

Visitor awareness of brown bear (*Ursus arctos*) human-food conditioning in Bieszczady and Tatra National Parks (Carpathians, Poland)

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Abstract: This paper investigates the awareness of visitors to Bieszczady National Park (BNP) and Tatra National Park (TNP) of human influence on brown bears (*Ursus arctos* Linnaeus, 1758), i.e. what causes human-habituated bears to become food-conditioned. In the parks studied, 928 questionnaires were collected in July and August 2007. The survey was supplemented with data on the amount of garbage collected in both parks by municipal services in 2007. Respondents in BPN displayed significantly greater knowledge about the causes of human-food conditioning of bears than respondents in TNP (64.2% and 52.7%, respectively, had more than the average of 3.54 correct answers per 5 questions in the questionnaire). As many as 60.1% of visitors in both parks incorrectly associated human-food conditioning with a lack of natural food and 34.4% with an excessive number of bears. Most respondents did not realise that to prevent human-bear conflict, decisive actions must be taken towards every food conditioned bear observed in the free-living population. Unlike in BNP, in TNP there is a large amount of rubbish left by visitors along trails. In 2007, municipal services collected in both parks a similar amount of garbage per 1000 visitors (0.39 m³ and 0.37 m³ in BNP and TNP, respectively) but the annual number of visitors is nearly 8-fold lower in BNP than in TNP. In BNP, only visitors put rubbish in containers, while in TNP, additional 6 cleaning companies are employed to collect rubbish thrown by visitors along trails. In contrast to TNP, however, in BNP there are no bear-proof containers. Both parks need to prevent the access of bears to rubbish. It is also advisable to initiate an effective information campaign among visitors about prevention of human-food conditioning of bears.

Keywords: *Ursus arctos*, public attitudes

INTRODUCTION

To achieve the goal of successful bear conservation, human-bear conflicts must be mitigated (JERINA et al. 2003). Bears are attracted to roadsides by herbaceous vegetation (ROEVER et al. 2008). The problem starts when people taking photos try to approach bears and leave the trail and/or bait bears by offering food, as this may lead to human habituation of bears. It is defined as indifferent or curious behaviour of bears when the distance between bear and observer is less than 50 m (RAUER et al. 2003).

Another problem to be solved may soon be human-food conditioning, as some bears regularly approach humans and human settlements to get food (JAKUBIEC 2001). Nuisance individuals are potentially dangerous e.g. for visitors of national parks (OLLIFF & CASALICK 2003). Interactions between humans and bears in some areas are managed by bear education campaigns focused on removing food attractants (SPENCER et al. 2007). Reduction of human-provided food is crucial to avoid food conditioning. In Yosemite National Park a positive correlation was found between reduction of availability of anthropogenic foods and the annual percent volume of human-provided food and garbage in American blackbear (*Ursus americanus*) scats (GREENLEAF et al. 2009).

The Bieszczady Mountains were, until recently, considered to be free from human-habituated bears. By contrast, in the Polish part of the Tatra Mountains some habituated bears have been observed since 1979 (JAKUBIEC 2001). Their more frequent habituation seems to be associated with a higher activity of people (MCARTHUR JOPE 1883). For example, in 2007, Bieszczady National Park (BNP) was visited by 293 000 people, while Tatra National Park (TNP) by 2 238 500 people (GUS 2008). Data on visiting intensity in TNP in 1870-2000 (CZOCHAŃSKI 2002) show a peak of 3.6 million visitors in 1978.

Park staff in TNP have undertaken a range of actions to prevent conflicts between humans and bears (ZIEBA & ZWIJACZ-KOZICA 2005). Nevertheless, the fate of food-conditioned bears (also known as container bears) in the Tatra Mountains was often dramatic. In 1980, a park guard shot the first food-conditioned bear. In 1991, a female and her offspring were transferred to a zoo. In 1994, another bear was put to sleep in Slovakia. In 1994, an individual disappeared together with her telemetry collar. In October 2007, six visitors killed a young bear in Chochołów Valley (Dolina Chochołowska). In the beginning, those people fed the cub but later they failed to keep it away, so finally they decided to kill it (ANTCZAK 2009).

A method used in many countries, which has a potential to make food-conditioned bears abandon their unwanted behaviour, is aversive conditioning (RAUER et al. 2003, MAZUR 2010). In Poland a successful example of solving the problem was a female human-habituated bear fed by visitors, which started to avoid people after the park guards carried out a range of preventive measures, including negative reinforcement (rubber bullets, capture one of her cubs during a failed attempt to put the female in a telemetric collar) and closure of the visitors trail in the area of her frequent presence. Currently there are no problems with bears in the Polish part of Tatra Mountains (ANTCZAK 2009).

So far, no preventive measures, such as installing garbage containers inaccessible to bears, have been undertaken in BNP. Recent press reports, however, have discussed at least 5 bears that have penetrated the area of Lake Solina. Visitors were taking photographs of bears, which stayed in the vicinity of trails and fed on natural food. Some people tried to feed the bears with sandwiches. One bear regularly approached garbage containers at a holiday resort near Lake Solina (POTACZAŁA 2009a, b). This indicates that visitors contribute to an increasing risk of human-food conditioning of bears in the Bieszczady Mountains.

The aim of this paper was to evaluate the awareness of visitors to these 2 national parks (TNP and BNP) of the reasons and consequences of human-food conditioning

of bears. Another goal was to assess differences between the 2 national parks in this respect. It was assumed that not only the number of visitors may differ, but also the level of their ecological awareness. To combine knowledge with practice, data on garbage amounts collected in both parks were discussed.

MATERIAL AND METHODS

In total, 500 questionnaires were distributed between 20th and 23rd July 2007 among visitors to TNP, at the entrance point to Strążyska Valley (Dolina Strążyska), and 500 questionnaires between 30th July and 2nd August 2007 among visitors to BNP (at the entrance point to the Wołosate-Tarnica trail). More than 92% of the questionnaires were returned. This paper presents a part of the survey. It comprises knowledge of the factors contributing to human-food conditioning (Table 1).

The data analysis for this paper was generated using SAS software (SAS 2004). Statistical analyses were conducted using the Pearson chi square test. Test results for the main question (Table 1) were compared with answers to additional questions: (1) What information about bears would you like to receive in a national park? (open question); (2) What should be done with food-conditioned bears, which are not afraid of humans and approach people and human settlements to get some food or garbage? (Shoot to death / transfer to a zoo / no intervention needed / other / no opinion).

Table 1. Evaluation of answers to the question “What are the reasons why bears become container bears?” (according to WECHSELBERGER et al. 2005)

Answer	Evaluation
They do not have enough natural food	No – 1 point
People encourage bears by offering food	Yes – 1 point
Rubbish is an easily accessible source of food for bears	Yes – 1 point
There is an over-population of bears	No – 1 point
Rubbish is not stored properly	Yes – 1 point

Data on the quantity of garbage collected annually per 1000 visitors was obtained for BNP from the Municipal Services Department in Lutowiska and for TNP from the staff of the park (J. Chowaniec, personal communication).

RESULTS AND DISCUSSION

The average number of correct answers to the question about reasons for human-food conditioning was 3.54 for 5 explanations. Results above average were in a higher proportion of BNP respondents (64.2%) than of TNP respondents (52.7%)

($\chi^2 = 12.512$, 1 df, $P < 0.001$). This shows that not only the number of visitors differs between the parks, but also the level of their ecological awareness.

In both analysed parks most doubts arose about the influence of natural food scarcity on food conditioning (Table 2). Hardly 39.9% of all respondents seem to understand that food-conditioned bears choose human food irrespective of the amount of natural food. Results obtained from tourists in another survey in Slovakia were similar, with 40.7% correct answers for this statement (WECHSELBERGER et al. 2005).

Table 2. Answers to the question “What are the reasons why bears become container bears?” in Bieszczady National Park (BNP) and Tatra National Park (TNP)

No.	Explanation	Answer	BNP		TNP		Total	
			<i>N</i>	%	<i>N</i>	%	<i>N</i>	%
1	They do not have enough natural food	Yes	201	42.6	169	37.1	370	39.9
		No	271	57.4	287	62.9	558	60.1
2	People encourage bears by offering food	Yes	417	88.3	395	86.6	812	87.5
		No	55	11.7	61	13.4	116	12.5
3	Rubbish is an easily accessible source of food for bears	Yes	414	87.7	374	82.0	788	84.9
		No	58	12.3	82	18.0	140	15.1
4	There is an over-population of bears	Yes	330	69.9	279	61.2	609	65.6
		No	142	30.1	177	38.8	319	34.4
5	Rubbish is not stored properly	Yes	349	73.9	313	68.6	662	71.3
		No	123	26.1	143	31.4	266	28.7

Respondents seem quite aware of the danger of incorrect rubbish management for bear conservation. In comparison to TNP visitors, BNP visitors choose significantly more often correct answers for 2 suggested reasons of human–food conditioning: “Rubbish is an easily accessible source of food for bears” (true, 87.7% in BNP vs 82.0% in TNP, $\chi^2 = 5.8706$, 1 df, $P = 0.015$) and “There is an over-population of bears” (false, 69.9% in BNP and 61.2% in TNP, $\chi^2 = 7.8375$, 1 df, $P = 0.005$). In contrast to Polish respondents, Slovakian ones tied food conditioning more eagerly with overpopulation and less frequently with encouraging bears by offering food or easy access to rubbish (WECHSELBERGER et al. 2005).

49.7% respondents with a knowledge of human–food conditioning above average (3.54) and only 35.7% respondents with knowledge below average answered the open question concerning information they would like to gain in national parks on bears. Visitors expressed their interest especially in locations where bears live and how to behave in case of a human–bear encounter. It seems that explaining some issues to visitors with lower ecological awareness may be difficult, as they seem to be less interested in gaining information.

The average quantity of garbage collected per 1000 visitors in 2007 was 0.39 m³ in BNP and 0.37 m³ in TNP. Till the year 1999, dust bins were also positioned along trails in TNP and about 1m³ of garbage per 1000 visitors was collected annually (J. Chowaniec, personal communication). Currently in both parks refuse bins are situated only near entrance points. Cleaning companies play a major role in removing rubbish from trails during theseason in TNP.

A lot of rubbish is collected in containers at entrance points in both parks studied. Still, bears have access to some quantity of rubbish. In 2008, 45 m³ of garbage were collected along trails in TNP during the campaign "Clean up the World". Out of tourist season, the trails in TNP in past years were not regularly cleaned by the private companies. At entrance points to BNP, bears have also potential access to garbage-containers, which are not bear-proof. In TNP, the design of containers prevents bears from accessing the garbage. Similar containers are used in Slovakia (RIGG & ADAMEC 2007).

During the last 20 years in Tatra Mountains, park guards took decisive actions towards every food-conditioned bear, but knowledge about it among visitors seems to be very limited. Thirty-five percent of respondents thought that for food-conditioned bears no intervention is needed, 33% thought that they should be removed from the free-living population (e.g. transferred to a zoo), 31% expressed no opinion, and less than 1% mentioned the possibility of threatening bears with rubber bullets.

FINAL REMARKS

The majority of visitors (87.5%) are conscious that a consequence of bear feeding is human-food conditioning. Nevertheless, some respondents in correctly assume that additional natural factors, such as lack of natural food or over-population, contribute to food conditioning (60.1% and 34.4% respectively). Visitors to TNP know less about bears than visitors to BNP. Many visitors do not consider human-food conditioning to be a problem that should be resolved through the action of park staff. People who have lower awareness than average about food conditioning are less interested in receiving information on bears in the visited park than people with knowledge above average. Raising awareness of food conditioning as well as cleaning of trails by private companies in TNP (also out of season) and placing of bear-proof containers at the entrances to BNP would limit the access of bears to garbage in the parks studied.

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