tracks were observed until December 20-25, and in 2010-2013 – until January 6-15.

Sometimes in winter bears come out of their dens for a short period during a thaw. For example, in 1992 bear tracks were observed January 10, when the average temperature for that 10 day period was 1.5ºC; in 2002, the tracks of a large bear were observed February 3 (the average temperature for the 10 day period was +0.3ºC); in 2004 bear tracks were observed February 8 (the average temperature for the 10 day period was –2.5ºC).

The onset of spring is determined when the minimum temperature rises above zero degrees. The average date of the onset of spring for the region is March 4. The earliest spring observed was February 3, 2002, and the latest was April 15, 2013. The variation in the period of the onset of spring is 71 days.

The earliest date recorded of a bear emerging from its den was February 1. More often, the first bears emerge between March 23-31. The latest dates recorded were April 3-7, 1996 and April 2-7, 2013.

Therefore, bears in the Bryansk Forest where relatively mild winter conditions prevail hibernate for a duration of 50 to 100 days.

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BROWN BEAR DEN TYPES IN SOUTHWESTERN RUSSIA (RUSSIA, BRYANSK REGION)

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The Bryansk Region is in the central part of the eastern European plain (51º40’ - 54º05’ N and 31º10’ - 35º20’ E). Most of the region belongs to the coniferous forest subzone. Since the 1950s, an isolated population of 45-50 brown bears has lived here.

In 2000-2013, 14 dens were found. Eighty percent of the dens were open surface types. As a rule, these are adult male dens. She-bears with cubs emerge from the den later, when snow cover begins to fragment or is absent, making it difficult to track them.

The dens resembled a large nest. The bears dig a shallow depression in the soil, where they lay birch, willow, or spruce branches, as well as reeds and sphagnum moss or other material found in the biotope. A nest-type den is usually placed among several small trees, on a hummock surrounded by boggy areas, near the trunk of a large tree (usually spruce), under tree roots, or in the base of a fallen tree. The bear breaks several thin trees over the “nest” to form a makeshift roof. Active marking behavior is always seen near the den: broken trees, claw and bite marks on tree trunks, areas where grass or moss cover has been scraped off. The “nest” is round or oval with an external diameter or 120-160 cm. The inside diameter ranges from 60×80 cm to 90×120 cm. The height of the sides of the “nest” is 35-45 cm.

Dens are often situated is moist mixed forests or on small birch-reed swamps.

In 2013, two earthen dens were found in a mixed forest. These were the dens of a female with cubs and that of a young bear. The entrances to the dens were 40×70 cm. The inside of the den of the female with that year’s cubs was 120×160 cm, with a height of 60 cm; the young bear 100×120 cm with a height of 50 cm. An interesting den was found in 2004 in the floodplain of a small creek. A bear made it in the empty trunk of an alder with a diameter of 46 cm. The bottom was covered in nettle, and the bear sat upright inside, also covering itself with nettle branches on top.

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ASIATIC BLACK BEAR RESTORATION PROJECT AT JIRISAN NATIONAL PARK BY GENETIC CONSIDERATIONS

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In 2002, Asiatic black bear restoration project has been started at Jirisan National Park where about 5 wild bears were confirmed. As a result, it has led 35 wild bears in Jirisan National Park region including 17 wild births.

During 2004-2013, 30 bears were introduced from North Korea, Russia, etc. and released into the wild. Korea National Park Service (KNPS) will primarily aim to increase the number of bears in more than Minimum Viable Population (n=50) until 2020. Endangered Species Restoration Project in South Korea involves conservation of Korean biological resources to improve biodiversity and ecological health.

Introduced bears should show their characteristics based on genetic provenance, morphology, physiology, and behavior, and thus they should be assessed as appropriate through comparison with the original or any remaining wild populations. Especially, the bears should aim to provide an adequate genetic diversity.

DNA sequences, mtDNA, have become the most frequently used taxonomic characters for inferring phylogenetic history and reexamination of present classification because they are the basic units of information encoded by organisms.

Mt DNA of total 30 bears introduced until 2013 was analyzed to confirm the gene of reintroduced bears. From blood and hair samples (n=30), total cellular DNA was extracted. Full sequences (1,140 bp) of mtDNA cytochrome b gene were obtained. These sequences were compared with the corresponding sequences of six subspecies in GenBank of the Asiatic black bear. Phylogenetic trees were constructed by neighbor-joining and maximum likelihood methods using the program MEGA (version 5.0).

As a result, these bears were identified as the same subspecies, *Ursus thibetanus ussuricus*, and released into the wild through a wild adaptation program. In addition, the restoration program has been proceeded, based on the scientific studies such as genetic bottlenecks, the survival rate at release sites, and a genetic diversity influencing on their settlement rate.

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RESIDENTS' ATTITUDES AND BEHAVIORS TOWARD BROWN BEARS AND BROWN BEAR MANAGEMENT IN SAPPORO

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The objective of this research is to provide basic information on the attitudes and behaviors of residents in Sapporo toward brown bears (*Ursus arctos*) and bear management. In Sapporo, the capital of Hokkaido, Japan, with two millions of residents, more and more bear sightings have been reported in recent years. In 2011, a few bears were sighted for the first time in some central parts of the city.

The presenter conducted a mail survey among the residents of Sapporo. They were divided into 4 categories: (a) residents of urban areas where bears or their signs were reported for the first time in 2011, (b) residents of urban areas where bears or their signs had been repeatedly reported, (c) residents of suburban areas where bears or their signs had been repeatedly reported, (d) residents of urban areas with no bear sightings. The number of samples was 1,443 in total, and respondents, 868. The response rate was 60%.

The results showed: (1) the level of acceptance of bears outside human residential areas is as high as half in category(a), (b) and (d), but slightly lower in category (c), (2) mass media and neighborhood associations as well as the municipal government play important roles in dispersing information and knowledge about bears among the people, (3) a quarter of the residents in category(a), (b) and (c) didn't get any information about the bear sightings in their neighborhoods, and one third of those who got the information didn't take any preventive action against bears because they believed the bears would cause no harm to them, or because they had no idea what to do with the bears, (4) residents want the municipal government to conduct a variety of activities, especially bear habitat investigation and public education about bear biology and garbage management, (5) farmers and orchard owners in category (c) also want more direct measures to avoid product losses, including helping farmers install electric fences, and control kill of bears in the springtime.

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BEHAVIORAL CONTEXT OF ASIATIC BLACK BEAR (*URSUS THIBETANUS*) VOCALIZATIONS

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Call structure may encode information about morphological and physiological parameters, motivation and emotional arousal of the caller. Vocalizations of Ursidae species have been studied mostly in giant panda, and our knowledge about other species is very limited.

In 2009–2010, we studied vocal behavior of three Asiatic black bear orphan cubs during rehabilitation (from 3 to 20 months) on the Russian Far East. We analyzed over 23,000 behavioral situations during forest excursions and categorized them into 10 behavioral contexts: alarm, distress, agonistic interaction, isolation, foraging, play, locomotion, comfort, investigation and satisfaction. We recorded calls of cubs in these situations using Zoom H2 Handy Recorder (220 audio records in total) and classified them into seven structural call types: whine, moan, yelp, grunt, snort, chuffing and humming. We calculated occurrence of these call types in each behavioral context and performed DFA to assess the differences in structure of whine (the most frequently produced call type) uttered in three situation types of agonistic (begging, threat and fight) and distress context.

Cubs emitted calls during 10% of daily activity in 1,910 behavioral situations: in satisfaction (in 100% of situations), distress (98%), agonistic (88%), isolation (79%) and alarm (74%) contexts. All these contexts (except for satisfaction) imply high level of emotional arousal. Cubs never vocalized in foraging, locomotion, comfort, investigation and play contexts. Cubs produced certain call types in certain contexts: chuffing and snort in alarm context, whine – distress and agonistic, yelp – isolation, and humming – satisfaction (during bottle- or ear-suckling). Whines emitted in distress, begging, threat and fight situations, differed significantly in fundamental frequency, frequency modulation, harmonic-to-noise ratio and duration of calls (mean percent of correct assignments was 73 ± 15%, significantly higher than random 33 ± 2%).

Vocal communication of Asiatic black bear cubs is an important mechanism of food competition regulation and alerting siblings about possible danger or spatial isolation from the group. Whine is the most polymorphic and informative call type. The structure of whine reflects motivation and probably the level of emotional arousal of the caller.

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BROWN BEARS (URSUS ARCTOS) AT THEIR SOUTHERNMOST DISTRIBUTION ON THE EUROPEAN CONTINENT: RESEARCH AND CONSERVATION EFFORTS AT MOUNT OITI, CENTRAL GREECE

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Brown bears (*Ursus arctos*) occupy nearly all the forested mountainous areas of central and northern Greece, along the Pindos and Rhodopi mountain ranges; this is the southernmost population of the species on the European continent, estimated to number 350-400 individuals. In the past 15 years bears have made a remarkable comeback in Greece and recolonized new mountain areas in the country, including Mount Vermio, Pieria, Olympus, even reaching as far south as Mount Vardousia and Oiti. Within the framework of an EU LIFE project, titled “Conservation of priority forests and forest openings in "Ethnikos Drymos Oitis" and "Oros Kallidromo" of Sterea Ellada” research and conservation efforts were initiated in 2012 to manage and protect the biodiversity and habitat of bears at their supposedly southernmost distribution within Greece, at Mount Oiti.

Research and conservation efforts were carried out from October 2012 until March 2014 and included the recording of field data (i.e., evidence of bear presence) and damages to livestock and agricultural property. In total, information on bear presence was collected on 55 occasions, with an increased seasonal presence in summer and autumn. However, bear presence was collected also during the winter. In addition, bear presence data were collated to information regarding local livestock breeders (i.e., 37 livestock owners and 10,300 animals), bee keepers (i.e., 47 bee keepers and 4,418 beehives) and the presence of wild fruit trees.

Despite the collection of a limited amount of field data it is clear that the brown bear has been or still is occasionally present at Mount Oiti. Analysis of the data of the project has resulted in the preparation of scientific and technical specifications necessary for the effective monitoring and management of brown bears in the area.

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A PREDICTIVE SPATIAL MODEL FOR BROWN BEAR (*URSUS ARCTOS*) DENNING SITES

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Predictive models of species denning habitat are useful for understanding distribution of core use areas and identifying areas with potential conflicts. Bear den site selection in areas with dominance of forestry-lands and human disturbance is not completely understood. We used a GIS multivariate model based on the Mahalanobis distance statistic and 9 digital habitat layers to evaluate bear denning site suitability in the Eastern Carpathians, in central Romania. Based on sensitivity analysis with ROC, we found that the distance to elevation and distance to roads, human settlements and streams were the most predictive variables. Our potential distribution model of bear den sites showed a very good overall performance according to classification accuracy and discrimination capacity. Denning in elevated rugged terrains and away from roads and villages revealed that bear den distribution in the Eastern Carpathians is highly influenced primarily by factors associated with human disturbance. The derived predicted distribution map can be used to prioritize areas for conservation, identify areas with potential conflicts, and to implement adaptive management in wilderness and protected areas.

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PERSPECTIVES FOR REINTRODUCING PHYSICALLY DISABLED BEARS INTO THE WILD: THE CASE OF A 3-LEGGED-BEAR

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In August 2012 a six months old male bear cub was found injured and abandoned by the female at the Olt river bank in Bixad (Covasna County, Romania). Hit by a train he lost his right foreleg and was unable to follow the sow. The ARMU - Animal Rescue Mobile Unit – created within the LIFEURSUS Project (2010-2013) took immediate actions and transported the bear to the Animal Rescue Centre in Focsani where the cub underwent medical surgery. During his recovery of eight months at the Centre he had minimal human contact, therefore developing wary behavior towards people. Due to a positive development of his physical condition and comportment the 3-legged-bear was relocated to the orphan bear cub center in Balan (Harghita County). He was equipped with a GPS collar to ensure further monitoring of his behavior. From there he was "soft" released, e.g., bears have the possibility to leave the facility and come back through an open gate. He left the rehab Centre in June 2013 and established his home range in the Hasmasi Mountains near the rehab Centre. We compared his home range size and daily movements to two other non-disabled bears of the same age. Neither our study bear shows any abnormal behavior in roaming, nor is he particularly limited in daily covered distances. So far we consider the reintroduction of this bear as successful in terms of chances of survival and we will further monitor him with great interest. Our study can be of great importance for assessing survival rates of disabled animals in the wilderness.

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GENETIC INVENTORY OF BROWN BEAR POPULATION IN SLOVAKIA

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Carpathian brown bear population is distributed within five countries (Romania, Ukraine, Poland, Slovakia) having its occasional occurrence in the Czech Republic and Hungary. As far as the present range is concerned, the population is split into two parts – Western and Eastern Carpathians, which are disconnected not only geographically but also genetically. The border between the eastern and the western parts goes through Eastern Slovakia. It is not connected with the western part on both the Slovak and also Polish sides of the common border.

The range of brown bear population in Slovakia represents about 1 mil ha, from which about 90% belong to the Western Carpathians and the remainder to the Eastern Carpathians. The core area of the Western Carpathian range covers the mountain ridges of the High Tatras, Low Tatras, Orava Beskyds, Malá Fatra and Veľká Fatra, and the Slovak Ore Mountains. The remaining mountain ridges with brown bear occurrence, e.g., Strážovské vrchy, Kremnické and Štiavnické vrchy and Magura represent the outskirts, where the brown bear population is expanding towards west, south and north east. In the north, the brown bear population is connected with brown bear occurrence in Poland.

In autumn 2013 a project of genetic inventory of the brown bear population in Slovakia has been launched. The project is carried out at the Technical University in Zvolen and financed by the State Nature Conservancy of the SR from the Operational Program Environment of the EU. The end of the project is expected for June 2015.

The genetic inventory is based on collecting the non-invasive samples (feces) in two autumn periods (2013 and 2014) using the methodology which was agreed upon within the consortium. For the DNA isolation from non-invasive samples the Qiagen kit will be used and the fragmentation analysis will be based on a set of 23 primers optimized for three multiplexes. The estimation of population size will be based on simulation using the CMR method. Expected population estimates and densities will serve for elaboration of the brown bear management plan in Slovakia.

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ASSESSING HABITAT SUITABILITY BASED ON PRESENCE-ONLY MODEL USING MAXENT AND GEOGRAPHIC INFORMATION SYSTEM (GIS): A CASE STUDY OF ASIATIC BLACK BEAR (*URSUS THIBETANUS USSURICUS*) IN JIRISAN NATIONAL PARK, REPUBLIC OF KOREA

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Knowledge of species' habitat requirements and spatial distribution of species are essential to biological conservation and management as well as ecosystems conservation and restoration. The analysis of species–environment relationship has always been a main issue in ecology and biogeography Models predicting the potential geographic distribution of species are important for a variety of applications in conservation biology. A large number of statistical models are currently in use to simulate the spatial distribution of species, spread of invasive species, spatial patterns of species diversity, or impact of climate change. Maximum entropy (Maxent) model is a species distribution model originating from the statistical mechanics. It is a general purpose environmental model for predicting the potential distribution of species.

In 2002, Asiatic black bear restoration project has been started in Jirisan National Park where about 5 wild bears were confirmed. As a result, it has led 35 including 17 wild births.

Over time, the habitat of Asiatic black bear has damaged due to an ever-increasing demand on tourism, rural economic activities, human habitation, and so on. It is, therefore, important to estimate not only current bear's habitat or core home range, but also potential habitats.

Ten environmental variable theme maps with 10m spatial resolution were created by ArcGIS 10.0 and were used to find out the most influential variables associated with Asiatic black bear distribution.

We collected sample points of Asiatic black bear using radio-telemetry by field work. 684 spatially correlated species occurrence points were included from the analysis and were used in Maxent modeling. We selected 75% data for training and the rest 25% for testing. A total of 5 runs were set for model building. The area under the receiving operator curve (AUC) was used to evaluate model's goodness-of-fit and model with highest AUC value was considered as the best performer. The mapping accuracy of the average test AUC for the replicate runs is 0.758, and the standard deviation is 0.018.

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PARASITES OF *URSUS ARCTOS*: REVIEW AND IMPACT ON BEAR'S OTHER ANIMALS' AND HUMAN'S HEALTH

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During the recent years, there is an increasing international effort on the study and conservation of the brown bear (*Ursus arctos*), especially of small, isolated populations, threatened due to their low numbers and frequent contact with humans. Although the factors with adverse consequences on the brown bear's populations are mainly anthropogenic, mostly intentional or accidental killing and habitat fragmentation, there are some natural threats that can also play important role on these animal's population dynamics. Among such natural threats are the parasites that under certain circumstances may influence the fitness, health status, reproductive capability and even survival of the animals. The surveys about the parasites of brown bears are scant. Some of the parasites that have been reported are protozoa (*Toxoplasma gondii, Neospora caninum, Sarcocystis spp., Eimeria spp., Cryptosporidium spp*.), trematoda (*Nanophyetus salmincola*), cestoda (*Taenia hydatigena, Taenia spp., Diphyllobolhrium spp*.), nematoda (*Dirofilaria ursi, Aelurostrongylus abstrusus, Toxascaris transfuga, Bayliscaris spp., Capillaria spp., Trichinella spiralis*) and arthropoda (*Sarcoptes scabiei, Arctopsylla sp., Dermacentor spp*.). Some authors have speculated that bears void gastrointestinal parasites before hibernation, in order to save nourishment that parasites would consume during this physiological state. A possible pre-denning change of the bear's diet could maybe explain this reduction of the parasitic burden. Some of brown bear's parasites can also infect other animal species. For example, *A. abstrusus* is a parasite of Felidae, *Taenia hydatigena* is a parasite of Canidae that also causes Cysticercosis in herbivores, *Sarcoptes scabiei* can cause sarcoptic mange in a wide range of mammalian hosts, etc. Moreover, some of these parasites such as *Toxoplasma gondii, Cryptosporidium spp., Trichinella spp*. and *Sarcoptes scabiei* are also related to public health, since they can infect humans. Well-designed epizootiological investigations need to be carried out in order to enlighten the role of the parasites in brown bear's fitness and to clarify their role in other animal's and public health.

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POPULATION LEVEL MANAGEMENT AND CONSERVATION OF BROWN BEARS IN NORTHERN DINARIC MOUNTAINS AND THE ALPS

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In politically fragmented landscape of Europe, one of the most important goals in conservation and management of brown bears is transboundary, population level coordination. Unfortunately, this goal is often very difficult to achieve. We are trying to overcome this obstacle in Croatia, Slovenia, Austria and Italy through a large Life+ project funded by the European Commission and targeting the brown bear population in Northern Dinaric Mts. and South-eastern Alps.

The project started in 2014 and has three main objectives:

1. Population-level monitoring, management and conservation of brown bears in northern Dinaric Mts. and South-eastern Alps. As the foundation for this, we will design, optimize and start implementing a complex, transboundary, science-based surveillance of bear population conservation status using state-of-the art methods, create a tightly-knit network of bear conservation professionals in the area, create communication and data-exchange channels and management tools required for transboundary collaboration and produce management and conservation documents required for legislative support.

2. Decrease of human-bear conflicts and promotion of coexistence. We will explore reasons for human bear conflicts and provide practical solutions through best practice examples to solve these problems in some of the most problematic areas. We will explore carrion of road-killed wild ungulates as a natural diversionary food source for the bears, and increase professional capacity of officials dealing with human-bear conflicts. We will explore the attitudes of critical interest groups and general public towards bears and use this in targeted education and promotion campaigns and non-consumptive use of bears to improve bear-human coexistence.

3. Promotion of natural expansion of Brown bear from Dinaric Mts. into the Alps. This will be achieved through exploring spatial connectivity through habitat and connectivity modeling and use this in practical actions to slow down habitat fragmentation and connectivity deterioration by identifying critical habitat patches and providing specific guidelines for environmental impact assessments to prevent their deterioration. On the same topic, we will take steps to decrease traffic-caused bear mortality. We will monitor the population expansion with state of the art methods and promote bear-human coexistence in the Alps where the know-how of living with bears has been lost through more than a century of their absence.

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CANTABRIAN BEAR CORRIDOR RESTORATION: COMBINING EMPIRICAL SPECIES DATA WITH CONNECTIVITY MODELS TO IMPLEMENT CONSERVATION ACTIONS

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Habitat loss and fragmentation due to land use intensification and development of transportation infrastructures, together with direct anthropogenic mortality, have led to a large decline and subdivision of many bear populations. As a result, the viability of bear populations is often largely dependent on functional connectivity through dispersal across broad landscapes. This is particularly the case for the brown bear in the Cantabrian Mountains (Northwest Spain), the last remaining native brown bears in the Iberian Peninsula. With a total population of about 200 individuals, Cantabrian brown bears occur in two small and endangered subpopulations with limited genetic flow that are separated by a 50 km-wide gap with high density of transportation infrastructures and human settlements. Though recent studies revealed a positive population trend and evidences of incipient migration and gene flow, the enhancement of effective connectivity between both subpopulations via dispersal and migration is a crucial concern for the species´ long term conservation. It is therefore critical to provide rigorous, empirically based and spatially explicit predictions of potential corridors and important connecting elements in the landscape to guide habitat conservation and restoration, and to prioritize the mitigation of potential barriers for bear dispersal. To this end, we proposed an integrated framework based on empirical species data that combines multiscale habitat modeling, landscape genetics and connectivity modeling through least-cost path analysis, circuit theory and habitat reachability metrics, as developed in the GEFOUR research project. We used the models to identify main stretches of barriers in need of mitigation actions and to select the forest habitat patches along the whole corridor area that are more important for the maintenance or enhancement of landscape connectivity for bears. We combined these results with detailed information on current forest management, livestock use and other human activities and constrains in the study area. We provide conceptual and tangible results and use them to design and implement a restoration strategy aiming to maximize landscape permeability for the bear population. Some of these restoration actions are included in a recently approved EU LIFE project.

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BEAR PROTECTION AND MOTORWAY MANAGEMENT: A NON-STOP APPROACH

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Motorway management for an Infrastructure Company, such as EGNATIA ODOS S.A. in Greece, includes design, construction and operation phases. With reference to the management of Egnatia motorway and its vertical axes, Bear Protection became an issue in the first stages of design.

In the case that part of the alignment of the motorway entered the “bear habitat area”, the first attempt to cope with that problem was to re-design the alignment with a significant increase of tunnels, bridges and other bear-crossing structures. Secondly, a special monitoring program was designed, aiming to investigate the bear (*Ursus arctos*) population density, movement patterns, etc., in several phases of the project, in cooperation with the specialized NGOs. Subsequently, several protection measures were incorporated to the operation of the motorway. This procedure was a step-to-step preventive approach.

In another case, part of the motorway was completed without involvement with a “bear habitat area”. In due time, when the presence of the animal in the area gradually became so intense, that several collisions between bears and oncoming traffic occurred, then a different approach had to be adopted. In a short term, the aim was to radically reduce the casualties with mitigation measures, notably the reinforced fencing, or special signing, and in a long term to try increasing the “permeability” of the motorway for the animal population. EGNATIA ODOS S.A. is now in the process of financing quest for the improvement of the permeability of the existing structures.

The efficiency of the pre-mentioned measures is to be checked, since the whole approach still has aspects in question.

The experience from the above showcased that the bear protection as part of motorway management is a win-win situation in a non-stop procedure, which has to take into consideration the developments in the bear research management and conservation area, therefore a close collaboration with experts in order to exchange information is much needed.

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PUBLIC PERCEPTION OF BROWN BEAR (*URSUS ARCTOS*) CONSERVATION PRACTICES AT THE 5 SISTERS ZOO (SCOTLAND, UK)

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Animal sanctuaries and zoos do impressive conservation work worldwide to maintain biodiversity. Unfortunately, many projects have failed to publically communicate the purpose and importance of their work, which can hamper conservation efforts.

This study will aim to determine perceptions of visitors watching brown bears (*Ursus arctos*) in the sanctuary at the 5 Sisters Zoo, Scotland. I will determine how much visitors know about the animals they are seeing and from what sources they are most likely to get their information about bears. As bears are now extinct in Scotland, the project will also try to determine whether people believe ex-situ conservation of the animals here is relevant to them and if they would support international conservation effort in countries with bear populations.

Visitors' knowledge of bears, factors that influenced their knowledge and their interest in conservation will be assessed using a brief multiple-choice survey. Each survey will be anonymous and time stamped. The survey answers will be put into a spreadsheet chronologically and compared to the behavior of the bears exhibited at the time of the survey to see if certain behaviors exhibited by the animals make visitors more or less interested in them, their addition to the zoo, and conservation of bears in the wild and in other sanctuaries. Continuous records of the bears' behavior come from CCTV cameras that are filming the bears during summer visiting hours (10:00–18:00).

I predict that visitors will express more interest in ex-situ conservation of bears when they are interacting socially or eating, and be less interested in them when they are resting or out of sight. In-situ conservation could be unappealing to visitors if perceived as threatening, but the excitement of potentially seeing the animals in the wild might make them interested in supporting conservation effort.

The resulting information can help suggest how affective current zoo education programs are at informing visitors about the brown bear and its conservation in Europe. It can also help to suggest what aspects of visiting the bears visitors most enjoy and if this sort of personal engagement with the animals affects their perception of bears.

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RELATIONSHIPS BETWEEN SPRING FEEDING BEHAVIOR OF ASIAN BLACK BEAR AND NUTRITION VALUES OF THEIR FOODS BY DIRECT OBSERVATION

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After the hibernation, Asian black bear (*Ursus thibetanus*) effectively have to recover strength. Thus, spring feeding strategy is very important for bears. However, there are little studies of spring feeding behavior of Asian black bears. We hypothesized that spring feeding behavior of bears may relate to nutrition components of each food items. The object of this study is to identify the food items on spring. The second object was to reveal how nutrition components of each food items influence the food item selection.

The study area was located in the Ashio-Nikko Mountains, central Japan. We tried the direct observation of bears from 31 March to 27 July 2013 for the identification of food items. Then, we measured the feeding period of each food items. We collected leaves of major tree species in this area at once every two weeks regardless of bear feeding. We analyzed nutritional components (crude protein, neutral detergent fiber-'NDF') and calculated total energy of these leaves.

As a result, we identified 7 food items during the study period. Bears mostly ate grass in April, leaves and flowers of woody plant in May, ants in June and July. Nutritional analysis revealed that the leaves eaten by bears had a higher crude protein content and, lower NDF content than uneaten leaves. The nutrition value of the leaves eaten by bears changed seasonally. Bears ate these leaves when they had high crude protein contents and low NDF contents.

Bears chose food items which had the high crude protein content and the low NDF content in spring. We suppose that bears have to eat low NDF food because bears can't digest plant fiber easily, and bears eat high protein foods in spring because bears may build muscle and bone effectively.

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FIRST REPORT OF DIROFILARIA SPP IN A BROWN BEAR (*URSUS ARCTOS* L.) IN GREECE

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Brown bears in Greece are considered to be endangered; the population is estimated to number 190 - 260 individuals and appears generally stabilized. Main threats to the survival of the species are related to commercial land use activities, poaching and road accidents. Herein, we provide the findings of a necropsy performed on a 4 year old, male brown bear presented to us with severe injuries after a car accident. The animal died 24 hours later. We also discuss the potential importance of our findings to the management and conservation of this endangered species in Greece. The bear was in a good nutritional state. On necropsy, typical animal-vehicle, crash-induced injuries were found. They included skin cuts, subcutaneous and muscle hemorrhages, bone fractures of skull and leg bones, ribs and spine, and multiple hepatic lacerations. In the right ventricle of the heart there were 4 adult female nematode worms, morphologically consistent with Dirofilaria spp. They are currently being analyzed to molecularly determine whether they are *D. immitis* or *D. ursi*, since the latter has never been reported in Greece before. The nematode worms are also being phylogenetically analyzed in order to eventually make comparisons with the canine *Dirofilaria immitis*, found very commonly in our country. This is the first report of infection of a brown bear with Dirofilaria spp in Greece. Although this is a common heartworm found in most dogs, this should alert us to its presence also in the brown bear and be considered in future health assessments of the species. In case the nematode turns out be D. ursi, this will be a very important finding and alert us of the presence of this parasite in southern Europe.

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BROWN BEARS VS. FARMERS? WHOSE STRATEGY IS BETTER?

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The multi-functional landscape of Romania Eastern Carpathian Mountains is considered to have an important role on maintaining the actual brown bear population. Characterized by a development of livestock farming and agricultural activities due to the accessibility to European financing the Southern part of the Eastern Carpathian area is recognize as the area with the highest density of brown bears. Without considering the ongoing bear habitat degradation, the increasing of damage is explained by local people with the boost of the brown bear population size. During 2007-2013 we registered 704 damages made by brown bears to livestock, crop fields, bee hives and orchards. Each registered conflict was analyzed considering the time of occurrence, type of damage, distance from forest patches and human settlements, presence of reliable protection systems and estimated brown bear density. Over 73% of the damage were on livestock half of them involving the killing of bovines during grazing activity. The distance from woodside was an important factor, over 60% of damage being made under a distance of 400 m from the tree cover. At the same time, almost 60% of damages occurred at a distance less than 1,500 m from villages. Overlapping the two ranges we can say that some areas have a higher potential of damage occurrence and needs more attention to plan grazing activities. Considering the size of the animals killed, the attacks on close vicinity of the villages were targeting small animals like birds, rabbits, swine, sheep and goat suggesting the fact that the size matter when the survival is the most important aspect. Just 18% of all damages were reported on agricultural land, mostly on corn field. In the studied area the density of bears, seems to have a low importance on damage occurrence and frequency, other factors being determinant for the conflicts situations.

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SUPPLEMENTAL FEEDING – SIGNIFICANCE FOR THE BROWN BEAR ACTIVITY AND BEHAVIOR

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This study represents partial results of a project that aims to mitigate the damages from brown bear population in Bulgarian part of Rhodope Mountains - a region with high human-bear conflict. In the period 2013-2014 camera traps were placed in 53 grid cells with coverage of 36 km^2 each. The camera traps were set at sites with various attractants for bears – game feeding stands or animal trails. The attractants were in the form of awarding bait namely food (maze or wheat) or non-awarding bait: different scent attractants (vanilla or raspberry attractants) or both. The study was conducted to determine the connection between the patterns of supplemental feeding and bear activity. Supplemental feeding is widespread in the country and although it is not meant solely for bears it is affecting the interspecies and human-related behavior of the species. This presentation will show the preliminary results of this study.

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EIGHT YEARS OF CONSERVATION EFFORTS – WHAT IS THE SOCIAL EFFECT?

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In 2004 a sociological survey on human attitude towards bears was conducted in two regions with stable brown bear populations in Bulgaria. The objectives of the survey were: to determine the attitude of the local people towards bears; where the relationship between humans and bears clashes (e.g., do bears cause damage and, if yes, what kind); to find out the general opinion of the locals about what measures could be taken to solve problems occurring between humans and bears. After 8 years of intensive conservation work and several brown bear projects in 2012 the study was repeated to estimate what was the impact of this efforts. The same questionnaire was used in order to assess the change in people's attitude, knowledge and believes toward bears and bear conservation projects. The scope of the survey was extended with two more regions to cover the whole bear population in the country. Additionally stakeholders and representatives of all interested groups were also interviewed. Special attention was addressed to bear damages issues and management practices. Results showed that residents of Rhodope Mountains region have the most negative attitude towards bears and bears' conservation projects. This region registered the highest number of damages cause by bears. But in general local population attitudes towards brown bears and projects related to its protection stays positive. Local people still recognize the state as main authority and rely to institutions to help them deal with problems.

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ANALYSES OF THE EFFECT OF ELECTRIC FENCES IN BULGARIA ON INTENSIVE BEAR DAMAGES

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In the frame of Life+ (EXTRA) project the intensity and types of bear damages were studied between 2008 and 2012 in Smolyan region, Rhodope Mountains. This region suffers extremely high number of damages and problem bears due to its specific – relatively lower mountainous territories covered with vast, mainly coniferous forests, numerous villages with lost buffer zones around them, and nearby hunting stations providing supplementary feeding as anthropogenic food source for bears. The damages on beehives and sheep are contributing most to the number of all bear damages in the region. Bear damages changed rapidly from 2008 (68 officially announced) to 122 in 2009 (with 87 holdings affected) as the increased numbers are due to beehives damages (80). The livestock damages usually vary between 24 and 34 cases/year. During the Life-EXTRA project more than 90 electric fences were distributed in the region and 90 more were bought on the State budget and distributed between 2010–2012. Most of the electric fences were offered to beekeepers – since they sustained most of the damages in previous years. This caused a clear decreasing trend of all damages mainly due to the total decrease of damages to beehives (from 65,57% in 2009 to 10% of all damages in 2012). The follow-up study on the beehives protection shows 100% effectiveness of the electric fences as none of the attacks of bears on beehives with proper electric fencing was successful after 2010. There are still attacks on unprotected beehives. Thus, the Union of Beehive Keepers in the region reports that for the beehive keepers, the electric fences are the best solution and with this tool the problem with bear attacks is solved.

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DIETARY HABITS OF BROWN BEAR IN THE FORESTS OF WESTERN BLACK SEA REGION, TURKEY: THE PRELIMINARY RESULTS

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Understanding the dietary habits of large mammals is of great importance for their conservation and management. However, there is limited information about the ecology of large mammals in Turkey. In this study, we examine the dietary habits of brown bear (*Ursus arctos*) in Western Black Sea Region of Turkey. The study site is a closed mixed forest ~300 km^2 in size with one of the highest brown bear activity in Turkey. The methodology of the study is based on fecal analysis of brown bears. We are collecting the feces by transect method throughout the forest and the field surveys are being conducted for consecutive two years from May to November. Both the plant and animal remains are separated from the feces, and will be identified taxonomically in the laboratory to determine the food habits of brown bear in the study area. During the field surveys of the first 6 months of the study we obtained 69 brown bear feces. Preliminary analysis of feces in the laboratory shows a higher ratio of plant ingredients (leaves and fruits), but at the same time animal remnants were also observed (insect remnants, hairs of other mammals). We are expecting to obtain results on the dietary habits of brown bears and to get information on brown bear–human conflict and brown bear–plant interactions in the region. Consequently, these findings will contribute to the conservation and management of the brown bears in Northern Turkey.

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ANESTHESIA PROTOCOL FOR CAPTIVE BROWN BEARS (*URSUS ARCTOS*)

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During the last 3 years we immobilized 38 different captive brown bears (*Ursus arctos*). The data of these anesthesias are summarized in the study below. The animals got confiscated from their original housings (private owners or animal parks in Germany, Poland, Kosovo) due to animal welfare reasons. The anesthesia was administered via a three cc dart equipped with a 2×60 mm needle and shot by a CO2 dart-gun. A combination of Ketamine (2.4 ± 0.8 mg/kg BW, Ketamine 10 %; Essex GmbH, Munich, Germany), Medetomidine (0.036 ± 0.01 mg/kg BW, Dr. S. Quandt, Bryanston, Rep. South Africa), Midazolam (0.05 ± 0.02 mg/kg BW, Dr. S. Quandt, Bryanston, RSA), and Butorphanol (0.05 ± 0.02 mg/kg BW, Dr. S. Quandt, Bryanston, RSA) was injected as initial dose. A rapid and smooth induction time of 4 ± 1 minutes (total recumbency) after intra-muscular (preferably upper front leg or lower shoulder) dart-injection was observed. If prolonged immobilization was required, the drugs needed to be topped up (dependent on the situation) on average 40 minutes (22 – 75 minutes) after induction. The patients got medical oxygen intra-nasal or intra-tracheal, a venous catheter (V. jugularis) for an isotonic infusion drip, and got monitored for reflexes and shifts in vital parameters every 10 minutes. The heart rate was on average 46 ± 15 beats/min, respiration rate was 8 ± 3 deep breaths/min, pulse-oximetry showed on average of 97 ± 4 % oxygen saturation, at 37.6 ± 0.4°C body temperature. Furthermore blood samples for blood gas analysis (i-stat), biochemistry, hematology and hormone analysis were taken. The protocol was partially antagonized with 5.9 ± 1.7 mg Atipamezol (Antisedan, Orion Corporation, Espoo, Finland) per 1 mg Medetomidine plus 4.6 ± 3 mg Naltrexon (Dr. S. Quandt, RSA) per 1 mg Butorphanol intra-muscular, earliest 30 minutes after the last Ketamine injection. The bears were put into transport cages and transported fully awake into bear sanctuaries. The advantages of this anesthetic protocol are a rapid induction time, without respiratory problems or spontaneous arousals, a stable and reliable maintenance for at least 40 minutes after darting, and a smooth recovery.

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GETTING TRANSBOUNDARY COOPERATION INTO PRACTICE: BROWN BEAR GENETIC MONITORING IN THE TATRA MOUNTAINS

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International cooperation in the management of large carnivore populations is particularly important in transboundary regions. However, it is a very difficult task everywhere due to countries' differences in the species numbers, protection regimes, human attitudes, as well as in traditions, language, history and culture. A coordination of the monitoring methods in the transboundary regions is crucial to get a real picture and, within the European Union, for a proper reporting on the species conservation status required periodically by the Habitats Directive. Eight of the ten brown bear populations in Europe are transboundary. The brown bear population in the Tatra Mountains represents the core area of the western segment of the Carpathian population and it is shared by Poland and Slovakia. From April to October 2011, a first brown bear genetic monitoring was jointly conducted by the National Parks in the Polish (TPN) and Slovakian (TANAP) Tatra Mountains. Bear hair samples (n=371) were systematically collected from natural rubs and tree hair-traps, and then genotyped using 8 microsatellites. A total of 107 bear hair samples were successfully genotyped, 60 from Poland and 47 from Slovakia. Forty-five unique genotypes were identified: 15 individuals were exclusively captured in Poland, 15 exclusively captured in Slovakia, however other 15 individuals were present on both sides of the border. Population estimates based on capture-marked-recapture suggest an overestimation of bear numbers in the whole area when conducting the monitoring separately. Transboundary bears were recorded as far as 14 km (air distance) from the border. The maximum distance between the locations where the same bear was genetically trapped was 38 km. Our results question the "sum of hunting ground counts" approach, still frequently used to evaluate the status of bears in eastern European countries. They also highlight the importance of using the same methods (including the same sampling period, lab procedures and statistical treatment of data) and of joining efforts in bear monitoring at management units.

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THE SUCCESS OF RELEASE OF 8 BEARS IN KARELIA

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The rehabilitation and reintroduction of captive-reared mammals in general and brown bears (*Ursus arctos*) in particular are controversial. Although the method used by Pazhetnov shows very good results, some authors are still opposed to the release of captive-reared bears. Our study is an additional experience in bear conservation. In 2012 and 2013 we released respectively 3 and 5 bear cubs in the Republic of Karelia (Russian Federation), aged of 7 to 10 months old. Most of them were caught in the wild up to one month old and kept in a quarantine Centre till their release. Over the 8 bears released in summer (July-September), five did not use feeding support and fed straight on berries. They were seen a couple of times by human and displayed fleeing behavior. One female was caught back after she was seen feeding close to crops. As she was not growing well, she was kept in enclosure and fed till October when she was released. She did show fear behavior towards human. The last two cubs were habituated: they looked for human presence and followed human walking. We led them in the forest for foraging till October when they went into hibernation. Their behavior when waking up from the den is still unknown. We discuss the importance of the background of these bear cubs in the success of release, especially the influence of the feeding method and the caring structure. We set up recommendations for the release of bear cubs into the wild and emphasize the role of the animal keeper. The radio-monitoring of the next released bears will give more information on their movements and behavior.

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LIVESTOCK GUARDING DOGS IN GREECE – PRACTICAL CONSERVATION MEASURES TO MINIMIZE HUMAN BROWN BEAR CONFLICTS

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During the last decade, Greek farmers, apart from serious constraints in their work (complex legislation, low product prices, debts due to loans etc.) have to deal with increasing populations of large carnivores (bears and wolves) with subsequent depredations on their livestock capital. Often, they use illegal methods, such as poison baits or direct killing to solve the problem. Preventive measures, such as use of indigenous breeds of livestock guarding dogs ("Hellenikos poimenikos" and "Molossos of Epirus" breeds) to protect domestic animals are actively promoted (mainly by NGO's) in order to minimize livestock losses and restrict the illegal use of poisoned baits which although strictly prohibited by the Greek legislation since 1993, still persists as an important human-related mortality factor not only for large carnivore species (i.e., brown bears) and livestock guarding dogs but also for secondary consumers in the trophic chain (i.e., rare species of scavenger raptors). And this without underestimating the danger of the toxic substances to public health. Local breeds of livestock guarding dogs (LGDs) have protected domestic sheep, goats and cattle from predators for centuries, as they are adapted to the climate and conditions of the Greek countryside and traditional livestock raising practices. Nowadays many farmers import alien breeds from other countries (such as Caucasian Shepherd Dog, Kangal Shepherd Dog) a phenomenon that leads to hybridization and progressive loss of the indigenous breeds. In this study, we present the results of our efforts to develop and support an LGDs network, over three administrative regions of the country and which includes shepherds selection, dogs selection, dogs donation, raising and training of puppies, monitoring and evaluation. These actions became possible under three LIFE projects in Pindos Mountain range implemented from 2009 to2013. Results from the network operation has shown so far that LGD's are a cost-effective preventive method for reducing domestic animal mortality caused by large predators. This method is commonly accepted in the agricultural community of less favored areas and has a positive effect on public attitude shift regarding large carnivore acceptance and tolerance levels.

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FATTY ACID METABOLISM IN CAPTIVE BROWN BEARS: IMPLICATIONS FOR ESTIMATING THE DIETS OF FREE-RANGING URSIDS

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For top predators, the ability to locate and capture preferred prey is closely tied to population dynamics and conservation status. Among ursids, a reduced ability to find high-quality food is an important consequence of habitat loss. Quantitative fatty acid signature analysis (QFASA) can reveal ecologically significant changes in the diets of free-ranging predators, yet the accuracy of QFASA-based diet estimates is contingent upon understanding fatty acid (FA)-specific patterns of metabolism. Among bears, QFASA has been applied to polar bears (*Ursus maritimus*) but patterns of FA metabolism have been inferred from studies of captive mink (*Neovison vison*). We used a series of feeding experiments to quantify the relationship between consumer and diet FA composition (i.e., we determined QFASA "calibration coefficients") for brown bears (*Ursus arctos*). Four newly weaned male cubs were initially fed dry dog food, enriched with vitamins and minerals (Diet 1). The diet was subsequently switched to dog food supplemented with salmon oil (Diet 2) to approximate the lipid content and composition of the wild diet of polar bears. The third trial was initiated when the bears were yearlings and were fed a combination of dry dog food and mixed fish oil (Diet 3). Each trial ran 90-120 days, between May 2011 and August 2012. We collected adipose tissue biopsies after 30-45 days, with sampling repeated every 15-30 days thereafter. Bear FA changed quickly in the direction of the diet, with pronounced changes evident at the first sampling after a change in diet. Bear and diet FA were largely equilibrated by day 60, although some FA showed evidence of change through 120 days. Although calibration coefficients were broadly similar for the two marine-based diets, differences were evident for some FA used in previous QFASA studies. For many FA, calibration coefficients from bears were similar to those derived from mink. Our results will be applicable to future studies of bears consuming terrestrial, marine, or mixed diets. Although our results reinforce the importance of taxon-specific analyses, the similarities across taxa and diets suggests it may be feasible to develop a generalized QFASA approach for mammalian carnivores in diverse ecological circumstances.

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ASSESSMENT OF THE USE OF CROSSING STRUCTURES BY BEARS AND OTHER MAMMALS ALONG THE EGNATIA HIGHWAY IN NORTHERN GREECE

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The expansion of transportation networks is leading highways, roads and vehicle traffic as one of the most detrimental direct human related factor of animal mortality on continental ecosystems. The design and incorporation of wildlife crossing structures into highway construction is a method which can mitigate these anthropogenic negative effects on wildlife. However, for most species, there is limited knowledge regarding effective and affordable crossing structure designs. We monitored ten (10) crossing structures along a 15km sub-section of the Egnatia Highway section (4.1), located in NW Greece, in order to investigate whether wildlife and especially brown bears (*Ursus arctos*), used them as movement corridors to overcome the highway artificial barrier effect. The monitoring was performed by means of motion activated infra-red wildlife cameras, during a 4 months period (September-December) in fall 2011. We investigated the influence of several factors on the effectiveness of each crossing, such as the dimensions of the structures, the surrounding vegetation, the land-use of the area, the human activity nearby and distance from natural or human resources. The use of mitigation structures by bears was positively correlated with height (rp = 0.794*, p. value < 0.05) and Openness Index (rp = 0.824*, p. value <0.05) while no correlation was observed with the length and width of the structures (p.value =0,281 for length and p.value = 0,075 for width). Regarding landscape features, we found a significant positive correlation with the distance from villages (rp = 0,737*, p. value <0.05), as well as a limited positive correlation with the distance from livestock units (rp = 0,707, p. value= 0.05). Finally, we found a significant negative correlation with the distance from rivers and streams (rp= -0,843**, p. value <0.01). It is worth noting that the only correlation that was found between human activity and the use of mitigation structures by bears was a positive correlation with the presence of vehicles (rp=0,741*, p. value < 0.05). Finally, we observed seasonal differences concerning the use of crossing structures by bears.

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EFFICIENCY OF DIFFERENT TYPES OF HAIR TRAPS FOR BROWN BEAR RESEARCH AND MONITORING

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Noninvasive sampling by hair snaring is commonly used worldwide in bear research; however little is known about the efficiency of different hair-collection devices. In this study, we assessed the efficiency of five distinct types of barbed wire hair traps: corral (n=34), path (n=62), natural rub tree (n=9), "smola" (beech wood tar) tree-trap (n=36) and turpentine tree-trap (n=35). The corral and tree-traps were baited in each inspection. A total of 35 fixed hair trapping stations were distributed in a grid of about 10×10 km across the exploited part of the forest (ca. 900 km^2) in the Bieszczady Mountains (SE Poland), often in the vicinity of the ungulate supplementary feeding sites – which are widely distributed across the study area and frequently used by brown bears (*Ursus arctos*) – in order to maximize capture probabilities. Mostly they included a corral, two paths, one "smola" tree-trap and one turpentine tree-trap. Natural rub trees were located at 5 hair trapping stations. Hair traps were surveyed from March to December 2010 over multiple sampling sessions at approximately 14-day intervals. No sample was collected at seven stations, which were excluded from the analysis. The mean number of surveys per hair trap was 16.3±3.1. All hairs found on one wire barb of a given hair trap was considered as one sample. We collected 861 bear hair samples from 77 hair traps. The efficiency of each type of hair trap was evaluated by calculating the percentage of positive checks. The efficiency of path, turpentine tree-trap and corral (mean± SD: 2.3%±5.2, 4.8%±8.0, 12.4%±12.2, respectively) was significantly lower than of "smola" tree-trap (30.2%±26.0) and natural rub tree (49.0%±16.9). The results of this study indicate that tree-traps baited with "smola" were the most efficient and had a similar sampling efficiency to natural rub trees. Taking into account the difficulties associated with locating natural rub trees in the field and the need to sample a wide range of locations, we recommend the use of "smola" tree-traps to collect bear hair samples. We also provide further recommendations on sampling methodology using rub-tree hair snares for the brown bear.

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ANDEAN BEAR CONSERVATION ALLIANCE: FROM A DREAM TO REALITY

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WCS and CMZ have been discussing for several years how to make small amounts of funding have an important impact on the conservation of the Andean bear. It became clear that the solution was an alliance of many institutions consolidating efforts around a common plan for the conservation of the species. In 2010, WCS and CMZ initiated the Andean Bear Conservation Alliance. The ABCA discussed the goals and lines of actions of an initial five-year plan (2011–2015).

From 2011 to mid-2013 the activities focused on research and capacity building, with the development of monitoring techniques using occupancy estimators, the development of the "Workshop and Manual for the Assessment of the Presence and Distribution of Andean Bear Populations", and the "Manual for the Monitoring Andean Bear Populations at the Natural National Parks of Colombia".

From mid-2013 to 2015, the developed tools will be applied in at least 5 natural national parks and their surrounding landscapes in Colombia. The information and tools are been presented to undergraduate and graduate students at the biology departments at the main universities in Colombia, Ecuador, Peru and Bolivia. Three small grants will be given annually to students working on the distribution and status of Andean bear populations using these techniques. Now in the fourth year of the Action Plan, there are four institutions in the alliance, with the addition of the Saint Louis Zoo and Global Conservation Connections in 2012. The goal is to add two more partners by the end of 2014.

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THE CHANGE IN BEHAVIOR OF ORPHAN BEAR CUBS APPROACHING HIBERNATION

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Many projects of rehabilitation around the world deal with orphan animals. One of the questions often raised is whether the animals can get appropriate survival and behavioral skills without their parents. Our study concerns the European brown bear (*Ursus arctos*) and its behavior approaching hibernation. Two bear cubs, initially caught by hunters at about 3 weeks old and then kept in a quarantine Centre during several months, were moved to Voknavolok (Republic of Karelia, Russian Federation) in August 2013. As they display panic when left alone, it was decided to lead them to the forest for foraging every day. Every evening, the bears went back to a hut where they were closed for the night. We drew up an ethogram and wrote down their time budget from 9th September to 14th October. The bears showed a significant decrease of eating behavior during the period of observation. There was no clear correlation between this data and the temperature, although they both do decrease simultaneously. Over the whole period, moving behavior appears to increase. This could be explained by the fact that food becomes scarcer and the bears need to cover longer distances and explore more to find enough food. Interesting is a sudden drop of eating behavior on 10th October, while the temperature also dropped. That day was the first of five days when the bears did not want to leave the hut and finally went into hibernation. Despite the absence of their mother, the bear cubs were able to put on weight and to change their behavior at the approach of winter. The results of our study give a positive argument in the feasibility of orphan bear rehabilitation.

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BROWN BEAR STATUS IN GREECE: MILESTONES OF 27 YEARS OF CONSERVATION EFFORTS (1987-2014)

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Today, brown bear range in Greece comprises two distinct population nuclei located in Pindos and Rhodopi mountains covering a total range of 13,500 km^2 min to 21,000 km^2 max with recolonization areas included. With a total bear population at 350-400 ind. min, Greece constitutes the southernmost edge of the species range in Europe. Until the early '80's hardly any interest was attached to the fate of this endangered species. In the mid 80's isolated individual and NGO's initiatives managed to trigger, the attention from state authorities to the precarious conservation status of the species. Between 1987 &1989 the first national large scale conservation project was implemented under EU/ACNAT. It aimed at the establishment of conservation actions addressing mainly bear-human conflict situations. The 90's have been the first apogee in bear conservation efforts: three consecutive bear conservation projects under EU/LIFE Program (from 1994 to 2002), marked one of the most productive and successful period in brown bear conservation at a country scale. The dawn of the new millennium (2009-2017) welcome four additional LIFE projects aiming at sustaining species conservation efforts whereas from 2002 to 2009 came a pioneer monitoring project in order to evaluate the impact of highway construction on brown bear habitat and population connectivity prior, during and after construction. Milestones from these efforts can be summarized as follows: a. Elaboration of a National "Action Plan for the Conservation and Management of brown bear in Greece", b. proclamation of two National Parks in core bear habitat areas totaling 3,500 km^2, c. radical amendments of the national compensation system for bear damage on agriculture, d. promotion and incorporation in the CAP for subsidization of preventive measures, e. rerouting of the largest highway in the country and subsequent incorporation of specific environmental terms, monitoring programs and mitigation measures in all EIA's regarding highways construction, f. issue of specific law provision to control vehicle traffic on forest roads in order to minimize bear disturbance, g. official adoption of a Problem Bear Management Protocol. Still, lack of skilled personnel as well as political resistance and lack of political will remain major constraints coupled to a lack of sustainable funding. The need for closer cooperation between NGO's, local authorities, stake-holders and specific interest groups remains a major prerequisite. Overall this outcome should by far encourage continuation of efforts as well as engage new scientists in the race.

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BRAIN AND RENAL B LYMPHOMA IN BROWN BEAR – CASE REPORT

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Adult (7 years of age) female brown bear from the bear sanctuary in Kuterevo (Croatia) showed depression to obtundation, disorientation, generalized ataxia, difficulties in food intake, dropping jaw and dry nostrils, that suggested facial sensitivity and motoric deficits in July 2013. Neurological localization was CNS with bilateral trigeminal involvement. The symptoms progressed up to anorexia. The liquid food was provided but possible to swallow only by immersing the whole muzzle under the surface. On 22th of November 2013 we immobilized and examined the bear. No morphological changes were found on the upper alimentary tract, except suspectedatrophy of masticatory muscles. Diagnostic tests included hematology and serum biochemistry. The serum was also tested for common autoimmune disorders that might affect the muscles and connective tissue. The tests showed the untypical reaction of serum antibodies with the canine esophageal epithelium cells, but as the tests were not validated for the bear, we could not fully confirm the diagnosis. The prolonged-effect steroid therapy (methylprednisolone) was applied twice to inhibit inflammatory and possible autoimmune condition, and supportive care was introduced. Temporary clinical improvement was recorded. However, unrelated to expected winter dormancy behavior, the general weakness, anorexia and

significant loss of body movements' coordination as well as atrophy of masticatory muscles progressed so the bear was euthanized on 15th of January 2014.Necropsy revealed whitish nodular neoplasm affecting both kidneys and brain stem. Histological and immunohistochemical examination confirmed diffuse growth of anaplastic B lymphocytes in affected tissues and through both Nervus trigeminus. Growth of B lymphoma within neural tissue and uremic encephalopathy were causes of severe motoric neurological signs. This is the first report on such tumor in bears. The state was evidently irreversible and not curable.

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EVALUATING TRENDS IN SIGN SURVEYS INDICES FOR THE ENDANGERED CANTABRIAN BROWN BEAR POPULATION (SPAIN)

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Estimating abundance and trends in populations of large carnivores, such as brown bears (*Ursus arctos*), is a complex task, given their elusive behavior and low densities characteristic of the species. In the endangered brown bear population inhabiting the Cantabrian Mountains of North Spain, annual counts of females with cubs of the year have been used as a surrogate of population size and to estimate trends. Nevertheless, the counts have limitations due to being directed on a concrete age and sex portion of the population and because of constraints to measure sampling effort. We present herein a methodological procedure based in sign surveys related to sampling effort with demographic objectives.

We conducted surveys in 75 squares of 6.25 km^2 each in the southern slope of the Cantabrian range in two areas: western and eastern subpopulations, and in two sectors in each area, with regular reproduction v. sporadic reproduction. Surveys were conducted three times every year during the period 2004-2011. Data on spots with bear activity (mainly scats and tracks) yielded and index related to survey effort (P-Ind/km). We conducted a total of 11,881 km and obtained 1,166 points with bear signs.

We found that P-Ind/km showed an increasing trend (exponential growth rate = 0.12, SE=0.01) during the study period for all areas and sectors combined. Nevertheless, trends were different when values were compared among sectors and showed also differences along time (quadratic function). P-Ind/km values increased 1.4 and 1.9 times through the studied period in both sectors with regular reproduction (averaged exponential growth rates of 0.05 and 0.10 respectively), while increased 4.2 and 3.5 times in those with sporadic reproduction (averaged exponential growth rates of 0.22 and 0.19 respectively). At the end of the period, one of the sectors with sporadic reproduction yielded a higher value in the index than a contiguous sector with regular reproduction.

We discuss on the feasibility of performing this procedures with demographic objectives, for example by conducting surveys to the whole current range inhabited by the population.

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FATTY ACID COMPOSITION OF SUBCUTANEOUS FAT OF BROWN BEARS IN CROATIA

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Fats are essential for animal life; not just as a source of energy, but as well as essential components of membranes. White adipose tissue is an energy storage depot in the form of triacylglycerols, primarily deposited in abdominal and subcutaneous fat. It is especially important as energy source for brown bears throughout the winter. Polyunsaturated fatty acids are essential diet component in animals high in food pyramid and are not synthesized in mammals in the absence of their essential fatty acid precursors. The objective of this study was better understanding of dynamics of fat metabolism in brown bear. The study was conducted on 12 animals: male: n=6, 4.75±4.94 yr.; female: n=6, 3.75±1.73 yr. Samples were collected during the legal hunting season (March-May and September-December 2013). After thawing, homogenization and lipid extraction, the fatty acid composition was determined by gas chromatography. Results showed that lipids isolated from depot adipose tissues of brown bear were dominated by monounsaturated fatty acids (males 51.56%, females 46.53%), while the most common was oleic acid (C18:1n-9). Saturated fatty acids constituted of 28.03% in males and of 30.73% in females, and palmitic acid was found in the highest percentage (C:16). Polyunsaturated fatty acids were found in 27.01% in males and 22.75% in females. The most abundant fatty acid in brown bear adipose tissues was linoleic acid (C18:2). The fatty acid composition of subcutaneous fat of brown bear showed no sex differences. Abundance of polyunsaturated fatty acids varies between different foods and their relative abundance in the food of animals have important consequences for animal performance. Results can help in better understanding of the westernmost stable population of brown bears in Europe and their quality management.

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LIVING AT THE EDGE: HABITAT REQUIREMENTS OF BROWN BEARS IN THE NORTHERN CARPATHIANS

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Habitat models for species conservation should rely on the integration of ecological knowledge into the modeling process in order to be useful. However, this practice is often limited by incomplete information on species requirements and insufficient efforts to adopt robust inference modeling approaches. We developed occurrence and breeding habitat models for the European brown bear *Ursus arctos* in the Northern range of the Carpathian population, focusing on the evaluation of a restricted set of hypotheses based on prevailing insights on the species constrains. We tested three hypotheses in relation to the group of factors that would better explain the probability of presence and reproduction of brown bears: (1)the forest composition hypothesis, which included two predictors, the deciduous to total forest ratio and the length of forest ecotones with grasslands and shrubs; (2)the human influence hypothesis, tested from the density of inhabitants and of urban areas such as towns, villages and settlements; and (3)the topographic complexity hypothesis, which included terrain ruggedness and elevation range. Hypotheses were confronted using a dataset of 3,151 bear observations in Poland for the period 1985–2005. Forest availability was the most important limiting factor, whereas anthropic factors (human density and urban areas) separated between suitable and non-suitable forest-rich areas. Forest composition contributed poorly to predict bear occurrence, but was important to differentiate between breeding and non-breeding habitats: breeding females required a larger amount of forest cover, lower human influence and the interspersion of grassland/shrubland patches. Model transfer to the western Carpathian population in Slovakia supported the accuracy of habitat predictions and the robustness of the approach. Our model predicts a suitable habitat through a narrow area in Poland in the linkage zone between the Western and Eastern segments. Results highlight the need to control unplanned urban sprawl to preserve the species habitat and the connectivity between the Western and Eastern segments of the Carpathian population. Predicted but unoccupied habitats in other regions also require consideration, particularly some favorable areas of confluence with other large carnivore habitats. We encourage adopting robust hypothesis testing approaches in habitat modeling in order to support better model transferability and conservation planning.

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THE PRESENCE OF THE BROWN BEAR (*URSUS ARCTOS* L.) IN THE NORTH EASTERN ALPS (FRIULI VENEZIA GIULIA REGION) IN RELATION TO THE ALPINE METAPOPULATION

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The North Eastern Alps (Friuli Venezia Giulia Region) represent a peripheral area of presence of the Dinaric population (for the North Dinaric population, Slovenia, 400-450 individuals estimated) of the Brown Bear; in this area in the last years some individuals has started to come from Trentino population (40-45 individuals estimated) and to use this areas. In previous researches this area has been considered one of the most suitable areas, in the Alps, for supporting the alpine brown bear population and for enhancing the creation of the alpine metapopulation. From 2004 to the 2013 in mountains areas of the Friuli Venezia Giulia has been studied (2,500 km^2) the presence of the Brown Bear with different techniques: the genetic sampling (by opportunistic and systematic methods), photo interpretation and behavioral analysis and radiotelemetry. The genetic samplings have been obtained by the hair traps (50 permanent hair traps plus 80 temporary and moving hair traps) and by opportunistic techniques. By the genetic analysis it has detected the presence, from 2004, of 21 different genotypes (4 from Trentino and 17 from the Dinaric population, 3 of them studied by telemetry), all of them were males. The number of genotypes detected in different year has showed a cyclic pattern, with a increment in the last year, due to dispersing individuals from Dinaric source population; in different years, from 3 to 8 (2013), different genotypes have been detected, with a evident turnover. The median time of presence (years of sampling), for each genotypes, was 2 years, and only 6 genotypes have been sampled for 3 or more years (1 from Trentino); 10 genotypes have been sampled in only one year. Despite to the increment of the Trentino population and the high density of the Dinaric populations, in the north eastern alps the process of immigration and colonization appears to be slow and intermittent and seems correlated more to the demographic aspects (i.e., localization and philopatry of the females, now present only in the Alpine and Dinaric areas of Slovenia and on the right side of Adige river, in Trentino), management of the Dinaric population, dispersal behavior and presence of not permeable infrastructure (high way Ljubljana-Trieste) rather than the ecological values of the areas.

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A PRELIMINARY ASSESSMENT OF GOBI BEAR SYSTEMATICS AND POPULATION SIZE

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A relict and highly endangered population of unique desert-dwelling brown bears (*Ursus arctos*) inhabits the remote oases in the Great Gobi Strictly Protected Area in southwestern Mongolia. This population is isolated from other brown bear populations by ~1,200 km, and the evolutionary and systematic relationships with other brown bear subspecies are unclear. Previous genetic work suggests the Gobi population has comparatively low levels of genetic diversity and is most closely related to Himalayan brown bears in Pakistan and India (*U a isabellinus*). In a larger effort focused on conserving the Gobi bear population, we describe preliminary assessment of Gobi bear systematics and population genetics. To examine evolutionary and systematic relationships of Gobi bears to other brown bear populations in Mongolia and neighboring regions, we collected 690 hair samples from Gobi bears using barbed wire hair snares in 2013, 82 tissue samples from three other regions of Mongolia and 5 hair samples from Himalayan brown bears. Using 13 nuclear microsatellite loci and 1 sex identification locus, we are in the process of conducting individual identification analyses. Thus far, we have identified 27 unique individuals, including 22 males and 5 females in the Gobi bear population; however, this number is likely biased, based on camera trap data and potential displacement of females from hair trap sites. Using sequence data from the mitochondrial DNA control region and cytochrome oxidase-2 we also evaluated the systematic relationships of Mongolian brown bears. Using mitochondrial phylogeny, preliminary data indicates that Gobi bears and Himalayan brown bears in Pakistan are the most ancient brown bear lineages. Microsatellite data indicated significant differences between Gobi and brown bears in the four other sampled areas. We found a deletion mutation at the sex marker SE47 of the X chromosome for Gobi bears, resulting in a 232 bp fragment rather than a 240 bp fragment as seen in other brown bears. This suggests Gobi bears may represent an independent subspecies of brown bear. Confidence in the Gobi bears sub-specific distinction can be increased by using a larger sample size from Pakistan and conducting additional analyses using sequence data from the nuclear genome.

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A NEW BEAR FOREST IN RHENEN: TURNING 20 YEARS OF EXPERIENCE INTO PRACTICE

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In April 2014, after six months of intensive construction works, the first phase of the renovation of the Bear Forest in Ouwehand Zoo in Rhenen was completed. The Bear Forest is a two hectare semi-natural enclosure which has three main purposes: a) it serves as a sanctuary for mistreated and abused captive European brown bears, b) it acts as a research centre to learn more about captive bears, c) it acts as an education centre where no less than 800,000 visitors a year can learn about bears in the wild – their biology, threats and conservation stories, and in captivity – their welfare issues and solutions. What exactly was done to improve this sanctuary for its residents and visitors alike? First of all the dens were renovated and improved and several new dens were added. The concrete pool, filtration system and artificial waterway have been fully repaired and enlarged. A new seven meter high waterfall has been created at the beginning of the stream, with a small pool in front of it. For management purposes a new extra indoor enclosure complex has been built, which also acts as a separation facility. This is located on the other side of the Bear Forest. In front of these indoor enclosures / quarantine facility new vegetation (*Ilex aquifolium* and *Pseudotsuga menziesii*) has been planted to give more shelter to bears that have to be locked indoors temporarily. The public walkway through the Bear Forest has been relayed to give the bears more space in one area of their enclosure. In the centre of the Bear Forest, on the junction between the elevated bridge and the walkway, a large education square has been created. There is a viewing platform on top of it where visitors have an excellent view over most of the Bear Forest. On ground level many new educational exhibits are presented. Last but not least, the entrance of the Bear Forest has been completely reshaped and an 'entire' Carpathian village has been recreated. This provides an excellent setting for visitors to learn about bears and the conservation, education and welfare projects Alertis supports mainly in Eastern Europe.

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SUITABILITY AND HEALTH HAZARDS OF RADIO-FREQUENCY IDENTIFICATION SYSTEMS IN CAPTIVE BEARS

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Thousands of Asiatic black bears suffer on bear bile farms across Asia. The industry poses a risk for laundering wild-caught bears into these captive populations. Currently no adequate and practical registration or monitoring system is in place preventing such laundering. This study aimed at assessing potential health hazards of three types of radio-frequency identification (RFID) systems that could be viable for improved monitoring of captive bears on bear farms but also in sanctuaries.

Methodology: Three types of passive HDX RFID systems, fully ISO 11784 compliant, were applied to 20 captive bears at a bear sanctuary in Vietnam: 8 bears received 5.9g heavy, round ear tags, 8 bears 8.9g heavy, round ear tags and 4 bears received 3.2cm long large-scale subcutaneous transponders (LSST). Estimated reading ranges varied between 32 and 42cm. Bears were regularly monitored over 12 months and signs of infection recorded. At the end all ear tags were removed and a comprehensive check-up conducted.

Results: On average bears showed mild exudation at the ear tag site at any stage of the study, with the 8.9g ear tags faring slightly better than the 5.6g. In 3 bears ear tags were removed prematurely due to severe inflammation. 3 ear tags showed technical failure during the study. After removal of the 16 ear tags, all bears showed clear signs of inflammation around the insertion site. In comparison, the LSSTs did not show any negative health impacts and transmitted without failure until the end of the study.

Conclusion: The amount of severe inflammation warranting removal of ear tags and the high rate of technical failures of the tags makes use of RFID ear tags for bears at bear farms or in other captive conditions not advisable. LSSTs did not cause any adverse health impacts during this study and proved easy to read using the selected stick reader. Limitations for usage of LSSTs must be acknowledged, such as no visual identification, higher cost and less common to procure. LSSTs may be recommended as currently best possible method for identification of bears in bear farms or other captive situations.

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FIRST DATA ON NORTH-EASTERN DISTRIBUTION OF THE APENNINE BROWN BEAR (*URSUS ARCTOS MARSICANUS*) USING NON-INVASIVE GENETIC SAMPLING

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The Apennine brown bear is an endemic subspecies distributed in the south-central Italian Apennines, with the Centre of its core area located in the Abruzzo, Lazio and Molise National Park (PNALM). The population is highly threatened by factors directly or indirectly related to human activities, such as poaching, traffic accidents, habitat fragmentation, low genetic variability and diseases. A long-term monitoring program estimated a population size of 49 (47-61 95%CIs) brown bears inside PNALM (in 2011), and 6 individuals ranging in the peripheral western portion of its distribution outside PNALM (Lazio region) have been sampled between 2005 and 2013. However, so far demographic information on brown bear presence in the north-eastern portion of the range was lacking. Therefore, we aimed to evaluate the presence of the Apennine brown bear in the Majella National Park (PNM) and Regional Natural Reserve Monte Genzana - Alto Gizio (RNRMGAG). Between the years 2012 and 2014 an opportunistic and non-invasive sampling monitoring program through the use of hair-traps and during surveys on damaged sites has been implemented. We have analyzed 57 non-invasive genetic samples for individual genotyping (11 STR and 1 sex-specific marker) that have allowed us to detect the presence of 6 individuals, 5 males (M72, M93, M95, M97, M98) and 1 female (F96). The female F96 has been spotted together with an adult male (M72) in the mating period. The M93 genotype was continuously present in the area between 2012 and 2014, even during the winter. The M98 genotype had never been sampled before in the Apennine brown bear population. These data suggest that there is a good connectivity between the PNALM and the PNM and that the RNRMGAG serves as an important ecological corridor between the other two protected areas. The survival of the Apennine brown bear is highly dependent on the possibility to expand the distribution range beyond PNALM. It can thus be concluded that brown bear presence in the PNM and RNRMGAG should be permanently monitored, and management activities aimed at reducing the main factors of threat should be implemented.

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THE GENETICS OF THE BROWN BEAR (*URSUS ARCTOS*) IN GREECE: SUMMARIZING A COMPREHENSIVE STUDY

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In the human dominated landscape of Europe, comprehensive knowledge of the genetic status of a species at a population level is imperative towards the goal of maintaining a stable demographic. Though European predators are on the road to recovery, signatures of genetic structure and bottleneck detected in populations around the continent are indicative of past demographic fluctuations. Brown bears (*Ursus arctos*) were particularly affected by the human driven population decline, which over the course of the last two centuries led to their extinction in many European countries. The demographic history of the bears in Greece has followed a similar pattern yet little is known about the impact of past population reduction on the overall genetic status of the population. We provide a comprehensive non-invasive genetic study for the brown bear population in Greece. By utilizing nuclear as well as mitochondrial DNA we investigated its genetic structure, diversity and phylogeography and produced population parameters with capture-recapture methods. We present a summary of our key finds based on the analysis of 382 samples on 11 polymorphic microsatellite loci previously used on Slovenian bears, and on a 248 base pair fragment of the mitochondrial control region. Bayesian inference showed that the Greek brown bear population is highly structured and its genetic clustering closely matches the geographical distribution of bears in Pindos and in the Rhodope mountains. We also found remarkable congruence between nuclear and mitochondrial DNA results which is suggestive of contemporary and ancient population processes. Signatures of population bottleneck were detected in all genetic clusters yet the viability of population remains high due to its minimum population threshold, and ongoing bidirectional gene flow, which offsets the observed genetic isolation. The gene flow exchange and the unique mitochondrial diversity which we detected in Greek bears, amplifies the importance of a population which bridges the Balkan distribution in its southernmost fringe.

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