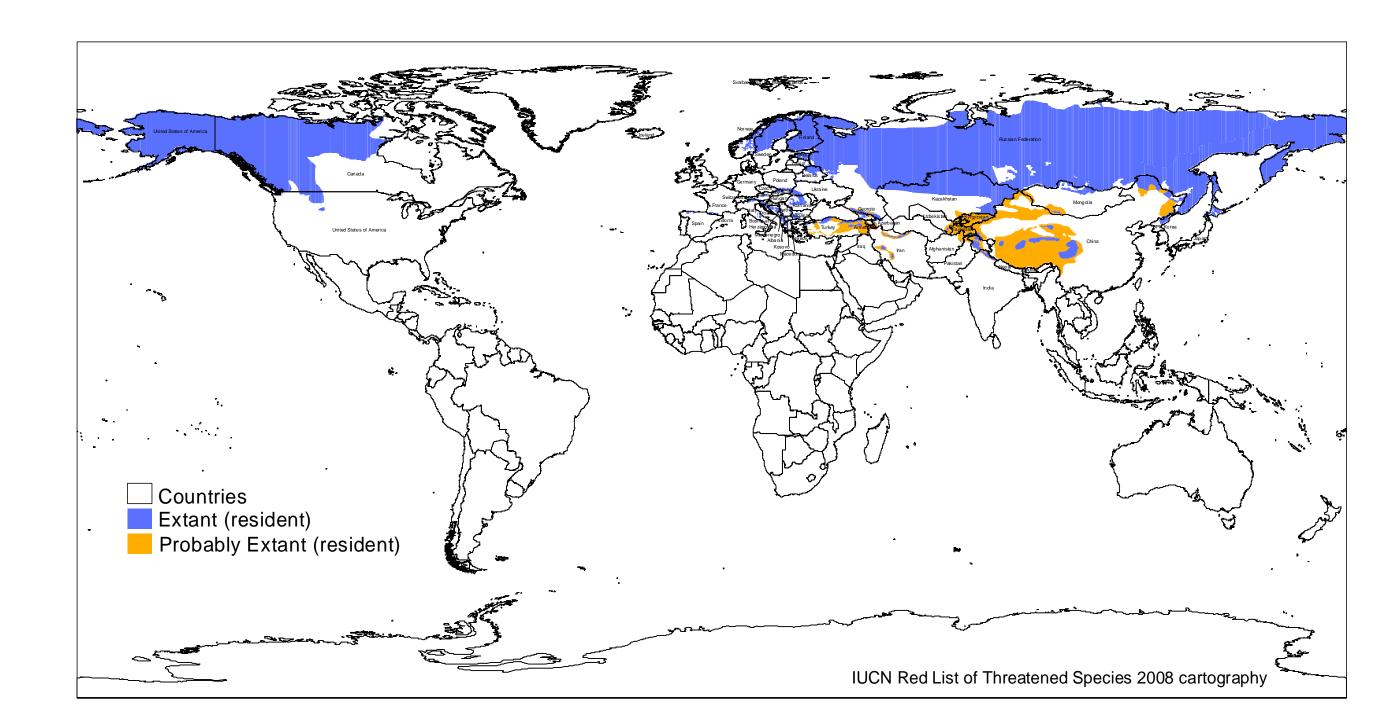
Brown bear attacks on humans in the world

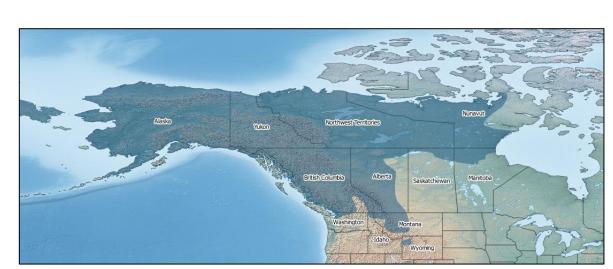
A preliminary overview. Period 2000-2015

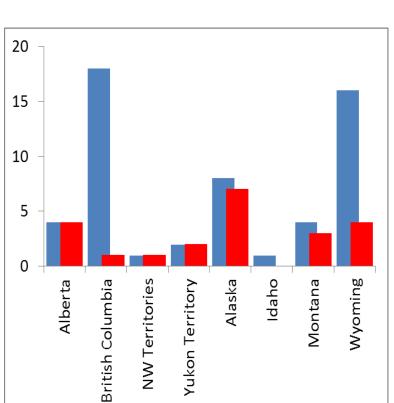
J. Naves¹, M.M. Delgado⁹, A. Fernández-Gil¹², J.V. López-Bao³³, N. Selva⁵⁰, V. Penteriani⁶¹, C. Bautista³, V. Bolshakov⁴, S. Bondarchuk⁵, J.J. Camarra⁶, S. Chiriac⁷, P. Ciucci⁸, A. Dutsov¹⁰, I. Dykyy¹¹, J. Frank¹³, A. García-Rodríguez¹⁴, S. Gashev¹⁵, C. Groff¹⁶, B. Gutleb¹⁷, M. Haring¹⁸, S. Härkönen¹⁹, D. Huber²⁰, J. Kalinkin²¹, A.A. Karamanlidis²², V. Karpin²³, P. Khoetcky²⁴, I. Kojola²⁵, N. Korytin²⁶, V. Kozsheechkin²⁷, M. Krofel²⁸, J. Kurhinen²⁰, I. Kuznetsova³⁷, Y. Mertzanis³⁸, A. Meydus³⁹, H. Norberg⁴⁰, S. Palazón⁴¹, L.M. Pătrașcu⁴², K. Pavlova⁴³, P.Y. Quenette⁴⁴, E. Revilla⁴⁵, R. Rigg⁴⁶, Y. Rozhkov⁴⁷, A. Rykov⁴⁸, V. Sahlén⁴⁹, I. V. Seryodkin⁵¹, A. Shishikin², M. Shkvyria⁵², V. Sidorovich⁵³, V. Sopin⁵⁴, D. Tirski⁵⁷, A. Vasin⁵⁸, P. Wabakken⁵⁹, T. Zwijacz-Kozica⁶⁰.

¹Dpt Conservation Biology, Dofiana Biological Station-CSIC, Spain. ²VIN. Sukachev Inst of Planter Gonegy, Ural Branch, Russia. ⁵Equipe Technique Ours, Office National does hesever (K.G. Abramov), Russia. ⁵Esthorter-Alin State Nature Biosphere Reserve (K.G. Abramov), Russia. ⁵Esthorter-Alin State Nature Biosphere Reserve, Russia. ⁵Esthorter-Alin State Nature Reserve (Mildife Society, Bulgaria, John State Nature Reserve Stolby, Russia, John State Nature Reserve Russia, John State Nature Reserve Tungusky, Krasnovarisk State Pedagogical University, Gonewas State Nature Reserve, Russia, John State Nature Reserve Russia, Popto Coolegy, Norway, State Nature Reserve, Russia, Popto Coolegy, Norway, State Nature Reserve, Russia, John State Norway, State Natural Resource Management, Norwegian University of Life Sciences, Norway, Stat

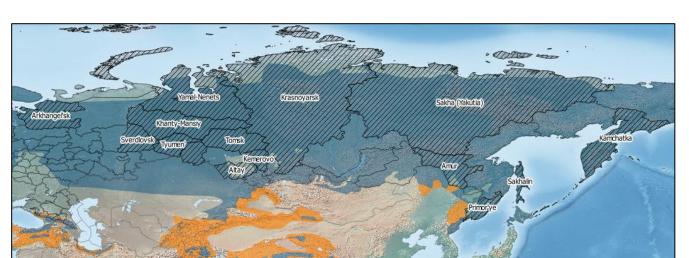
Core team: J. Naves, M.M. Delgado, A. Fernández-Gil, J.V. López-Bao, N. Selva, V. Penteriani.

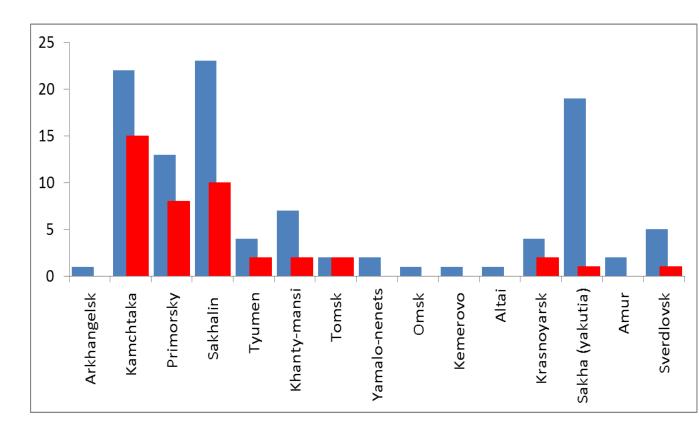






Brown/grizzly bears attacks on humans in North America, per states (USA) and provinces (Canada) (2000-2015 period). Red bars: Fatalities (number of killed people in bear attacks). Source: (1) and data of British Columbia from (6)





Brown bears attacks on humans in the federal territories of Russian Federation (2000-2015 period). Red bars: Fatalities (number of killed people in bear attacks). Geographic context (surface) and number of years with data during the study period is currently imprecise in some cases.

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avier Naves

Estación Biológica de Doñana (Consejo Superior de Investigaciones Científicas) C/ Américo Vespucio s/n, Isla de La Cartuja, E-41092 Sevilla, España inaves@ebd.csic.es

Contact during the Conference: Nuria Selva

Estación Biológica Doñana CSIC

Introduction

Although large carnivores attacks on humans are rare events they can contribute to lower public tolerance for their presence and conservation. During the last decades, large carnivore attacks on humans have increased over time in some areas, a scenario also true for brown bears *Ursus arctos* (1).

The total world population of brown bears is estimated to exceed 200,000 individuals. Russia has the largest number of brown bears, estimated to exceed 100,000, while estimates in the U.S.A are around 33,000, Canada 25,000, and Europe (excluding Russia) 18,000 (2,3).

Objectives and data collected

Our goal herein is to present a general overview on brown bear attacks on humans in the world, a topic rarely covered in the scientific literature (1, 4). We considered attacks only those cases in which physical contact between bears and people occurred.

We analyzed the period 2000-2015. In Europe we did analyze the relationships of number of attacks with the size of the bear population and human density.

To date, we have collected 54 attacks in North America (22 fatalities); 107 attacks in Russian Federation (comprising the European area; 43 fatalities) and 299 attacks in European countries (west of Russian Federation; 20 fatalities). We have also collected some anecdotal observations in Afghanistan, Albania, Iraq and Pakistan.

Analyses of European data

In Europe brown bears are distributed in 10 populations and 24 countries (3), several in human-dominated landscapes, and some of them among the most endangered in the world.

A total of 299 bear attacks were registered during 2000-2015 in Europe, although not all populations had data for the entire study period. We recorded attacks in 19 out of 24 bear countries, and in 9 of the 10 bear populations.

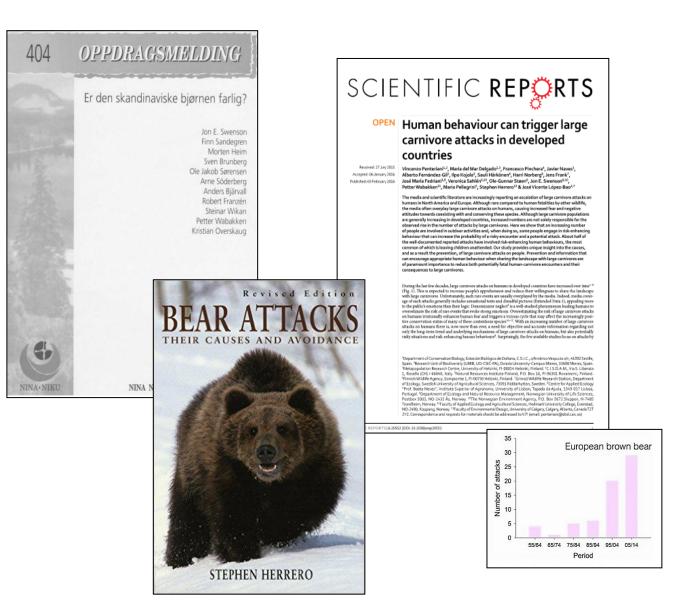
Fatalities (N=20) were recorded in four populations, with the majority (N=15) in the Carpathians. The highest rate of attacks by bear population (calculated as number of attacks ● 100 bears⁻¹ ● 10 years⁻¹), measured as average rates attacks per country, were found in the Cantabrian population, followed by the Dinaric-Pindos and the Carpathian one. Measuring the rate of attacks at a population level, we found highest rates in Alps and East Balkan followed by the Carpathian one.

We did analyze the relationships of number of attacks with the size of the bear population (3) and human density (5) in each country-population. We found that the best model included only the number of bears (see note). Nevertheless, the relation with the number of attacks was weak (p = 0.04 of the variable coefficient in the function), suggestion that other factors are probably playing stronger roles.

Note: We did the analysis via GLMM negative binomial error distribution. The area (km²) of the management unit (bear range) (3, 2) and number of years with data on attacks were included as an offset in the models, and population as random factor (analyses performed in R).

Perspectives

To fulfill data bases of brown bear attacks on humans, especially in North America and in Asia, and analyze different factors related to the attacks, e.g. bears' behaviors and human activities. Thereafter, we would compare our results among populations worldwide.



population	managemente units (country-popul.)	attacks	fatalities	years	range (km²)	bears	human density (n/km²)	rates attacks (country) (a)	rates attacks (country/popul.) (b)	rates attacks (popul.) (c)
Scandinavian	Norway_scan	2	0	16	149550	105	6.90	1.19	0.85	0.49
	Sweden_scan	20	2	13	317450	3000	4.95	0.51		
Karelian	Finland_kar	17	0	15	359225	1600	13.65	0.71	0.35	0.69
	Norway_kar	0	0	15	21775	46	1.40	0.00		
Baltic-Belarus	Estonia	3	0	16	36550	625	19.00	0.30	0.15	0.24
	Belarus	0	0	16	45000	160	31.00	0.00		
Carpathian	Poland W	1	0	16	4000	34	107.30	1.84	3.23	2.72
	Poland E	7	1	16	4000	61	44.10	7.17		
	Romania	127	12	15	89900	6000	62.34	1.41		
	Slovakia	55	0	16	19700	800	89.00	4.30		
	Ukraine	8	2	16	28000	350	101.00	1.43		
East Balkan	Bulgaria	14	1	7	10200	315	35.20	6.35	3.17	3.48
	Greece_balk	0	0	16	3600	35	19.60	0.00		
Dinaric-Pindos	Greece_pin	16	1	16	19500	375	26.80	2.67	4.75	1.78
	Macedonia_pin	9	1	5	17200	180	55.70	10.00		
	Croatia_pin	3	0	16	12200	1000	21.45	0.19		
	Slovenia_pin	10	0	16	12700	448	73.30	1.40		
Central Apennines	Italy_apen	0	0	16	2300	49	32.70	0.00	0.00	0.00
Alps	Austria	0	0	16	1900	5	58.20	0.00	2.16	3.68
	Italy_alp	2	0	16	2800	29	92.40	4.31		
Pyrenean	France/Spain_pyr	1	0	16	11400	25	8.00	2.50	2.50	2.50
Cantabrian	Spain_western_cant	0	0	16	4800	203	18.10	0.00	6.58	1.13
	Spain_east_cant	4	0	16	2900	19	6.30	13.16		

Brown bears attacks on humans in Europe (west of the Russian Federation), per country and bear population (2000-2015 period; data for the whole period is not available for all countries). Fatalities are number of killed people in bear attacks. (a) Rates attacks (country): attacks • 100 bears⁻¹ • 10 years⁻¹, in a country in a given population. (b) Rates attacks (country/population): in a given population measured as the average rate attacks (country). (c) Rates attacks (population): attacks • 100 bears-1 • 10 years-1, in each population

