

International Association for Bear Research and Management



Oso
Bär
Björn
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Samxe
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Bear



Use of radio-collars in bear research, management and conservation: Joint position statement by the International Association for Bear Research and Management and the IUCN SSC Bear Specialist Group

Summary

The International Association for Bear Research and Management (IBA) and the International Union for Conservation of Nature (IUCN) Species Survival Commission (SSC) Bear Specialist Group (BSG) support science-based management and conservation of the world's eight species of bears.

The IBA and BSG recognize the importance and value of using radio-telemetry collars on bears for research, management, and conservation purposes. We also acknowledge the animal welfare issues and risks involved. We strongly support efforts to minimize negative effects on study animals and using alternative, less invasive methods, when feasible. We support radio-collaring because many important scientific questions cannot be answered using other techniques. We urge biologists to employ the highest standards of capture, handling, and collaring to minimize the probability of stress and injury to bears.

BACKGROUND

There are eight species of bears; at the global level six of them are listed in a threatened category on The IUCN Red List of Threatened Species. In addition, many small and isolated populations of bears are facing pressures to their survival. On the other hand, some bear populations are faring well due in part due to the positive outcomes of conservation interventions. To ensure the continued success of these interventions, primary management must focus on increasing challenges related to conflicts with humans¹. The environmental and social contexts for bear management around the world differ widely, requiring place-specific scientific studies.

To further the knowledge and understanding of bears and inform management decisions, a wide array of techniques has been employed, some of which require physically handling bears. One commonly-used technique is radio-telemetry, whereby collars with VHF or GPS devices are fitted to bears and used to investigate important aspects of their ecology (e.g., their movements, home ranges, resource use, and cause-specific mortality). Radio-telemetry studies have provided data valuable for management and conservation, and the

¹Can, Ö. E., D'Cruze, N., Garshelis, D. L., Beecham, J., Macdonald, D. W. (2014). Resolving human-bear conflict: a global survey of countries, experts, and key factors. *Conserv Lett* 7(6): 501-513.

vast scientific literature based on radio-collared animals indicates that bear biologists worldwide rely heavily on this technique.

The International Association for Bear Research and Management (IBA) and IUCN SSC Bear Specialist Group (BSG) recognize however, that there are animal welfare concerns related to radio-collaring. We also acknowledge that in some areas, local people are opposed to capture, handling, and collaring of bears for cultural and spiritual reasons. Although we do not consider these latter aspects here, it is important that the beliefs of local people, including indigenous groups who have shared landscapes with bear species (in some cases for many centuries), are identified and respected in any bear study.

ANIMAL WELFARE CONCERNS OVER RADIO-COLLARING

Radio-collaring typically involves animal capture, chemical immobilization, fitting a radio collar, and the bear wearing that collar for an extended period of time. Collars drop off either through the use of a breakaway link that degenerates over time, or a release mechanism set to a specific date or commanded via a remote link, or they are removed when the bear is handled at a later time.

Chief concerns regarding collaring are: 1) capture and handling is required, which involve some risk and stress for the bears; 2) improperly fit collars or unanticipated neck growth can cause neck injury; and 3) the electronic components of collars may fail, entailing loss of contact with the animal, resulting in collars remaining on longer than desired. Biologists considering the collaring of bears should be aware of their responsibility in minimizing potential for harm to each animal and should weigh potential gains in knowledge against potential adverse consequences.

THE VALUE OF RADIO-COLLARING

A number of study techniques can yield information about bear distribution, demography, ecology, and behavior without physically handling bears. Examples include visual observations of behaviors in natural habitats, surveying bear signs, monitoring with remote cameras, collecting fecal or hair samples for genetic or hormone analyses, and interviews with local people who coexist with bears. However, radio-telemetry provides a wealth of information that cannot be obtained with any other technique². It is notable that knowledge of the tropical bears is limited, in part, because few radio-collaring studies have been conducted.

Telemetry is considered an essential tool to study movements, activity, and habitat use at various scales³. Data from bears tracked with radio-collars have revealed detailed facets of bear biology, ecology, and behavior that have not only increased scientific knowledge, but have aided in management and conservation stemming from better understanding of habitat requirements, responses to human activities and changing climate, survival, reproduction, conflicts, food-conditioning and habituation, and identification of movement routes important for connectivity among populations. Bear telemetry data have been used to inform specific conservation actions such as habitat protection programs and delineation of protected areas. Despite many advances in non-invasive data collection

²Garshelis, D.G. 2006. On the allure of noninvasive genetic sampling — putting a face to the name. *Ursus* 17(2): 109-123.

³Kays, R., Crofoot, M. C., Jetz, W., Wikelski, M. (2015). Terrestrial animal tracking as an eye on life of the planet. *Science* 348(6240): aaa2478.

methods (particularly DNA sampling and camera trapping), scientists have yet to find an alternative to radio collars for gathering many types of essential information.

THE THREE Rs: REPLACEMENT, REDUCTION, AND REFINEMENT

Since the first studies involving collared bears in the 1960s and 1970s, concerted efforts have been made to substantially reduce impacts of the devices on study animals with the goal of improving animal welfare and scientific results. The community of bear researchers has the responsibility of being aware of the potential risks involved in handling and collaring bears^{4,5}, and also continuously striving to improve techniques to reduce these risks. Studies that involve animals are expected to conform to appropriate legislation at regional and national levels⁶ (e.g., welfare acts or regulations, species conservation laws where applicable). Additionally, many countries and academic institutions, as well as peer-reviewed scientific journals require that research performed on animals in the wild must first be reviewed and approved by an animal welfare, animal care and use, or ethics committee.

A common guide in animal studies worldwide involves the careful evaluation of three key principles: 1) replacement, 2) reduction, and 3) refinement. **Replacement** refers to substituting, wherever possible, methods that can achieve the same scientific objectives without handling live animals. **Reduction** means decreasing the number of live animals handled to the lowest number necessary. Technological advances have enabled the collection of more data per study animal (e.g., GPS telemetry), thus maximizing the scientific benefit of each study subject. Additionally, the recent move toward publishing and sharing of raw data (e.g., in data repositories such as Movebank) may reduce the number of study subjects needed to answer questions on any individual study. **Refinement** means designing and conducting the study in such a way that maximizes scientific output, while minimizing costs to the animals by using the least invasive techniques available. Capturing methods for bears and handling standards are being continuously improved^{6,7,8}, as are the telemetry collars (e.g., smaller size and weight, more fixes with satellite transmission, mortality sensors, integrated drop-off systems).

RECOMMENDATIONS

The IBA and BSG share the belief that rigorous scientific data are essential for designing and implementing well-informed management and conservation decisions. Whereas non-invasive techniques have become increasingly useful, we maintain that handling and collaring bears remains essential for answering certain types of scientific

⁴Kaczensky, P., Knauer, F., Jonozovic, M., Walzer, C., Huber, T. (2002). Experiences with trapping, chemical immobilization, and radiotagging of brown bears in Slovenia. *Ursus* 13: 347-356.

⁵Cattet, M., Boulanger, J., Stenhouse, G., Powell, R. A., Reynolds-Hogland, M. J. (2008). An Evaluation of Long-Term Capture Effects in Ursids: Implications for Wildlife Welfare and Research. *J Mammal* 89(4): 973–990.

⁶Vasbinder, M. A., Locke, P. (2017). Introduction: Global Laws, Regulations, and Standards for Animals in Research. *ILAR Journal* 57(3): 261-265.

⁷Canadian Cooperative Wildlife Health Centre & WCVM Wildlife Health Fund (2002). Capturing and handling of wildlife; approaches to reducing stress. Western College of Veterinary Medicine, University of Saskatchewan, Saskatoon, Saskatchewan.

⁸Proulx, G., Cattet, M., Powell, R. A. (2012). Humane and efficient capture and handling methods for carnivores. In: Boitani, L., Powell, R. (eds.) *Carnivore Ecology and Conservation: A Handbook of Techniques*. Oxford University Press, Editors: L. Boitani, R. Powell, pp.70-129.

questions, many of which are crucial to address the pressing conservation challenges of our time.

We strongly advise all IBA and BSG members, as well as others involved in bear research to:

1. use the most suitable and least-invasive method to address study objectives following the three key principles of replacement, reduction, and refinement;
2. follow internationally accepted ethical and welfare standards in animal research;
3. if capture and collaring are deemed necessary, ensure that the highest standards are used, always being cognizant of animal welfare concerns;
4. expand research on the effects of and improvement in capture, chemical immobilization, handling, and collaring of bears.

IBA and BSG – who we are

The International Association for Bear Research and Management⁹ is an organization open to biologists, wildlife managers, and others working to support science-based management and conservation of the world's eight species of bears. IBA's membership is comprised of approximately 550 members from approximately 55 countries. The IBA hosts international conferences, publishes the peer-reviewed scientific journal *Ursus* and an International Bear News newsletter, and financially supports research and conservation projects worldwide through a grants program.

The Bear Specialist Group¹⁰ focuses on identifying and alleviating threats to terrestrial bear populations across the world. It is one of over 140 taxon-specific Specialist Groups within IUCN's Species Survival Commission. The IUCN is the world's largest international authority on the status of nature and natural resources worldwide and the SSC, one of its six commissions, is a science-based network of volunteers, with a wealth of expertise on species and their conservation. The BSG has about 180 appointed members, representing nearly all range countries where bears exist. Members conduct studies and monitoring efforts, provide scientific guidance on conservation initiatives, and promote the adoption of agreements that foster conservation of bears.

Our aim is to provide and use the best available science for governments, institutions, policy-makers, other scientists, and the general public, in support of management and conservation of bears.

⁹<https://www.bearbiology.org>

¹⁰<http://www.globalbearconservation.org/>