REHABILITATION AND RELEASE OF

BEARS

FOR THE WELFARE OF CONSERVATION OR FOR THE CONSERVATION OF WELFARE?

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Including Presentations and Results of the Workshop on "The Evaluation of Bear Rehabilitation Projects from a Conservationist's Point of View: Creating a Linkage between Different Fields of Interests" held by the International Bear Foundation (Alertis) and the Bear Taxon Advisory Group (Bear TAG) of the European Association of Zoos and Aquariums (EAZA) in November 2000

Editors:

Lydia Kolter & Jiska van Dijk

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* presented during the workshop on "The Evaluation of Bear Rehabilitation Projects from a Conservationist's Point of View: Creating a Linkage between Different Fields of Interests" held on 26th and 27th of November 2000, at Ouwehand Zoo, Rhenen, The Netherlands.

FOREWORD

Six of the eight bear species of the world are endangered or vulnerable. During the last 50 years many populations of each species have declined locally, and some have been extirpated across broad regions. Today, without concerted timely action, there is little hope left for the last remains of fragmented populations in entire countries. Fortunately, with active conservation programmes, some local and even national bear populations have the capacity to recover and avoid extinction. To achieve this potential, it is crucial to maintain existing habitat used by bears, to have adequate habitat available to support a viable population and to implement an effective conservation management programme.

Some critically endangered populations have stabilized or recovered with the help of re-introduction and/or augmentation programmes. These have been most successfully accomplished when the donor bears were captured and translocated from wild stocks adjacent and genetically similar to the recipient stock. Bears are intelligent, long-lived, and opportunistic feeders. Once they are fed by humans or gain positive reinforcement of ready access to human foods or domestic livestock under the wrong conditions, bears are more likely to come in conflict with humans. To provide the greatest opportunity for success, it is very important to gain support from local people and appropriate governmental agencies prior to initiation of the conservation program.

The utility of establishing captive breeding programs to provide bears for reintroduction or recovery of wild stocks is less certain. Understanding of giant panda biology has benefited from captive breeding programmes and led to greater public understanding and support for the establishment of the habitat reserves that have been so important in their conservation. However, species-specific behaviour and biological characteristics of bears usually make such approaches much more effective for ungulates than for bears.

Because organisations and private individuals sometimes take bears into short-term custody that have been injured, orphaned as cubs or caught by accident, it is often suggested that such bears be used for reintroductions or augmentations. Depending on the circumstances and their physical condition, such bears have sometimes been released following a period of recovery or adequate maturation (for cubs), but little is known about their fate after release or their impact on the local receiving population. To address these uncertainties, post-release monitoring research should be carried out to clarify the potential of this approach for bear conservation.

The goal of this publication is to share experiences and provide the information exchange that is necessary for the conservation and welfare of bear populations worldwide. It is our responsibility to do what we can to best secure the future of bears.

Fairbanks, January 2005
Harry Reynolds

INTRODUCTION

In November 2000, a workshop on The Evaluation of Bear Rehabilitation Projects from a Conservationist's Point of View: Creating a Linkage between Different Fields of Interests was held by the International Bear Foundation, currently known as the Alertis, Fund for Bear and Nature Conservation and the Bear Taxon Advisory Group (Bear TAG) of the European Association of Zoos and Aquariums (EAZA).

During this two day workshop in Rhenen, the Netherlands, several parties directly or indirectly involved in the rehabilitation and release of bears and bear conservationists were brought together to exchange information and share experiences on this topic. Despite the fact that rehabilitation and release of different bear species such as American black bears, brown bears or spectacled bears has been and currently is being practised, only anecdotal information on its success or failure is available. Bear conservationists however see a high probability of such releases having a negative impact on bear conservation due to the possibility of disrupting the receiving bear population and/or due to the possible creation of problem bears. These are bears that become or are already habituated to human presence and cause problems by coming too close to human settlements, raiding on livestock and crops or even attacking humans. Bears behaving like this will quickly change the positive attitudes of local people towards bear conservation to negative ones. Bears kept under human care during rehabilitation or even born in captivity might be particularly prone to developing these behaviours as they lose their fear of people. From the other viewpoint it is assumed, particularly by animal welfare organisations, that the risks are minimal and by 'saving' these individual bears, not only they are helped but also the wild bear populations benefit from such releases through an increase to the wild population.

The aim of the workshop was to present the methods and results of releasing rehabilitated bears into the wild and to discuss the risks and chances of bear releases for bear conservation . Additionally, the potential value and contribution of captive bears to conservation was closely examined.

The differences in the assessments concerning the conservation value of releasing rehabilitated bears could not be resolved during the workshop, but there was agreement, that habitat protection is of utmost importance for bear conservation, that conditions responsible for the occurrence of orphaned bear cubs, which are the main subjects for rehabilitation and release projects, should be restricted or even removed and that any release project has to be done according to the IUCN/SSC Re-introduction Specialist Group re-introduction guidelines to minimise any risks to wild populations.

During the workshop the wish was expressed in continuing and increasing the exchange of information on this topic. There was also the desire to place it on the political agenda within organisations such as the International Bear Association (IBA) and The World Conservation Union (IUCN). A step in that direction was the holding of a workshop during the IBA conference 2002 in Norway.

Hopefully by publishing this document, another important step will be made towards these goals and the editors encourage animal welfare organisations and bear conservationists, as well as the IBA and IUCN, to increase the dialogue and strengthen knowledge on bear rehabilitation and releases, practices and impacts. The document contains not only contributions presented during the workshop but also those relevant to the topic and submitted later. The minutes of this workshop and of the follow-up workshop during the IBA conference 2002 in Norway are appended as well as "suggestions for bear rehabilitation and Releases" an outcome of discussions from within a smaller group. The IUCN/SSC Re-introduction Specialist Group kindly gave permission to include the guidelines on re-introduction and those on the placement of confiscated animals. The World Association of Zoos and Aquaria (WAZA) also permitted the attachment of their guidelines on the acceptance of seized and confiscated animals. To initiate a database a reference list (bibliography) on bear releases and rehabilitation is included, too.

Thanks to The International Bear Foundation and Ouwehand Zoo Rhenen for hosting the workshop and the contributing authors. Last, but not least, a big thank you to Carolyn Koehler and, in particular, to Siân Waters, who very promptly improved and corrected the English. Siân was for sure the accelerating element/force in the editing process.

Lydia Kolter and Jiska van Dijk

PAPERS

Considerations for the Rehabilitation and Release of Bears into the Wild

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Bears on the move

Going back several decades both European brown bears and American black bears have been released back into the wild after being cared for by humans for a certain period of time. In Europe, for example, there are references to the release of zoo-reared brown bears in Trentino, Italy in the late 60's (Roth 1972, Tomasi 1970), of releases of young bears in Bialowieza, Poland, in the late 30's and early 40's (Buchalczyk 1980), and hand-reared young bears in Croatia in the late 80's (Huber 1994). In North America, professional rehabilitation centres exist as well as private licensed persons who rear orphaned or injured black bears (cubs, sub-adults and adults) and release them back into the wild (Carney and Vaughan 1997, Clarke 1980, Jonkel 1980). For the spectacled bear in South America release attempts are known from the Maquipuuna Reserve in Ecuador in 1996 (Watkins pers. comm.) and Colombia in 1997 (Black 1996). Based on personal communications with people from the Russian Far East, India, Indonesia (Fredriksson 2005), Romania and Slovakia reveal that clandestine practices and practices with the specific approval of the authorities not only took place in the past but are still going on today.

There is not much documentation and for many releases no detailed information exists. The reason why so little information exists is because these releases are often ad hoc and not part of a long term program and thus not documented in detail. This is especially true when there are no scientists involved. Also many releases often lack a follow-up program in terms of monitoring the released animals. Another possible explanation could be that when a project is unsuccessful the people involved might not be very keen on passing on their experiences.

As the media is ever present nowadays and modern communication structures enable us to exchange more information, better and faster, rehabilitation and release of bears is put more in the spotlight. The advantages of these communication structures and increase in interest by the media are that clandestine releases of surplus zoo bred bear

cubs can hardly be done without the knowledge of the broader public. Another positive aspect of attracting media attention is that it can serve as very effective tool to educate and inform the public about the threats that wild bears are exposed to and about the reasons why these wild bears came into captivity. The disadvantage however is that especially rehabilitating and releasing bear cubs is quite charismatic. For animal welfare organizations supporting such a practice is an attractive and often a money-making option. Because little is known about the effects of rehabilitation and release on both the released bears and on the wild bear population already present, we have to be careful with carrying out these practices. The popularity of bear releases might well be way ahead of the definition of its contribution to the conservation of bears in the wild.

Definitions and types of release

The IUCN/SSC guidelines for re-introductions (1998, see appendix VII) define *re-introduction* as an attempt to establish a species in an area which was once part of its historical range, but from which it has been extirpated or become extinct. This definition gives, when strictly used within its context, little room for describing conservation efforts in which bears are *translocated* (i.e. deliberate and mediated movement of wild individuals to an existing population of conspecifics) or in which bears are used for *supplementation* (i.e. addition of individuals to an existing population of conspecifics). Re-introduction thus implies the point of departure as being when no bears remain in the area to be focused on, whereas bear conservationists have been using the term re-introduction both for translocation projects and for projects where bears are supplementing an existing population. The margin of the definitions re-introduction, translocation and supplementation lies between the number of bears that still exist in an area and the number of bears that will be used for translocation. The term re-introduction is used both in cases where bears were translocated in an area where they were extirpated or became extinct and where bears were translocated to augment a small at-risk population. Therefore the terms translocation, augmentation and re-introduction overlap each other and they all have in common that in our case it implies wild bears which have had little to no contact with humans and which do not originate from captivity. Only during the period of catching and transport are humans involved. This is different from, for instance, the re-introduction of the Arabian Oryx (*Oryx leucoryx*) in Oman (Stanley Price 1989), or the golden lion tamarin (*Leontopithecus rosalia*) in Brazil (Kleiman *et al.* 1986) or for the black-footed ferret *(Mustela nigripes*) in Wyoming, USA (Miller and Vargas 1994) where captive bred animals were used that had been in captivity over a period of time.

Kleiman (1996) however describes re-introduction as the release of either captive-born or wild caught animals into an area within their original range where populations have declined or disappeared. When using this definition the ultimate aim of re-introduction for both conservationists and animal welfare organizations should be to establish a viable population in the wild that enhances the long-term survival of the species. Animal welfare organizations focus in addition on the survival of a particular individual and on giving this individual a possibility to live in nature.

To give an impression of the potential backgrounds for re-introductions of bears the following examples can be given.

1. A randomly chosen bear from a viable population is caught in one area and directly transported to a release site in a different area.
2. A nuisance bear, i.e. a bear that comes too close and too often to human settlement, is caught and translocated to a more remote area either directly or after a period in which the bear remains in captivity.
3. A bear is hit by a vehicle and is severely injured but it can be caught and taken into captivity. In captivity it is taken care of and released back into the wild as soon as the wounds are healed. The period in which the bear remains in captivity depends on the severity of its wounds.
4. A small orphaned bear cub is found in its natal den without its mother or is confiscated from poachers. The cub is submitted to a care/rehabilitation program in which the bear is taken care of until it is released back into the wild. Depending on the program and on the age of the bear cub the period in which the bear remains in captivity varies.
5. A bear that is illegally in possession (e.g. trade), used by the owner (e.g. circus or dancing bear), or a troubled pet (e.g. once a little cub, now a strong aggressive adult bear) is confiscated by the authorities or purchased by an animal welfare organisation and is transported to a shelter. Because of financial constraints, a change in objectives within the organisation or changing governmental politics, it might be decided to release the bear into the wild.
6. A zoo-reared bear whose parents are kept in captivity and which is raised by the sow. When the bear is independent it is released into the wild.

The main distinguishing trait in the above examples lies in the differing period of time and the intensity in which a bear is exposed to human care. Despite having the reputation of being dangerous, bears are in general relatively easy to keep in captivity as we can see from their use as dancing bears, circus performers and their long history in zoos (van Dijk 2001). Most bears adapt relatively easy to their captive environment.

This adaptation capability can, however, work both ways. Bears that are taken care of might associate human activity with food availability. After release such bears may return to human settlements looking for food, a behaviour that is often not appreciated by local people. On the other hand one would expect that because of this adaption capability a so-called nuisance bear that is translocated into a remote area with plenty of natural food sources, should easily adapt itself to its new environment. Unfortunately managers have faced the opposite situation and translocated bears may either return to their original site or start to cause trouble at the site where they have been translocated to (Riley et al. 1994, Griffith et al. 1989, Garshelis and Pelton 1981, Beeman and Pelton 1976). Thus a bear seems to adapt relative easily to captive environments but changing from a nuisance bear to a bear that avoids human settlement is apparently not so easy.

In the examples of translocation and release after injury (examples 1 to 3) the period of time in which bears depend on human care is relatively short compared to the examples of orphaned bear cubs, confiscated bears and zoo-reared bears (examples 4 to 6). Although not proven, the impact of the first three examples on bear behaviour (adaptation and conditioning) might therefore be negligible. Prolonged care, on the other hand, has a likely effect on bear behaviour and should be taken into consideration for rehabilitation and release of orphaned bear cubs, confiscated bears and zoo-born bears into the wild.

Population dynamics, habitat use and behavioural aspects

To avoid the risk of releasing bears in unsuitable bear habitat, releases of rehabilitated bears are likely to be done in areas where wild bears are still present, either in very small numbers or in a large continuous population. Releases will therefore have an effect on the receiving wild population, given the assumption that the released animals survive at least over a period of time. According to Stokes (1970) density-dependent social intolerance can be expected when population density increases substantially. Studies on the population structure of bear populations have revealed that direct and indirect social interactions (i.e. dominant versus sub-dominant, percentage of home range overlap of related animals, territoriality, acceptance, and mating avoidance) together with food abundance play a crucial role in the population dynamics of bears (Joshi et al. 1999, Rogers 1997, Swenson et al. 1997, Stonorov and Stokes 1972). The severity of social intolerance is, according to Stokes (1970), directly related to the number of bears already present in the area in relation to its carrying capacity and saturation. Taylor (1994) has shown that food availability in particular explained dispersal patterns. Bears that are triggered, either by food availability alone or in

combination with social intolerance, to disperse into marginal habitat can come into too close proximity of humans and thus increase the risk of changing into nuisance bears.

In the case of augmenting a near extinct bear population which has suitable habitat with sufficient food sources with released and rehabilitated bears, the risk of social intolerance within the receiving population is most likely minimal. However, when releasing new individuals into a saturated populations (either large or small in number), the new incoming individuals must be able to adapt to the present situation. They must find their place within the existing population structure without causing too much of a stir.

The period of maternal care in bears varies not only between bear species but also varies within species (Craighead 2000, Joshi et al. 1999, Palomero et al. 1997). Swenson et al. (1998) have shown that self-sufficiency in European brown bear cubs can take place as soon as July when cubs are only around six months old and Loyal and LeRoux (1973) found evidence that, in some circumstances, Alaskan brown bear cubs can be self-sufficient by seven months of age. Cubs were then capable of finding sufficient food to gain enough fat reserves needed for hibernation. But if this is the age of self-sufficiency in brown bears, why is the family bond not broken after reaching self-sufficiency and why does the sow delay her reproductive cycle by prolonged maternal care? Apparently taking care of the cubs longer than necessary is more profitable than reproducing a new litter again. Within this period the sow is able to give extra protection to and teach her cubs bear specific behaviour skills necessary for survival in the wild.

The timing of the release of rehabilitated bears into the wild is an important factor regarding their rehabiliation but the period prior to releases also needs to be adequate for the bears to develop bear specific behaviour. Here we face the trade-off between the negative effect of a bear getting adapted to human activity whilst keeping the bear longer in captivity versus the positive effect of being able to teach and train the bear or create the environment in which the bear can develop skills necessary to survive in the wild. The rehabilitation program by Pajetnov & Pajetnov (1998, see also Pazhetnov and Pazhetnov 2005) is based on this trade-off whereby one carefully outweighs the disadvantage of a bear imprinting on humans and the advantage of holding bear cubs longer in captivity to enable the development of specific skills necessary to survive in the wild.

Success and failure of release and rehabilitation

Because few data are available on the fate of rehabilitated and released bears and little is known of its effect on the receiving population, we can only assume that there is an effect. It is plausible that differences in habitat use and behaviour exist between wild and released bears. Carlstead (1996) also points out that wild mammals reared in a captive situation adapt their behaviour to their environment, no matter how impoverished or enriched. Rehabilitated and released bears have been under the the care of humans and due to their adaptation ability and imprinting skills as seen in zoo bears and nuisance bears the question is not so much if there are differences but whether the differences are acceptable? We can only answer this question when we have more insight into the exact nature of these differences. Since we do not know how they differ in their home range use, long-term survival, social interactions and foraging skills, we can only argue about possible outcomes.

The release of rehabilitated bears in an area with few bears and enough food and, where the risk of density-dependent social intolerance is low, can be called a success when the released bears survive, reproduce and stay away from human settlements. The existing population is thus enlarged to some extent and augmented with fresh genes. Success is gained on both the conservation and the animal welfare level. Still, it might be a long way before the population reaches the range it had in the past. Had the released bears failed to survive, the release would have failed on the animal welfare level and would have had no effect on the conservation level. However, had the released bears survived and started to exhibit abnormal behaviour causing trouble, the effect of failure for the conservation of the entire population might be larger than the success of the release. This is because people will not distinguish between released and wild bears, and will thus discredit all bears.

For the conservation of wild bear populations local support is of utmost importance. To ensure public acceptance and local support, the ability to avoid humans and their activities and not to exhibit nuisance behaviour will therefore dictate the success of the release. According to Yalden (1993) an 85-90% majority in support of a conservation program would be overwhelming, but opposition from a 10-15% minority may well be sufficient to ensure the failure of the program. Stiver et al. (1994) state that incorporating local input into a bear management program can be permanently damaged by releasing potential nuisance animals into an area. It is usually the local people who dictate the fate of bears (Stiver et al. 1994).

Both for conservationists and animal welfare organizations working with rare large carnivores, each animal is precious and the consequence of failure might be as serious

as the consequence of success. If a released animal dies there is the loss of an individual to supplement a wild population, the loss of genetic resources as well as an economic loss of the resources put into raising and releasing it. Concerning the individual and the receiving population, the success or failure of releasing and rehabilitating bears can thus be assigned to:

1. the ability to avoid human activities and not to exhibit nuisance behaviour that eventually becomes a threat to local people;
2. no negative effect on the local bear population (i.e. no density and food dependent dispersal);
3. the survival of the released bears;
4. the reproductive success of the released bears.

Rehabilitation and release of bears could contribute to the conservation of the wild population when there is no potential risk of conflicts (nuisance bears) and when the released bears take part in reproduction. However in cases where populations are large, as for American black bears, there is no direct conservation need to augment the existing population with rehabilitated bears. Alternatively, when augmenting rehabilitated bears to a large population the possibility of failure (i.e. a nuisance bear creating a negative attitude towards the entire wild population) may be low. This needs some explanation. When looking at the results of Stiver et al. (1994) five out of 23 pen-reared black bears caused nuisance problems, which results in 1 out of 5 bears that potentially may become a nuisance bear. In a different rehabilitation program in North America (Caputo 2002) 2 out of 31 rehabilitated American black bears became nuisance bears, resulting in 1 out of 15 bears becoming a nuisance. On average, 1 out of 10 rehabilitated bears might become a nuisance bear. Increasing a large population of 1,000 bears and a small population of 10 bears, respectively, with 10 rehabilitated bears, the one nuisance bear has a more severe ‘failure impact’ on the small population (i.e. 5 %) then on the large population (i.e. <0.001%). From this black and white picture we can conclude that if releases of rehabilitated bears are done, they may best be done in areas where bears are abundant compared to areas where bears are at risk. However, looking further, the effect on population dynamics may be significantly larger in an area where the bear population is saturated compared to an area where the population is unsaturated. This is because of potential dispersal into marginal habitat due to food shortage and social intolerance. From this we might conclude that if rehabilitation and releases are practiced it is better to use unsaturated populations over saturated populations where the risk of dispersal into marginal habitat is low. In other words, when combining small and large with saturated and unsaturated and when only taking the risk of potential nuisance bears and population disruption into account, the practise

of rehabilitation and release faces minimum risks only in remote, large but unsaturated populations. Fortunately these remote, large but unsaturated bear populations don't face direct threats and augmentation with rehabilitated bears is thus merely for the purpose of animal welfare and not for conservation.

However, until we have better insight into the exact nature of the differences between released and wild bears and the effect of these differences on the receiving population, we should actually avoid bear rehabilitation and releases, because of the high risk for the receiving wild population. When releases of rehabilitated bears are done, they should carefully follow the re-introduction guidelines provided by the IUCN (1998, see appendix VII), to minimize all possible negative effects. Also more attention should be given to encourage the protection of remnant existing populations.

Conclusions

Both today and in the past bears that have been under the care of humans have been and are released back into the wild. This practice is bound to have an effect on existing bear populations, due to behavioural differences acquired during the period of human care. Because there is insufficient knowledge to evaluate the impact of release and rehabilitation on the receiving population and to prove its contribution to the conservation of the species we have to take great care when undertaking this exercise. The negative impact of a released bear that becomes a potential nuisance bear is higher when releases are done in small bear populations than in large bear populations, thus releases in larger bear populations are to be recommended. However due to the higher risk of density dependent social intolerance in both small and large saturated populations, which increases its chance of having nuisance bears, one should be very careful with releases in saturated bear populations. Because there is no direct need to augment large bear populations from a conservationist's point of view, and because releasing bears in small bear population is rather risky, releases should be avoided. All attention should be given to encourage the protection of the remnant existing populations.

References

Beeman, L.E., and M.R. Pelton 1976. Homing of black bears in the Great Smoky Mountains National Park. Int. Conf. Bear Res. and Manage. 3:87-95.

Black, J. 1996. South American bear rehabilitation; a spectacular sight. Wildlife Rehabilitation Today, 7(3):22-26.

Buchalczyk, T. 1980. The brown bear in Poland. Int. Conf. Bear Res. and Manage. 4:229-232

Caputo, R. 2002. Meneer mamma beer. Ben Kilham zorgt voor verweesde zwarte beren. National Geographic (Dutch version). Maart 2002:121-133

Carlstead, K.1996. Effects of Captivity on the Behavior of Wild Mammals. In Wild mammals in captivity: principles and techniques, ed D. V. Kleiman, M. E. Allen, K. V. Thompson and S. Lumpkin. London: University of Chicago Press, 317-333.

Carney, D.W., and M.R Vaughan 1997. Survival of introduced black bear cubs in Shenandoah National Park, Virginia. Int. Conf. Bear Res. and Manage. 7:83-85.

Clarke, S.H., O'Pezio, J., and C. Hackford 1980. Fostering black bear cubs in the wild. Int. Conf. Bear Res. and Manage. 4:163-166.

Craighead, L. 2000. Bears of the World. Voyageur Press, Inc, U.S.A. 132 p.

Dijk, J.J., van 2001. Bear. In: Encyclopedia of the World's Zoos, ed. C. Bell. Fitzroy Dearborn Publishers, Chicago, USA. Vol. 1: 100-107.

Garshelis, D.L., and M.R. Pelton 1981. Movements of black bears in the Great Smoky Mountains National Park. J. Wildl. Manage. 45:912-925.

Griffith, B., Scott, J.M., Carpenter, J.W., and C. Reed 1989. Translocation as a species conservation tool: status and strategy. Science 245:477-480.

Fredriksson, G. 2005: Conservation Threats Facing Sun bears, *Helarctos malayanus*, in Indonesia and Experiences with Sun Bear Re-introductions in East Kalimantan, Indonesia. In L. Kolter and J.J. Van Dijk (eds.): Rehabilitation and release of bears. Zoologischer Garten Köln, 35-42

Huber, D., Dabanovic, V., Kusak, J., and A. Frkovic 1994. Reintroduction of hand-reared brown bears into the wild: experiences, problems, chances. In G.M. Dorrestein & M. Kahraman (eds.): Proceedings of the International Conference on Aspects of Bear Conservation, Bursa, Turkey, 179-186.

IUCN 1998. Guidelines for Re-introductions. Prepared by the IUCN/SSC Re-introduction Specialist Group, approved by the 41st Meeting of the IUCN Council, Gland Switzerland, May 1995; publisher IUCN, Gland, Switzerland and Cambridge, UK, 10 pp [appendix VII]

Joshi, A.R., Smith, J.L.D., and D.L. Garshelis 1999. Sociobiology of the myrmecophagous sloth bear in Nepal. Canadian Journal of Zoology, 77 (11): 1690-1704.

Jonkel, C., Husby, P., Russel, R., and J. Beecham 1980. The reintroduction of orphaned grizzly bear cubs into the wild. Int. Conf. Bear Res. and Manage. 4:369-372.

Kleiman, D. G.1996. Reintroduction programs. In Wild mammals in captivity: principles and techniques, ed D. V. Kleiman, M. E. Allen, K. V. Thompson and S. Lumpkin. London: University of Chicago Press, 297-305.

Kleiman, D. G., Beck, B. B., Dietz, J. M., Ballou, J. D., and A. F. Coimbra-Filho 1986. Conservation program for the golden lion tamarin: Captive research and management, ecological studies, educational strategies, and reintroduction. In K.Benirschke (ed.): Primates: the road to self-sustaining populations, New York: Springer-Verlag, 959-979.

Loyal, J.J., and P. LeRoux 1973. Age of self-sufficiency in brown/grizzly bear in Alaska. J. Wildlife. Manage. 37(1):122-123.

Miller, B. and A. Vargas 1994. Reintroduction of the black-footed ferret (*Mustela nigripes*). In Creative Conservation. Interactive management of wild and captive animals. In P. J. S. Olney, G. M. Mace and A. T. C. Feistner (eds): Proceedings of the Sixth World Conference on Breeding Endangered Species, London: Chapman & Hall, 455-464.

Pajetnov, V.S., and S.V. Pajetnov 1998. Food competition and grouping behavior of orphaned brown bear cubs in Russia. Ursus 1:571-574.

Pazethnov, V.S. and Pazhetnov, S.V. 2005: Re-introduction of Orphan Brown Bear Cubs. In L. Kolter and J.J. Van Dijk (eds.): Rehabilitation and release of bears. Zoologischer Garten Köln, 53-61

Palomero, G., Fernandez, A., and J. Naves 1997. Reproduction rates of brown bears in the Cantabrian mountains. Int. Conf. Bear Res. and Manage. 9(2):129-132.

Riley, S.J., Aune, K., Mace, R.D., and M.J. Madel 1994. Translocation of nuisance grizzly bears in Northwestern Montana. Int. Conf. Bear Res. and Manage. 9(1):567-573.

Rogers, L.L. 1997. Effects of food supply and kinship on social behavior, movements, and population growth of black bears in North-eastern Minnesota. Wildl. Monogr. 97. 72pp.

Roth, H.U. 1972. The location of winter dens of brown bear in the Trentino, Italy. Naturhistorisches Museum der Stadt Bern Jahrbuch, 219-230.

Stanley Price, M.R. 1989. Animal Re-introductions: the Arabian Oryx. Cambridge University Press, Cambridge.

Stiver, W., Pelton, M., and C.D. Scott 1994. Use of pen-reared black bears for augmentation or reintroductions. Int. Conf. Bear Res. and Manage. 9(2):145-150.

Stokes, A.W. 1970. An ethologist's views on managing grizzly bears. BioSci. 20:1154-1157.

Stonorov, D. and Stokes, A. W. 1972. Social behavior of the Alaska brown bear. International Conf. Bear Res. and Manage. 2:232-242.

Swenson, J. E., Sandegren, F., Söderberg, A., Bjärvall, A., Franzén, R. and P. Wabakken 1997. Infanticide caused by hunting of male bears. Nature, 386: 450-451.

Swenson, J. E., Franzén, R., Segerström, P. and F. Sandegren 1998. On the age of self-sufficiency in Scandinavian brown bears. Acta Theriologica, 43(2):213-218.

Taylor, M. (Editor). 1994. Density-dependent population regulation in black, brown, and polar bears. Monogr. Ser. No. 3, International Conference on Bear Research and Management, Missoula, Mont., February 1992. International Association for Bear Research and Management, Washington, D.C.

Tomasi, G. 1970. Un esperimento di lancio di orsi. Estratto da natura Alpina, 21:87-93.

Yalden, D.W. 1993. The problems of reintroducing carnivores. Symposia of the Zoological Society of London, 65: 289-304.

Placement Options for Confiscated Bears

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Introduction

To assist re-introduction practitioners and wildlife managers, who have to deal with re-introduction and rehabilitation issues, the IUCN/SSC Re-introduction Specialist Group (RSG) developed Guidelines for Re-introduction (IUCN 1998) and Guidelines for the Placement of Confiscated Animals (IUCN 2000). The Guidelines for Re-introductions are essentially a policy document, prepared by the RSG, in response to the increasing numbers of re-introduction projects worldwide. The main aim of these guidelines is to ensure that re-introductions achieve their intended conservation benefit and do not cause adverse side-effects of greater impact. In contrast the Guidelines for the Placement of Confiscated Animals (IUCN 2000) provide placement options for animals that are confiscated from illegal or irregular trade. The main options provided by these guidelines are maintenance in captivity, return to the wild or euthanasia. If return to the wild is chosen as an option then it should be done in accordance with the Guidelines for Re-introduction (IUCN 1998).

Bears can be obtained from a variety of sources. Juvenile bears can be orphans rescued from the wild, those confiscated as ex-pets, dancing bears, circus performers or those used for medicinal purposes e.g. bile extraction. Customs authorities can also confiscate shipments of bears from illegal or irregular trade.

Placement Options

Once bears are confiscated, and placed in captivity, the following three main options are available:

1. Maintain in captivity for the remainder of their lives;
2. Return the animals to the wild;
3. Euthanasia (humane destruction of the individual(s)).

A decision-tree has been prepared (see p.26) which gives options for placement.

1. LIFE-TIME MAINTAINENCE IN CAPTIVITY

Individuals that are found to be unsuitable for release into the wild need to be maintained in captivity for the remainder of their lives. This would mean life-time care in a reputable zoological garden or captive-breeding institution which provides humane care for the individual(s).

The following factors are to be considered for individual(s) that are found to be unsuitable for re-introduction or rehabilitation programmes:

Public awareness: In captivity bears have a high potential for creating public awareness about illegal wildlife trade and also to highlight the negative aspects of the use of bears for circuses and medicinal exploitation such as bile extraction. A live specimen combined with an interactive display can create awareness and educate people about these aspects. Rare or high profile species can also be used for fund-raising initiatives which can be used to protect wild populations. In a government run wildlife rehabilitation facility for orangutans (*Pongo pygmaeus*) in Sabah, Malaysia there were over 200,000 local visitors annually visiting the facility (Karesh 1995). This provides a good opportunity to educate local people on wildlife conservation issues and in many cases this may be the only opportunity for locals to view such animals at such close range.

Cage space: A large number of common species can use up valuable cage space which can be used to house rarer and important species. Wildlife confiscations can create a strain on housing facilities by providing large numbers of confiscated wildlife for placement. This is one reason that alternatives, such as release to the wild, are done so as to ease congestion and reduce cost. This usually results in poorly managed release programmes with variable results. The maintenance of long lived species like bears under humane conditions requires long-term funding and resources.

Captive-breeding: Species whose genetic provenance can be positively identified can also be used for captive-breeding programmes and to ensure the survival of a species by maintaining a viable *ex-situ* population. This population can be used for re-introduction projects in the future. High-profile re-introduction attempts have benefited from animals in captivity such as the Arabian oryx (*Oryx leucoryx*) re-introduction in Oman (Stanley Price 1989). Bears would be more difficult to re-introduce from captive-bred sources due to the extensive period to necessary to develop appropriate survival skills for a truly wild existence. Also being potentially dangerous animals, tameness can be an issue of serious concern for local communities in potential re-introduction sites.

Non-invasive research: Individual(s) that are unsuitable for re-introduction or a captive-breeding facility can be used for non-invasive research. In such a scenario the animals will still have to be housed in appropriate conditions, which meet their needs. In such situations it is important to have spacious, natural, environmentally enriched enclosures to keep animals occupied and in relatively low densities. The advantage is that research results can be used to conserve the species both in captivity and the wild.

Disease: Comprehensive veterinary screening of individuals need to be conducted, before they are placed in captivity, as they may have been exposed to diseases and parasites. If not properly diagnosed and treated, this can cause infections to other animals in captivity. Whenever an animal is moved or relocated it never consists of the movement of a single species but of a "biological package" consisting of the animal and a host of viruses, bacteria, fungi, protozoa, helminths and other harmful pathogens (Woodford 1996).

Ownership Status: There are complex legal and ethical issues when animals are transferred from confiscating authorities to facilities providing life-time care. It is important to ensure that these animals do not enter illegal trade again and have well defined ownership status – such as legally binding contracts and/or Memorandums of Understanding (MoU).

2. RETURN TO THE WILD

According to the Guidelines for Re-introductions (IUCN 1998), a re-introduction should establish a free-ranging viable population in the wild. These can be achieved through re-introductions, re-enforcement/supplementations or conservation/benign introductions which are described in detail below:

a) "**Re-introduction**": an attempt to establish a species in an area which was once part of its historical range, but from which it has been **extirpated** or become extinct. The source animals can be either captive-bred or wild-caught.
b) "**Re-enforcement/Supplementation**": addition of captive-bred or wild-caught individuals to an existing population of conspecifics. This is done mainly to boost a declining population, increase genetic variability and correct skewed sex ratios.
c) "**Conservation/Benign Introductions**": an attempt to establish a species, for the purpose of conservation, outside its recorded distribution but within an appropriate habitat and eco-geographical area. *This is a feasible conservation tool only when there is no remaining area left within a species' historic range*.

d) **"Substitution"**: introduction of a species or subspecies that is closely related to a species or subspecies that has become extinct in the wild and in captivity. The introduction occurs in suitable habitat within the extinct species' former range (Seddon & Soorae 1999).

At this stage it would be important to mention "rehabilitation" in the context of welfare bear releases which is the – *"release of individual(s) to the wild, or to an existence approximating a true wild existence, with the individual(s) welfare being of paramount importance rather than conservation priorities or the potential impacts on a wild population."*

Re-introduction of bears

A re-introduction project involving bears should release individuals representing a viable social unit. These individuals should also satisfy criteria for survival in the wild and be released into their historic range in suitable habitat. If the release area is comprised of marginal habitat then a habitat restoration program should be implemented to restore it to an acceptable state prior to re-introduction. The release site should be adequate in food and water availability, den sites and be adequately protected from human habitation or presence to avoid conflicts. Releasing animals to marginal or inappropriate habitat may also doom them to a slow death in the wild. . Released Andean bears (*Tremarctos ornatus*) in Ecuador which were wild-born but had spent considerable time in captivity were responsible for killing young calves and "stealing" equipment from loggers such as blankets, utensils, etc. (Castellanos 2003).

Another approach can be to utilise confiscated animals to establish new free-ranging populations in areas where no remnant or wild populations exist (Karesh 1995). This sort of management action ensures that there are no risks associated with disease transfer or intra-specific interactions with a wild population. It has been found that wild-to-wild translocations are generally more successful in restoring bear populations (Clark & Smith 1994), though homing instincts can be a problem. A technique to limit homing instincts in Kentucky and Tennessee, USA, involved moving female black bears and cubs from their winter dens into new dens in the release area. The maternal instincts and presence of cubs is thought to limit homing by the female bears. The other technique was to trap black bears in the summer and hold them in acclimatisation pens for two weeks, and after release, provision them for 3-4 days. It was later found that the former method of moving females with cubs produced more site affinity (Eastridge & Clark 1999).

Re-enforcement/supplementation

If a release is being done into an area where there is a remnant wild population or where status is unknown, this would constitute a re-enforcement/supplementation exercise. This is carried out mainly to augment a small population by the addition of individuals to correct imbalances such as skewed sex ratios, increase genetic diversity or other factors that may have caused the population to decline. Adding individuals should only be done after careful planning and consideration and being sure of a positive outcome.

In the Italian central Alps, a brown bear supplementation was carried out because the remnant population was limited to only three individuals. New stock was needed as no breeding had occurred for eight years and arrival of new individuals, through natural immigration, was considered unlikely (Genovesi *et al.* 1999). Therefore a translocation involving wild-caught bears was implemented. The bears were sourced from a hunting quota, were wild-caught individuals from Slovenia and were released within 20 hours of capture. A total of 10 bears were released, one died naturally, seven cubs were born, of which one was preyed upon by an eagle. Also very little damage has occurred (e.g. to bee hives) and compensation is made by the Province if any does occur. (Genovesi, pers. comm. 2005). Two female grizzly bears were augmented into the Cabinet Mountains population in the USA from Canada. This was done specifically to introduce females to increase natural reproduction in this small population (Servheen 1993).

Augmentation carries more risk as it exposes the remnant wild population to factors such as behavior abnormalities, disease and genetic pollution. The wild population may already be at carrying capacity thus causing undue stress to both the released and wild individuals. Bears that have been obtained for re-habilitation have either been those that have spent extended periods of time in captivity or in some extreme cases may also have been born in captivity. These individual(s) will be at a disadvantage, when compared to wild bears, for release into the wild. Captive-born black bear cubs have been cross-fostered by placing the cubs in the maternal den of females and has proved useful in fostering black bear orphaned cubs to surrogate black bear females (Kasworm *et al.* 1991).

A technique in the US has re-habilitated black bear cubs which have been released as yearlings. The cubs are kept in strict isolation from humans and are subjected to “people aversion training”. Post-release monitoring has shown that they have survived in the wild for at least a year (Woodford, M., pers. comm.).

However the following factors should be considered when planning a bear re-introduction:

Tameness: Bears in captivity can become tame and lose their fear of man. This can be a negative aspect when such individuals are destined for a release programme. In large carnivore re-introductions, tameness can easily result in human/livestock-bear conflicts which can compromise the success of a release programme. Individuals with inappropriate behaviour patterns if released into an area with a wild population can also influence the behaviour patterns of their wild counterparts which can be detrimental to their survival. A re-introduction project involving wolves (*Canis lupus*) in Georgia, C.I.S., conditioned the release animals to avoid humans upon release. This was achieved by giving the wolves an electric shock via a collar in an enclosure where a person was introduced. After 30—35 days of this conditioning the wolves would flee to a distance of about one kilometer upon sighting a person (Badridze *et al.* 1992). In Ecuador, Andean bears (*Tremarctos ornatus*) which were released into the wild, but which had previously spent considerable time in captivity, were seen frequenting camp sites and a farm and therefore dogs and pepper spray was used to frighten them off (Castellanos, 2005).

Survival Skills: A lot of these skills are learned through experience, and with highly evolved mammals such as bears, over a considerable length of time. In captivity, such skills may not be adequately mastered and when released to the wild can be disadvantageous. These skills can be used for locating food and prey sources, hibernation sites, avoiding predators and humans, knowing local migration routes, learning to co-exist with conspecifics, knowing local home ranges amongst others. In Uganda, an attempt was made to rehabilitate a confiscated juvenile chimpanzee (*Pan troglodytes*) to a wild group. The attempt was unsuccessful when the rehabilitated chimpanzee returned back to a human habitation and research camp looking for food. This individual was then placed in an animal orphanage (Montgomery 1995).

Social Concerns: Re-enforcement or supplementation is more fraught with danger because of the adverse effects on the released individuals or the recipient wild population. The wild population for example could be at carrying capacity or coping with a stressful situation and the addition of more individuals can further complicate the situation.

Genetics: It is important that individual(s) destined for release belong to the same species, subspecies or race. The addition of individuals representing a different

genepool structure can in some cases contaminate unique local genepools. In some cases this can be a positive exercise if the effects of inbreeding need to be curtailed or genetic variation increased. In Italy, populations of the Italian grey partridge (*Perdix perdix italica*) began to decline, and hunting associations introduced unadapted alien subspecies from other parts of Europe. These releases proved a complete failure by genetically polluting the Italian race and causing further declines in the population (Lovari 1975).

Disease: When individuals are kept in captivity or are moved between locations, they are exposed to a variety of disease pathogens, both endemic and exotic. In captivity well-fed individuals can appear quite healthy but upon release the stresses of a wild existence can cause underlying pathogens to flare-up. The risk of introducing diseases to the wild must be taken seriously and thorough veterinary screening protocols should be followed when preparing animals for release. In captive bears there is a high incidence of ascarid worms which can be removed by a suitable anti-helmintic during the quarantine stage. If captive bears are destined for re-introduction and they are to be vaccinated, only "killed vaccines" should be used. This reduces the risk of transmitting diseases to wild populations through the shedding of "live viruses" by the released bears (Woodford, M., pers. comm.).

Cost-Benefit Analysis: It is also useful to undertake cost-benefit analysis for re-habilitation projects. The costs of maintenance in captivity, veterinary and drug costs, personnel costs, preparation for release into the wild and post-release monitoring should be compared against the costs of spending such money for the protection of habitat and wild populations. In some cases animals which are deemed unsuitable for release or those belonging to commoner species may warrant the spending of funds for other more useful activities. A cost-benefit study to re-introduce lion (*Panthera leo*) into the Pilanesberg National Park, South Africa found that it would cause the park management authority to incur costs of approximately US$ 280,000 per annum. These were mainly operating costs, predation and cessation of plains game hunting and loss of revenue from live animal sales which would form the prey base of the lions (Stuart-Hill & Grossman, 1993). Overall the region stood to gain US$ 7,225,000 from an increase in tourist numbers due to the presence of lions and nearby resort cities (Vorhies & Vorhies, 1993).

Remnant Populations: A population with very low numbers and which is highly endangered can actually benefit from the addition of extra individuals. In Austria the sightings of a lone adult male brown bear prompted the translocation of two bears from

former Yugoslavia. This was to initiate attempts to reestablish bears in Austria (Servheen 1993). An augmentation/supplementation exercise can be used as an extreme measure to save a population that may be heading for extinction due to a variety of factors. This type of intervention should be done after carefully evaluating the risks to the recipient population from adding additional individuals. This should not be seen as a means of disposing of surplus stock.

Political & Educational Potential: In some cases the return of a high profile flagship or keystone species makes a powerful political and educational statement. This can be used to increase tourism activities. The gray wolf re-introduction in the Yellowstone National Park in the USA recorded a visitor increase in areas inhabited by wolves during the first two years of the re-introduction program (Phillips 1997).

Biological and Ecological Potential: The return of individual(s) to the wild also ensures that their full biological and ecological potential is recognised if they survive and the project was successful!

3. EUTHANASIA

This is the final option available for individuals that may not be fit for release into the wild or for a captive existence. The following factors are to be taken into consideration:

Disease: Whilst animals are in trade or held in captivity they can be exposed to and contract chronic diseases. These diseases can be easily transmitted to other animals or individuals and can pose a serious risk to other animals. Individuals that are handicapped or with disabilities that do not allow them to lead a normal existence may also be candidates for euthanasia.

Unknown Genetic Origin: Individual(s) whose genetic provenance is unknown, should not be released into the wild or bred from in captivity, because of their potential for genetic pollution. Also such individuals have low conservation value and may only be suitable for public awareness or education purposes.

Resources: There can also be insufficient resources to humanely maintain such individuals in captivity or return them to the wild. Euthanasia is an unpleasant option and can be used to raise concern and awareness over illegal trade and use of wild animals.

Survival in the Wild: A lot of confiscated animals returned to the wild usually die of starvation, disease and/or predation. In such cases the most humane and cost-effective solution may be to employ euthanasia.

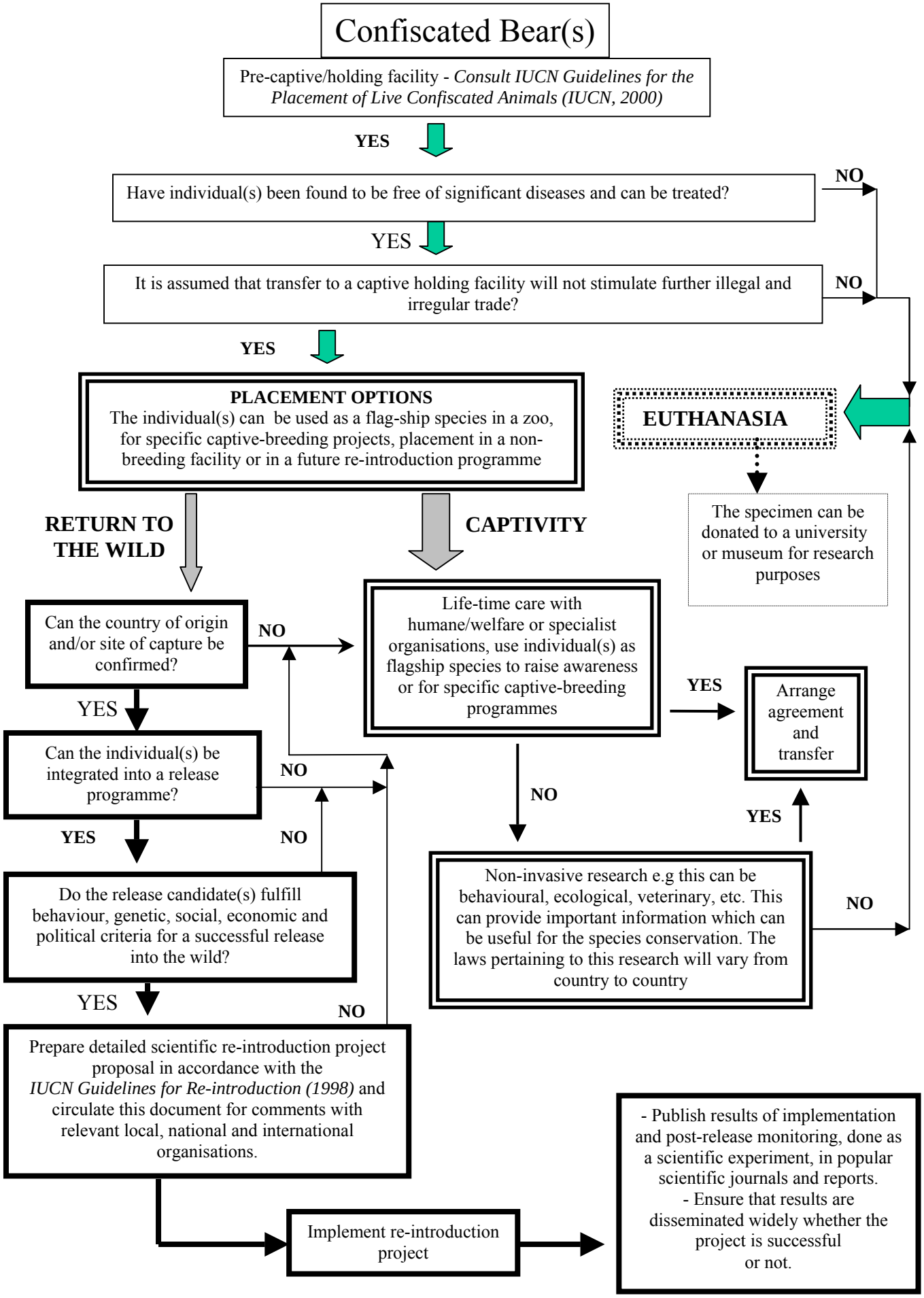
Biological Value: When an individual is euthanased a unique set of behavioural, genetic and ecological material is destroyed. This is seen as a negative impact on the particular species.

If euthanasia has to be considered then the most acceptable method should be employed. Also the euthanased animal can be donated to a university or museum for research purposes so as to utilise the full potential of the species.

Conclusions

When a group or single individuals are confiscated or rescued from illegal and/or in-humane activities their options for placement are limited to maintenance in captivity, return to the wild and the least desirable – euthanasia. Decisions for placement will depend on a case-by-case basis.

The IUCN/SSC Re-introduction Specialist Group (RSG) vision is to: *promote the restoration of species diversity and ecological processes through sustainable re-introductions, based on the best available practices to achieve viable populations in their natural habitats*. Therefore the first priority will be the conservation and welfare of existing wild populations. A re-introduction project should in no way pose a threat or risk to an existing wild population and should only be carried out after a thorough risk assessment. The IUCN/SSC Re-introduction Specialist Group also acknowledges that re-introductions are expensive, long-term projects requiring long-term post-release monitoring, and in the cases of large carnivore re-introductions, requiring both political and community support.


Confiscated Bear(s)
Pre-captive/holding facility - *Consult IUCN Guidelines for the Placement of Live Confiscated Animals (IUCN, 2000)*
YES
Have individual(s) been found to be free of significant diseases and can be treated?
NO
YES
It is assumed that transfer to a captive holding facility will not stimulate further illegal and irregular trade?
NO
YES
PLACEMENT OPTIONS
The individual(s) can be used as a flag-ship species in a zoo, for specific captive-breeding projects, placement in a non-breeding facility or in a future re-introduction programme
EUTHANASIA
The specimen can be donated to a university or museum for research purposes
RETURN TO THE WILD
CAPTIVITY
Can the country of origin and/or site of capture be confirmed?
NO
YES
Can the individual(s) be integrated into a release programme?
NO
YES
NO
Do the release candidate(s) fulfill behaviour, genetic, social, economic and political criteria for a successful release into the wild?
YES
NO
Prepare detailed scientific re-introduction project proposal in accordance with the *IUCN Guidelines for Re-introduction (1998)* and circulate this document for comments with relevant local, national and international organisations.
Life-time care with humane/welfare or specialist organisations, use individual(s) as flagship species to raise awareness or for specific captive-breeding programmes
YES
Arrange agreement and transfer
NO
YES
Non-invasive research e.g this can be behavioural, ecological, veterinary, etc. This can provide important information which can be useful for the species conservation. The laws pertaining to this research will vary from country to country
NO
Implement re-introduction project
- Publish results of implementation and post-release monitoring, done as a scientific experiment, in popular scientific journals and reports.
- Ensure that results are disseminated widely whether the project is successful or not.

References:

Badridze, J., Gurielidze, Z., Todua, G. S., Badridze, N. & Butkhuzi, L. 1992. The Re-introduction of Captive-Raised Large Mammals into their Natural Habitat: Problems and Methods. Institute of Zoology of the Academy of Sciences, Tbilisi, Republic of Georgia

Clark, J. D. & Smith, K. G. 1994. A Demographic Comparison of Two Black Bear Population in the Interior Highlands of Arkansas. Wildl. Soc. Bull. 22: 593-603.

Eastridge, R. & Clark, J. D. 1999. Black bear re-introduction in Kentucky and Tennessee, USA, Re-introduction News, 18: 22

Castellanos, A. X. 2003. Ecology of re-introduced Andean bears in the Maquipucuna Biological Reserve, Ecuador: conservation implications. Re-introduction News 23: 32-34

Castellanos,A. X. 2005. Reinforcement of Andean bear populations in the Alto Choco Reserve and neighbouring areas, northern Ecuador. Re-introduction News 24: 12-13.

Genovesi, P., Dupre, E. & Pedrotti, L. 1999. Brown Bear: Translocation of the brown bear in the Italian Central Alps, Re-introduction News, 18: 21-22

IUCN 1998. Guidelines for Re-introductions. Prepared by the IUCN/SSC Re-introduction Specialist Group, approved by the 41st Meeting of the IUCN Council, Gland Switzerland, May 1995; publisher IUCN, Gland, Switzerland and Cambridge, UK, 10 pp [appendix VII this proceedings]

IUCN (2000) Guidelines for the Placement of Confiscated Animals. Prepared by the IUCN/SSC Re-introduction Specialist Group, IUCN, Gland, Switzerland, 24 pp [appendix VIII this proceedings]

Kasworm, W. F., Thier, T. J. & Servheen, C. (1991) Cabinet Mountains Grizzly Bear Population Augmentation: 1990 Progress Report. USFWS, Grizzly Bear Recovery Co-ordinator's Office, University of Montana, USA.

Karesh, W. B. (1995). Wildlife Rehabilitation: Additional considerations for developing countries. J. Zoo & Wildlife Med. (Wildlife Conservation Society: FVP Tech pages; rehabilitation Paper (English).

Lovari, S. (1975). A partridge in danger. Oryx 13: 203-204

Montgomery, S. (1995). Love her and leave her. ANIMALS, March/April.

Phillips, M. (1997) Assessment of Re-introduction as Tool for Recovering Gray Wolves in the Greater Yellowstone Area. Re-introduction News, 14: 6-9

Servheen, C. (Ed.) (1993). Update on ongoing projects worldwide Montana, The Bear Specialist Group Newsletter, 1(3):

Seddon, P. J. & P. S. Soorae (1999) Guidelines for Subspecific Substitutions in Wildlife Restoration Projects. Conservation Biology, 13(1): 177-184

Stanley Price, M. R. (1989). Animal Re-introductions: The Arabian oryx in Oman. Cambridge University Press.

Stuart-Hill, G. & Grossman, D. (1993) Parks, Profit$ and Professionalism: Lion Return to Pilanesberg. African Wildlife. 47 (5):

Vorhies, D. & Vorhies, F. (1993) Introducing Lion into Pilanesburg: An Economic Assessment for Bophuthatswana National Parks & Wildlife Management Board. Eco Plus (Pty) Ltd.

Woodford, M. (1996) Risks of Disease. Naturopa, Council of Europe, 82: 26-28.

Why not to Re-introduce "Rehabilitated" Brown Bears to the Wild?

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Biological background

Brown bears are very unique animals: as the largest terrestrial carnivores they feed predominantly on vegetation. They are very demanding towards the habitat they live in and they need complex inherited and acquired skills.

Bears need large unfragmented areas with good vegetation cover, enough diversity and low disturbance (Huber and Roth 1993). Depending on geographical latitude and general habitat quality an individual bear may roam over some 100 km^2 up to 100.000 km^2. Bear walks in search for food, daily and winter shelter, sexual partners and to avoid other bears of the same sex.

Food finding strategy

Vegetation in bear habitat must comprise of various plant species that provide food in different seasons. With the typical carnivore digestive system bears are poorly decomposing plant cells and absorbing nutrients. This means that they have to find the optimal plant species and the edible parts of those plants in the right time and at the right spot. They also have to eat large quantities of those plants, while such food sources are rarely found in sufficient quantities at one spot. Bears need up to 10% of proteins in their diet and most of that they do satisfy by insects and other invertebrates and eventual carrion (Cicnjak et al. 1987). When other carnivores kill a sizeable prey they often can stay at a spot and eat for up to a week. Contrary to other carnivores, bears typically have to move their whole body for almost each tiny bite. Food for bears may be hidden almost everywhere: bears will turn-over many rocks, pluck rotten logs, dig at promising spots to find tubers, invertebrates and their larvae or eggs, food cashes of other animals, to catch a mouse or other small mammal. All this requires: 1. regarding to their habitat , vast and diverse area; 2. regarding to the bears themselves, much intelligence, curiosity, determination, skills, memory, and endurance (Modrić and Huber 1989, Roth and Huber 1986).

Cover vegetation for rest and denning

Vegetation and topography in bear habitat must provide hiding cover which bear needs daily to prepare a day-bed; a resting place for most of the daytime(Kusak and Huber 1998). Day beds are on spots where the horizontal visibility is lower than in other, average parts of the habitat. Specially demanding is the site for a winter den. The winter den is always on a spot difficult to access. Preferable are rocky areas with natural spaces where the den can be dug out and/or arranged (Huber and Roth 1997). The potential spots for digging are between the roots of large trees or at places with special structures like anthills in some areas. The den itself must fulfil several requirements: it should be big enough to accommodate a bear and eventual a litter, it should be small enough to maintain the bear's body heat together with favourable air temperature, it should be strong enough to be safe and not to collapse while the bear is in the den, and it should be waterproof. Above all it is important that the bear will not be found and disturbed during hibernation. Therefore a bear must have extremely large and diverse habitat that holds appropriate spots for dens. A bear must know its habitat very well to be able to find a good spot for a den. A bear must know and be skilful enough to dig the den, collect the nesting material and to make a nest where it can safely spend the winter.

Social and reproductive requirements

Bears live alone but maintain complex communication with other bears. Marks on trees and various scent marks make the presence of one bear known to the others. The success in the game of finding and avoiding other bear decides if a bear can stay in one area or not. The error might result in a death of a weaker one. Finding a sexual partner during the mating season is specially demanding. Males roam over vast areas trying to fertilise as many females as possible. They must be capable of detecting the olfactory signals sent by females in heat and, at the same time have the control of other males to be able to accurately decide where to fight and where to retreat. A female with cubs is the only bond within the species that lasts for at least a year and half (Frković et al. 2001). During that time a female has to skilfully avoid big males that may try to kill her cubs in order to mate with that particular female and to spread their own genes. Hence, social and reproductive requirements in bears also ask for a large habitat, excellent knowledge of this habitat, and skilful behaviour.

Process of learning

The share of learned skills compared to the inherited ones in bears is much larger than in other carnivores, not to speak of other non-primate mammals, and other non-mammalian vertebrates or invertebrates. Most of the skills required for survival under the conditions of continuous search for what is needed and in avoidance of trouble, are

learnt during the first two years of their life in nature while accompanied with their mother. Each bear develops his own behavioural strategy exhibiting individualism rarely seen in animal kingdom (Huber et al. 1994). The only common component may be the opportunistic behaviour; a bear quickly learns to go for an easier way whenever possible. In natural situation this optimises the use of potential benefits of each situation. When this concerns the relation to man, the opportunistic behaviour is typically not a safe way of life. It is for instance much easier for a bear to eat large quantities of food at a garbage dump than to search for the same amount over many kilometres.

Through the mechanisms of natural selection, however, many mothers fail to successfully raise their offspring: cubs may be killed by an adult male, may die in an accident or simply starve. The fittest mothers raise most cubs and their genes do get spread into the population. There are also cases in which the mother dies while nursing. Chances for survival of orphaned cubs are directly proportional with the length of time they spent with the mother. The ones that become orphaned while still in the den, i.e. during the first 3 months of their life, will surely die (Huber et al. 1993). If orphaned later in spring, summer or fall cubs are faced to the cruel game of survival. They may survive only with enough luck not to be killed by other bears or other predators and to find sufficient food if the seasonal crop was good and the cub finds it. Due to opportunistic behaviour orphaned cubs may occasionally survive by searching food from human sources, resulting into habituation to people, and either have to be killed or do die in traffic or other accidents.

Relation to man

Process of habituation

Especially for brown bears centuries of killing by humans resulted into a strong selective force towards shy bears (Frković et al. 1987). Only the ones that learned that man and everything related to man is dangerous survived and reproduced successfully. The gradual increase of human population and development of sophisticated weapons they used gave the opportunity for bears to adapt. Exception is North America where the white man arrived with already efficient guns facing naive brown bears that were wiped out from most of their territory within only one century. Bears in Europe are recently facing opposite challenge. In the last decades the smells and other signs of man are occasionally related to some food attractions for bears.

External and internal factors work together to increase the likelihood for an individual bear to start behaving unnaturally. In the group of external factors belong all described bears' demands towards the habitat. Any deficiency of habitat (usually provoked by man) may easily trigger the bear's internal factors to change behaviour. Each of described peculiar bear features like intelligence, individualism and opportunism carry the seed of habituation.

Man-made food sources will attract bears even regardless to general food availability in the habitat (Huber and Frković 1993). Bears will find, remember and repeatedly use any concentration of food. If the food sources are domestic animals, crops in field or orchards, or any storage, the use of these sources by a bear is seen as damage. When a bear makes a damage it is a multiple problem: cost for the owner of the food source, cost for the organisation that is responsible for compensations, and cost for protecting food sources from further damage. It also implies danger for human casualties when trying to protect their property, but most of all it implies a loss of public acceptance of bears. If the food is an open garbage dump in bear habitat the problem is very serious too: the bear may get himself in a trouble searching the garbage and eating potentially poisonous and infectious items (Madić et al. 1993; Modrić and Huber 1993, Huber et al. 1997). At any man-made food source bear may learn and adopt the undesirable behaviour: the loss of fear from man. The bear that does not run away from man is a nuisance bear.

Man-made obstacles for bear movements, like highways, may force a bear to try to satisfy some of its basic needs on one side of such obstacle. This may lead a bear closer to humans. At this point the chance increases for a bear to be killed in hunting, poaching, or by traffic (Huber et al. 1998; Kusak et al. 2000). Also the chance for loosing a litter in a disturbed den, for cubs to become orphaned, for the damage on human property or on man himself increases.

The handicapped bear like the one that was orphaned or that for any reason did not grow up with its mother in the natural environment has a disproportionate greater chance to become habituated in the described situations.

Habituated bears are unacceptable

A habituated bear is a nuisance bear although it is typically not spontaneously aggressive towards man. At the first instance a bear that does not run away may be an attraction. A small alone bear may be given food by some people and get increasingly habituated. There are cases when the same people that attracted and fed a cub in front of

their home, call the bear managers to remove the bear when it grew bigger and became a threat for their children. In other scenarios the bear that does not escape at the first instance may: 1. attract an enthusiastic photographer to get too close, 2. prompt the hunter or poacher to shoot at him with a inappropriate weapon and the wounded animal grabs him, or 3. create a false impression of bear "invasion". The latter happens when somebody does see a bear near the village almost daily. People frequently fail to recognise the individual animal and the local community start believing that there are many bears around. Usually they call the hunters to reduce the "overpopulation".

Acceptance of bears as part of our natural environment directly depends on how much they effect the living of local human population. The bears that cause considerable damage or even threat human lives are highly unacceptable. It is the individual bear behaviour that makes most of the difference, although the bad things done by a single bear are typically blamed to the entire bear population. Any situation that stimulates creation of problem bears should be avoided as the matter of the first priority.

The bear that behaves differently than other natural wild bears creates the problem for their population as well. An individual that does not follow the complex rules over different seasons, range marking, reproduction phases and food finding strategies will most likely be lost in the competition, but may occasionally influence some "normal" bears to start behaving "abnormally".

Conclusion

It is nearly impossible, or extremely unlikely, to hand raise orphaned wild or captive born bears in the way that will develop all skills necessary for their life in nature and to behave properly in relation to man and to other bears.

The problems of releasing "rehabilitated" bears are different in areas with low human population and a healthy bear population compared to the human dominated surrounding with a small endangered bear population. In the first case the main question is the survival and eventual successful reproduction of released bears in the wild. That could and should be measured by intensive radio telemetry tracking. However, strict measures against possible gene pollution by mixing foreign populations have to be implemented (Taberlet et al. 1992, Randi et al. 1994). The problem of behavioural "pollution" is hard to mitigate. Each eventually successfully reintroduced cub can be welcomed as a merely ethical achievement. Biologically this addition to a viable population is negligible.

On the other hand bear populations that are critically low and typically in a human

dominated surrounding can not afford the risk of adding a bear with potentially unacceptable behaviour. Even for re-introductions from other wild populations extreme care has to be taken to decrease the risk of bringing the misbehaving individuals.

In conclusion I propose the investments in efforts to prevent the situations where wild born bears become orphaned and to prevent the birth of unwanted captive bears. The existing captive population should be given the best possible care and used as ambassadors to raise public awareness about situation of free-living conspecifics .

References

Cicnjak, L., Huber, D., Roth, H. U., Ruff, R. L. and Vinovrski, Z. 1987. Food habits of brown bears in Plitvice Lakes National Park, Yugoslavia. Int. Conf. Bear Res. and Manage. 7: 221-226.

Frković, A., Huber, D. and Kusak, J. 2001. Brown bear litter sizes in Croatia. Ursus 12:103-106.

Frković, A., Ruff, R., Cicnjak, L. and Huber, D. 1987. Brown bear mortality during 1946-85 in Gorski Kotar, Yugoslavia. Int. Conf. Bear Res. and Manage. 7: 87-92.

Huber, D., Dabanović, V., Kusak, J. and A. Frković, A. 1994. Reintroduction of hand-reared brown bears into the wild: experiences, problems, chances. In: G.M. Dorrestein & M.M. Kahraman (eds.): Proceedings of the International Conference on Aspects of Bear Conservation, Bursa, Turkey, 179-186.

Huber, D. and A. Frković 1993. Brown bear management in Croatia, IUGB Congress. 21: 287-292, Halifax.

Huber, D., Kulier, I., Poljak, A. and Devčić-Kuhar, B. 1993. Food intake and mass gain of hand-reared brown bear cubs. Zoo Biology. 12: 525-533.

Huber, D., Kusak, J. and Frkovic, A. 1998. Traffic kills of brown bears in Gorski kotar, Croatia. Ursus 10: 167-171.

Huber, D., Kusak, J., Žvorc, Z. and Barić Rafaj, R. 1997. Effects of sex, age, capturing method, and season on serum chemistry values of brown bears in Croatia. Journal of Wildlife Diseases 33: 790-794.

Huber, D. and Roth, H. U. 1993. Movements of European brown bears in Croatia. Acta Theriologica. 38: 151-159.

Huber, D. and Roth, H. U. 1997. Denning of brown bears in Croatia. Int. Conf. Bear Res. and Manage. 9 (2): 79-83.

Kusak, J. and Huber, D. 1998. Brown bear habitat quality in Gorski kotar, Croatia. Ursus 10: 281-291.

Kusak, J., Huber, D. and Frković, A. 2000. The effects of traffic on large carnivore populations in Croatia. Biosphere Conservation 3: 35-39.

Madić, J., Huber, D. and Lugović, B. 1993. Serologic survey for selected viral and rickettsial agents of brown bears (*Ursus arctos*) in Croatia. Journal of Wildlife Diseases. 29: 572-576.

Modrić, Z. and Huber, D. 1993. Serologic survey for leptospirae in European brown bears (*Ursus arctos*) in Croatia. Journal of Wildlife Diseases. 29: 608-611.

Morić, S. and Huber, D. 1989. Curiosity of brown bears in Zagreb Zoo. Period. biol. 91: 86-87.

Randi, E., Gentile, L., Boscagli, G., Huber, D. and Roth, H. U. 1994. Mitochondrial DNA sequence divergence among some west European brown bear (*Ursus arctos* L.) populations. Lessons for conservation. Heredity. 73: 480-489.

Roth, H. U. and Huber, D. 1986. Diel activity of brown bears in Plitvice Lakes National Park, Yugoslavia. Int. Conf. Bear Res. and Manage. 6: 177-181.

Taberlet, P., Dubois-Paganon, C., Amamič, M., Boscagli, G., Camarra, J. J., Caussimont, G., Danilov, P., Franzen, R., Frković, A., Huber, D., Kalaber, L., Osti, F., Palomero, G. and Bouvet, J. 1992. Mitochondrial DNA polymorphism in European brown bear populations. Management and restoration of small and relictual bears populations. Int. Conf. Bear Res. and Manage. 9: 108-117.

Conservation Threats Facing Sun Bears, *Helarctos malayanus*, in Indonesia and Experiences with Sun Bear Re-introductions in East Kalimantan, Indonesia

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Conservation threats facing sun bears

The sun bear, *Helarctos malayanus*, is the smallest of the eight bear species in the world and the only tropical bear species inhabiting primarily lowland rainforest throughout much of Southeast Asia. The sun bear occurs from the eastern part of India, through Burma, Laos, Thailand, Cambodia, Vietnam, Malaysia and the islands of Sumatra and Borneo (Indonesian Kalimantan, Brunei and the Malaysian states of Sabah and Sarawak) (Servheen 1999).

Primary habitat of sun bears is lowland tropical rainforest, usually below 500 m. with few records above 800 m. (Wulffraat pers comm). These forests are also highly valued for timber production, agriculture, plantations and human settlement. Logging and conversion activities have by now affected most of these lowland areas. Timber harvest, at least in Indonesia, is not carried out with sustainability in mind and most logged areas are left behind as an unproductive wasteland, where regeneration potential is minimal. Remaining tree stands are often subsequently finished off by illegal logging activities. In addition these logged-over areas and a large percentage of the few remaining intact lowland forest blocks in Sumatra and Kalimantan have been seriously affected by El Nino related forest fires in 1982-1983 and 1997-1998. As a consequence preferred sun bear habitat is disappearing at a rapid pace throughout most of its range. Remaining sun bear populations are becoming increasingly fragmented and isolated, and conflict with humans is increasing as bears are raiding gardens and plantations in search of food. In addition, at least in Indonesia (where the author resides), no wildlife management, nor any effective park management is being carried out in designated protected areas.

In many areas of the sun bear range such as Burma, Laos, Cambodia and Vietnam poaching of bears for sale, gall bladders or food is increasing (Mills and Servheen 1991). Despite the fact that sun bears are listed under CITES appendix 1 as a species in danger of extinction, and also are protected by national wildlife laws in most countries

in its range, enforcement of these laws is grossly ineffective (especially in Indonesia), so bears are routinely exploited. The market for gall bladders in Kalimantan has increased with the influx of foreign users of traditional medicines (i.e. Korean plywood factories or logging companies) (Meijaard 1999b).

At present it is impossible to assess the overall status of sun bears across their range due to the virtual absence of reliable information on their distribution and abundance.

Re-introduction in general

The reintroduction of rare or endangered species is a much debated issue. When looking at the costs involved, the logistical difficulties and the shortage of habitats, the desirability of reintroduction projects as a conservation strategy has been questioned (Brambell 1977; Kleiman 1989).

In some cases though, reintroduction of captive mammals as part of a more comprehensive conservation effort could be considered appropriate (Campbell 1980, Kleiman 1989). The success of a reintroduction program depends on the goals, i.e. whether it is part of an overall conservation program for an endangered species including habitat protection/restoration, public education, whether it is to increase genetic variability or recreational purposes alone (Kleiman 1989).

Background: re-introduction of sun bears in Kalimantan, Indonesia

Sun bears are quite commonly kept as pets in Kalimantan (Meijaard 1999a; pers. obs.). The opening up of large forest areas through logging activities, and the accompanying increase in human presence, seems to be a driving factor in the large number of bears taken into captivity. Bears are vulnerable to capture in logging areas, and sometimes can be found in logging camps (Meijaard 1999a; pers. obs.). In addition, bear cubs may be caught and sold to wealthy, city-dwelling people.

As they mature sun bears become more powerful and unmanageable as pets, unless locked up in strong metal cages. At this point, some bear owners offer their (illegal) pets to zoos. These zoos, however, are overstocked with sun bears, and generally refuse to accept such bears. In other cases pet bears have been offered to restaurants (Sözer pers. comm.) or sold to logging companies, typically with Chinese/Korean ties.

On rare occasions illegally kept sun bears are confiscated by Indonesian authorities (the 'Kantor Sumber Daya Alam' "KSDA" in Indonesia). This may occur as a result of a

search for illegally kept orangutans, which are the primary focus of confiscation efforts. Despite the fact that under Indonesian law sun bears are equally protected there is no organization/institution with a focus on this species at present, nor are there facilities to house and care for confiscated bears.

A short-term strategy for dealing with the occasionally confiscated bears is to release them into protected areas. One of the main problems facing these reintroduction programmes however, is a lack of suitable release sites. Ideally, the release site should have adequate habitat, low or no human use, and few or preferably no resident bears. Resident bears often do not tolerate new bears, especially naïve ones, that suddenly appear. In addition, if a wild population occurs in the area, the carrying capacity of the area should allow for new bears to be added to the population so as not to increase food competition. In Indonesia most remaining good quality forest in Sumatra and Borneo still harbour sun bears. The primary threats facing wild sun bears in such areas is the lack of forest protection measures and direct human exploitation. A sun bear population could theoretically recover reasonably quickly if these factors were alleviated. In short it can be concluded that there are potentially more negative effects to a wild bear population by releasing confiscated bears than positive ones.

Further, the fate of confiscated animals is complicated by contradicting wildlife law. In Indonesia confiscated wildlife should either be: 1) immediately released, 2) released after having been rehabilitated, or 3) disposed off, if no other solution can be found, although euthanasing healthy endangered animals is against the law (H.D. Rijksen, pers. comm).

In short sun bear conservation faces a number of major problems:
1) habitat destruction
2) exploitation of bears for gall bladders, food and pet trade
3) insufficient number and spatial distribution of protected areas and poor management of existing designated conservation areas
4) insufficient wildlife management
5) no facilities to care for confiscated bears
6) lack of funds and agencies for management of confiscated animals
7) lack of suitable release areas for confiscated animals.

Experiences with sun bear re-introductions in East Kalimantan, Indonesia

Methods:

In 1997 five sun bears (estimated ages range from 2.5-5 years) were released into the Sungai Wain Protection forest in East Kalimantan. The bears had been in captivity since they were cubs and ended up at the Wanariset Orangutan Reintroduction Project facilities, near Balikpapan, although detailed information on the history of 3 of the individuals was not available. The bears had either been confiscated by the KSDA (office for wildlife and conservation issues) or brought to the Wanariset facility by their owners. The bears were kept at the station until a shortage of cages (for orangutans) prompted a decision to release them. A number of sun bears had previously been released in nearby forested areas without monitoring or publicity.

Sungai Wain (10.000 ha) is dominated by lowland dipterocarp forest, prime habitat for sun bears. A small population of wild sun bears was already present in the reserve, although no estimates of numbers were available. Five bears were implanted with radiotransmitters prior to release in order to monitor their adaptation and movement patterns. A low frequency (30 MHz) radio transmitter was used, as this signal was thought to carry further in densely forested, humid habitat. However, this turned out to be a poor choice. Range of these transmitters was typically < 300 meters. Consequently, the bears were lost a few days after release. Search parties were organized to locate the bears again. Approximately one month after release three of the five bears were found dead, killed by humans living near the edge of the reserve. The bears had moved into the garden areas and had started raiding crops. The fourth bear was caught in a village and taken back to the Wanariset Station about three weeks after release. Bear number five disappeared with no evidence of its eventual fate.

It is thought that the main problems facing this reintroduction approach were:

Bears were already (sub)adults and had spent quite some time in captivity. Foraging skills were either poorly developed or absent. It seems probable that they were either chased towards the edge of the forest by resident wild sun bears, or they found it difficult to find food in the forest and eventually happened upon the human gardens. The gardens provided abundant food and seemingly less risk, as these bears had lost most fear for humans.

It was apparent that pre-release assessments and training were insufficient. The approach though, is typical of releases carried out by Indonesian institutions, except that these bears were equipped with radio-transmitters, so their fate could be ascertained. The negative results gained from this work led to a rethinking of methodology for future releases.

Shortly afterwards, I began an ecological study of wild sun bears in the same area. During the course of the research three sun bear cubs were brought to the study site (January 1998; August 1998; October 1998), after having been confiscated by the local authorities. I agreed to attempt another reintroduction, but this time using a more gradual approach and also with the goal of assimilating the bears into the research project.

From the time they arrived, as small cubs (between 3-7 months old), the bears were walked through the forest during the day and kept in a cage at night, where they received additional food supplies. The first cub stayed in a wooden cage (3 x 3 m) in the research camp during the night for the first 6 months after which she refused to enter the cage anymore. From that time onwards she spent the nights in the forest but would come back to camp in the evening where she would receive some additional food (fruits and milk/porridge). She was equipped with a 164 MHz radio collar at that stage (approximately one year of age). After this daily coordinates were taken and in addition the bear was sought up in the forest twice a week for close behavioural observations (this still continues up to date and the bear has been monitored closely for more than 2.5 years). The frequency of her coming back to camp for additional food supplies has become less and less over a long period of time. At present (2.5 years since she became 'free-ranging') she still comes back for additional food about 4-8 times a month, although it is also thought that she partially comes back for 'social' reasons (she still shows some need for affection from two persons that have known her since she was a cub). These additional food supplies are not essential for survival.

The two other cubs, which arrived shortly after each other, were kept in a cage (4 x 2 x 2 m) built at some 800 m distance from the research camp in the forest. They were taken out early every morning, after which they were walked through the forest where they foraged on natural foods. On average the bears were active in the forest 9-10 hour per day. A total of 4 different people walked with the bears when they were cubs. Daily continuous observations were taken of these bears as well. In the afternoon the cubs were put back in the cage where they received additional food (milk/porridge and fruits). The second female refused to enter the cage after about one year (at the age of 1.5 year). She was then also equipped with a radiocollar and would come back to camp in the evening whenever she wanted to receive additional food. This process is still ongoing and dependency on additional feeding has become less. Still, she will also come back for additional food about twice a month, more than one year after she has become 'free-ranging'.

All three bears quickly adapted to the forest environment and showed instinctive knowledge of feeding behaviour. Within 6 months they consumed a large variety of the same foods that were observed to be eaten by wild bears (based on scat analyses; sign transects and observations) in the same area.

In this way three bears (2 females, 1 male) have been reintroduced and are presently living in the forest. They have been monitored for 2.5 years and have been equipped with radio-collars. They tolerate close behavioural observations, which has been an enormous asset in gathering knowledge on sun bear behaviour, ecology and habitat needs.

Behavioural indications have been observed for estrous in the female bears and faeces samples are collected for hormonal monitoring of ovarian activity. Home range sizes of these bears are similar to those of wild sun bears that were caught and radiocollared in the study area. Encounters between the released and wild sun bears have been observed. For the most part, the two female bears tolerate only people that have been with them for many days of observation, which includes myself and one Indonesian assistant. The young male bear was confiscated when he was only a few weeks old (eyes were still closed). This bear is far more tolerant of other people, and in fact has been known to occasionally follow local villagers in the forest. Because of this he is at present still kept in a cage at night (now at the age of 2.5 years). Behavioural modification work is presently underway to rectify this situation using a shock collar.[*]

Overall, these bears have fared far better than the previously released adult sun bears. Several factors seem to have contributed to the greater success: (1) a longer acclimation period, (2) less overall time in captivity (younger age of beginning the acclimation process), (3) younger age at the time of release (possibly being less threatening to wild bears), and (4) integration into an established research project, thereby enabling a greater investment of time and concern for a productive outcome.

Conclusions

Reintroduction of captive sun bears should not be attempted unless there is a commitment to long-term (1 year or more) training and monitoring. There also seems to be a limitation as to which bear age classes are still suitable for a release and the age at which they were taken from their mother and came into captivity. Bears that have been taken into captivity when they were newly born seem to loose most fear for humans and

[*] meanwhile killed by illegal loggers

have been found to follow any human scent trail they would come across in the forest, leading to the eventual killing of one bear. Time spent in captivity also seems very important. Bears that have spent more than a year in captivity will be more difficult to release due to the time period necessary for them to learn foraging skills and establish a home range. Gender of the bears is another factor to be taken into account. The two successful releases were both female bears. It could be that female bears are more easily accepted into an area with resident bears than a new male. Thus, from a practical standpoint, reintroductions are likely to be limited to small numbers of bears. A lack of suitable release sites (adequate habitat, low human use, and not too many other bears) further restricts the potential for sun bear reintroductions. Whereas this technique may save or at least improve the lives of a few individual bears, reintroductions are not likely to be a principal conservation strategy for the species. The most urgent problem for sun bears is habitat destruction. The solution, then, is forest protection to ensure adequate habitat for bears and other wildlife. A number of large forested areas still exist in Sumatra and Borneo, and these potentially harbour substantial populations of sun bears, but many are currently under logging concession licences. In my opinion, the highest conservation priority should be to protect these remaining, essential forests.

The problem of what to do with the large number of sun bears held in captivity throughout their range still remains. It is obvious that if only a few percent of suitable habitat will be protected the number of remaining sun bears will be proportional to the carrying capacity of those areas (if hunting can be limited). For the surplus bears that have lost their habitat some solution should be thought of soon as the situation is getting more and more desperate due to the rapid disappearance of lowland forest areas.

Some confiscated sun bears from Malaysian Borneo (Sabah) have recently made their way to a number of zoo's in the United States. Although this might be positive for the genetic diversity of the zoo population of sun bears in America, it is of little assistance to the conservation of the species in the wild, even providing the Sabahan government with an easy solution for their problems in taking care of displaced wildlife.

In some areas consideration should be given to building natural enclosures for confiscated bears, with environmental education and public awareness as the main focus. Knowledge about conservation issues and consequences of environmental degradation are poorly developed in SE Asia. The potential to 'use' confiscated wildlife to raise awareness locally about the ecological role of such cryptic animals as the sun bear and the need to conserve their habitat, also for human needs, is very large.

Euthanasia, although it should be considered as a last option, should be re-evaluated for those bears that have spent many years in captivity and face a future of poor caging and caretaking.

References

Brambell, M.R. 1977. Reintroduction. Int. Zoo.Yearb. 17: 112-116.

Campbell, S. 1980. Is reintroduction a realistic goal? In: Conservation Biology: An -Ecological Perspective. M.E. Soule and B.A. Wilcox (eds.). Sunderland, MA., Sinauer Associates, Inc., 263-269.

Kleiman, D.G. 1989. Reintroduction of captive mammals for conservation. Bioscience, 39: 152-161.

Meijaard, E. 1999a. *Ursus (Helarctos) malayanus*, the neglected Malayan sun bear. Netherlands Commission for International Nature Protection. Mededelingen no 34. 61 pp.

Meijaard, E. 1999b. Human-imposed threats to sun bears in Borneo. URSUS: 11: 185-192

Mills, J.A. and Servheen, C. 1991. The Asian trade in bears and bear parts. TRAFFIC USA/WWF. Washington D.C. 131 pp.

Servheen, C. 1999. Sun bear conservation action plan. In: Bears. Status Survey and Conservation Action Plan. Servheen, C., Herrero, S., and Peyton, B. (compilers). IUCN/SSC Bear and Polar Bear Specialist Groups. IUCN, Gland, Switzerland and Cambridge. 219-224.

Captive Spectacled Bears, Conservation, and Community Development in Peru

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Introduction

In May 2000 a captive spectacled bear (*Tremarctos ornatus*) was released in a dry forest in northern Peru, 46 km northeast of the coastal city of Chiclayo. The release site was one of two desert/dry forest areas in South America that had wild bears; both are in Peru. Unlike most captive release projects, the main purpose was to provide jobs for the community of Santa Catalina de Chongoyape in return for conservation of bears and the forest. Now 2 years after the bear's release, Peru has a new park, the Ecological Reserve of Chaparri. This is the first conservation unit in the country donated by a community. Illegal hunting of bears and other wildlife has diminished in and around the reserve. This report chronicles the events before and following the release that transformed the way a community viewed its resources. We discuss the strengths and failures we experienced. We offer guidelines for future collaborations between zoological parks and in situ conservation programs.

Background

In July 1999 the Peruvian government was poised to take possession of a female spectacled bear (*Tremarctos ornatus*) that was living with Juana Diaz in her house in Oxapampa, central Peru. Mrs. Diaz had grabbed the bear in her cornfield when the cub was approximately 3 months old. For the next 15 months, the bear named Yinda, was treated as her "4 legged daughter". She was suckled and was encouraged to explore her surroundings (e.g., swim rivers, climb trees, etc.). When Heinz Plenge caught up with the Diaz family, the bear was becoming too difficult to manage. This is a usual pattern with bears that are kept as family pets. What is also usual in developing nations is the lack of good facilities to care for confiscated animals. The Peruvian government was painfully aware of this problem and welcomed any help we could effect. We took custody of the animal. Our first task was to create a state-of-the-art facility to care for this bear The coastal dry forest near Chiclayo was chosen as the location of the facility for three reasons: 1) the habitat supported a wild bear population, 2) the people of Santa

Catalina de Chongoyape were well organized within their village and with their neighbouring villages, and 3) the approximately 2000 villagers had legal title to their land, some 42,000 ha of mountainous terrain that extended from desert sands near sea level to cloud forests at 1700 meters. Most of that land was inhabited by bears and other wildlife. Villagers cultivated only 250 ha. These were good on which to build a conservation program. Our plan was to build conservation around the best people we could find, not the most biodiverse area. We could replace the biotic elements that were recently extirpated, but we could not do anything with unorganized and unwilling communities.

Many meetings held with the community revealed that neither they nor the governmental authorities could protect their forests and wildlife against illegal harvest if they acted alone. Villagers were also plagued by the presence of cattle owned by outsiders. Some 3000 head of these cattle roamed the massif of Chaparri, breaking the native chaparral and trampling the soil. Bears such as those we saw in 1978-1991, were now restricted to the most remote upper slopes and ridges without access to running water. The combination of grazing and logging had dramatically reduced the ability of these slopes to retain winter precipitation. The runoff had become epic. The last El Niño (1997) created a temporary lake 80 km long and destroyed every road and bridge in the Department of Lambayeque. Ironically Santa Catalina de Chongoyape did not own the rights to use any of the water in its streams, even during flood times.

Our strategy was to create jobs and other benefits in return for community cooperation in preserving the forest and key species. The goal was to create private reserves that would link conservation units (national parks and forests, reserves, etc.) in northern Peru and southern Ecuador with protected corridors. We would start with efforts to link the dry forest reserves along the northern coast of Peru. This forest, known as the Tumbesian dry forest, stretched hundreds of kilometers northward, from the foothills of the Andes of Santa Catalina north to southern Ecuador. We would expand from there to link coastal forests with the cloud forests and paramos to the east and north, hopefully including the National Parks of Cutervo, Cordilleras de Condor y Sira, and Podocarpus in southern Ecuador. Our captive bear was well suited to become the symbol of this effort because spectacled bears inhabited most of this region. Andean forests are not as species rich as comparable sized forests in lowland Amazonia, but endemism can be five times greater (Leo 1993). The valley that we chose to be the home of Yinda had 107 registered bird species, 35 of which were endemic (Dr. Robert Williams, Pro Aves Peru, Pers. Comm. October, 2001).

In January 2000, Yinda entered oestrus at approximately 2 years of age. She was brought to Chaparri, an 800 meter high massif the reserve was named after. There she was tethered by a long rope until workers could finish constructing a 2 ha electrified enclosure for her. She escaped for 3 weeks in February. She probably was mated at this time by at least one male bear. The evidence included sightings of other bears and tracks found next to hers that included the markings of a dragged rope. Her shoulder and neck displayed bite marks when she was recaptured. She was put into the enclosure in March. At the end of April 2000, Yinda escaped during an unfortunate release of two other bears into the enclosure. One of the bears, a female of perhaps 8 years of age, died from heart failure as she passed between the wires of the fence a dozen or more times. Yinda, upon seeing more bears, fled through the enclosure. She has been living in the wild for 2 years and has a 1.5 year old cub. The enclosure has been reinforced and houses 7 spectacled bears as of April 2002.

On December 26th, 2001 the residents of Santa Catalina de Chongoyape donated 86% of their land (43,413 ha) to create the first private reserve in Peru; the Ecological Reserve of Chaparri. A federal law was written to create this new park category. The reserve is also a section of a biological corridor which includes the adjacent reserves of Batán Grande (13,400 ha) and Laquipampa (11,347 ha). During November 2002, the neighbouring community of Miracosta announced its intent of creating 3 new private reserves based on the Chaparri's model. Illegal hunting of bears and deer has dramatically declined. Some highly endangered species such as the white winged guan (*Penelope albipenis*) have been reintroduced. This 2 kg member of the Cracidae (Order Galliformes) was believed to have been extinct for over 100 years until it was found just north of Chaparri in 1977. Community pride has swelled as Santa Catalina de Chongoyape is becoming known as the town that cares for bears. The Department of Lambayeque, which covers the southern quarter of the Tumbesian dry forest, adopted a resolution to create corridors and make the spectacled bear the mascot of this effort. These and other successes resulted from the care of one bear. The subject of this paper is how this captive bear was turned into a symbol of a larger movement. We offer guidelines on how captive populations can help conservation programs in the field.

Conservation guidelines

In this section we provide more detailed information about the relationship between the captive bears and the conservation challenges. We organize this information under guidelines that are seminal to the enclosure and to our program in general. Most of the general concepts are mentioned in an overview of bear conservation planning and implementation (Peyton et al. 1999).

- Captive bears need a well-structured space, preferably large with natural vegetation.
- Preserve options for wild population management, and public education.

It is unnatural for a spectacled bear to be forced together with conspecifics in a tiny, flat, unstructured enclosure. Bears are for the most part solitary animals. The exceptions to this rule include mother and cub associations, when bears are together during mating, congregations of bears at abundant food sources, and occasional pairings of subadults from the same litter. Bears also occupy large areas with diverse food resources. Habitats spectacled bears occupy in the Andes, typically provide 15 to over 35 food species. These areas include sufficient hiding cover, and several vantage points for sensing information by olfaction and sight. Typically these latter sites are inclined trees on steep slopes, or a rock outcrop on a ridgeline.

The enclosure

The captive facility we built in Chaparri attempted to mimic the wild situation. It is several kilometers into bear occupied habitat and is built on a steep slope (30-45 degrees inclination) with natural vegetation. There are 19 food-items bears eat in the enclosure, including tree fruits, cactus, bromeliads, and bee hives found on cliffs The facility consists of two square separation cages (4-5 m to a side) connected to a 2 ha electrified enclosure. The separation cages are on slightly-inclined ground which facilitate cleaning. The enclosure is divided into 3 compartments, each with its own independent source of water, either brought down from artesian sources from above, or distributed from a source below with the use of a solar pump. The six bears that are in the enclosure right now each have their own sleeping cave constructed from rock and cement. The newly arrived seventh bear is being cared for at the house of the caretaker because we do not have facility constructed to care for animals <1 year old. The 7-8 wire fence is 1.5 meters high. The wires alternating between "hot" and ground. Hot wires distribute 8100-8400 volts in bursts lasting 3 milliseconds per second. A bear must touch both a hot and a ground wire to receive a shock. The doors between partitions can be turned off independently from the rest of the enclosure. The source of the electricity for the fence is located 600 m downhill at the house of a caretaker. It is more secure from theft there, and the bears are not bothered from the noise of the capacitor. We reinforced the outside of the fence with a 4 inch wire mesh after Yinda escaped. We have had no further escapes or problems with teaching new arrivals about the fence.

The captive bears in May 2002:

Name	Sex	estimated age (y)	history
Domingo	male	> 20	factory
Daria	female	>10	circus
Chacha	female	~ 5 – 7	circus
Cuto	male	~ 7	circus
Tongo	male	~2	factory
Cholita*	female	6-7 months	private household
Rosita	female	~ 12	Zoo and circus

* kept outside the facility

Behaviour of the captive bears and their potential for release

These are some of the advantages of a large naturally vegetated enclosure. The bears start doing what their wild counterparts do. Within weeks of their entrance into the large enclosures, the bears are exploring and eating foods known to support their wild counterparts. We believe inheritance plays a large role in enabling this species to identify foods. For example Yinda quickly identified foods that were not available where she came from and with probably less than 1 month of training on solid foods from her biological mother before she was captured. The caretaker does not need to feed the captive bears anything more than vitamins between March and July.

Some individual bears gradually may become adapted to a wild existence in a large enclosure before being released. Yinda spent several months in the enclosure prior to her escape. She became "very wild" during this time and would not come near anyone, including her human mother. The small female we have in the remote compartment of the enclosure (Chacha) is acting more like that now with every month that goes by. Only bears that demonstrate a willingness to explore and a desire to stay away from humans will be considered for release. Released bears, if any, will be radio collared for monitoring. Four of the bears we have do not show these traits, and are very habituated to human foods. If we released them, they would probably head for the nearest source of human food and become very bad ambassadors for their species. Finally, large enclosures with some steep topography and vegetation allow the bears to exercise, to conceal themselves when they want privacy, or to cool down when it is hot. The bears do not display stereotypical behaviour that is commonly observed in small enclosures, except for some pacing near the point where they are fed. We could change that by broadcasting the food and encouraging them to forage.

Role of the captive bears for conservation

The aesthetics combined with the more natural behaviour of the bears enhances the educational potential of the exhibit. We have had many meetings during which we invited local hunters and farmers to see the bears. They learned that these bears were not dangerous, and that they did not need to kill them to get a close look at them. Instead they marvelled at the bears' climbing ability and peaceful disposition. In the future we would like to receive support for doing scientific investigations using our captive bears as subjects. One study would be to investigate the relationship between diet, nutrition, and reproduction in our female bears, something we cannot easily do with wild bears because we cannot control their diet. We can do that with bears in our separation cages. The fact that our facility is in bear habitat makes it easy to procure natural foods for this study. We need to answer these questions to predict whether the species can survive without the fruit sources found at lower elevations of the cloud forest. These are the elevations that are most impacted by shifting agriculture.

- Define conservation problems broadly, not just in biological terms (Bryant and White 1982).
- Include local people in the planning stage and give them responsibilities.

Most bear projects in South America do not start with extensive knowledge about either the people or the habitat. We have known the people and conservation issues in this region for 25 years (Peyton) and 53 years (Plenge). Heinz Plenge is from this region and lives here. Bernard Peyton conducted field research on the spectacled bear and habitat for two years during 1977-1979 and has revisited the area 2 dozen times. Thus we have extensive information on historical patterns of wildlife and habitat distribution, land tenure, seasonal patterns of resource use and labour, local enforcement of regulations, history of grazing and logging conflicts. Subjects that are not known from rapidly conducted surveys. This allows us to define conservation from the perspectives of many disciplines and in many sectors of society. It allows us to link bear conservation with the important priorities determined by community leadership. For example, Heinz Plenge was able to convince the Peruvian government to grant the community water rights, something the leaders of Santa Catalina de Chongoyape had petitioned the government for during more than 2 decades. And finally it allows us to build our program to use existing community leadership. These are vital steps to promote buy-in, local ownership, and to not supplant leadership through conservation action.

- Make local people the primary beneficiaries of conservation action.
- Balance benefits with acceptable risks (Honadle and Vansant 1985).
- Provide meaningful benefits, and spread them widely.

Captive animal care is a terrific vehicle for creating two priority needs of rural communities: jobs and education. The linkage of these two benefits with bears creates very powerful incentives that preserve habitat and reduce bear mortality from hunting.

The immediate need of creating an enclosure for Yinda created more than 30 jobs. In the first year these people constructed an 11 km road to the base of Chaparri and an electrified enclosure. They also built a conference hall and two houses, one for Heinz Plenge and guests, and the other for a caretaker of the bears and his family. They planted 5 ha with drip-irrigated trees whose fruit will nourish wild bears. They built two pre-release enclosures for white-winged guans. A 55 ha enclosure was built for guanacos (*Lama guanicoe*) we will reintroduce. These building projects provided income and technical knowledge. They also helped compensate families for their reduced dependence on cutting the forest for charcoal or hunting the guans to extinction. We are mindful not to isolate people from their dependence on natural resources without creating alternatives. Examples we are developing include tourism, education, alternative crops, and art. The observation and record keeping that are essential to captive animal management are also essential in other jobs such as arranging travel, lodging, and meals for tourists later on.

It is vital that community members assume part of the risk of failure, or the program can evolve into a welfare effort with little accountability. In all these efforts we emphasized maximum employment, not efficiency. Therefore we used existing materials and abilities rather than imported technical solutions brought by consultants. For example the electrified fence has mequite (*Prosopis juliflora*) posts placed in holes dug by hand. The houses are built of adobe.

- Allow extra time for public education and institutional strengthening.
- Use symbolic acts to strengthen the conservation message.

Timing of conservation action is extremely important. It makes little sense to promote reintroductions and releases, or natural augmentation of animal populations if the animals have nowhere to live or will be shot. For this we took a very “latin” approach rather than a pure project approach.

Conservation action in Latin America is preceded by much more dialogue than that which is usual in North America. We spent considerable time and economic resources to educate people, villagers, neighbouring communities, regional authorities and hunters, and central government officials about the purpose of the captive bear facility. Heinz Plenge arranged feasts and celebrations. We hired a local shaman to bless these reunions. We also created a soccer tournament in which 150 teams competed for the “Bear Cup”. Our captive bears quickly became a mascot of a tournament that gave the

community great joy. The rules for the men, women, and children who joined the tournament were simple: do not hunt bears or destroy bear habitat. Overnight we created 1750 bear guards. Prior to the tournament, approximately 15 bears were shot every year. This past year we have notices of 3 bears being killed in a 250,000 ha region. There have been 4 incidents of people preventing hunters from killing bears up to six hours distance by road from the centre of Santa Catalina de Chongoyape. Three separate hunting parties approached Yinda and her cub at close range and did not shoot. We think this is powerful evidence that our campaign is working. Finally, we had a park guard training course in Chaparri in October 2001 during which 60 people from 11 communities learned captive animal and wildlife management techniques. We now have enough acceptance in these communities for protecting bears that we can begin thinking about releasing a very few captive bears in the future and begin researching the wild bear population. We realize these released bears have a good chance of depredating livestock and crops. However, they will be collared to help us remove them from the wild if they become nuisance animals. We want to experiment with release techniques to know how to do it when this management tool is really needed.

- Have strategies for what to do if the program succeeds.

If our program succeeds, we will unintentially create more problems to solve than less. We will be besieged to care for any captive bear the government and regional authorities confiscates. And incidence of bears depredating agriculture will increase when fewer bears are hunted and the bear population increases. Both problems will result from not having policies about what to do if the program is successful. We now take each in turn.

Beside education we do not have clearly defined priorities about what purpose our captive bears serve. Currently, we are a rescue centre for animals confiscated from clandestine zoos and circuses. We feel an obligation to take these animals because it increases our support for the entire program by the Peruvian authorities. These animals arrive in horrible condition (emaciated, very reduced muscle tone, claws digging into foot pads, open sores and bald spots, one with a broken jaw and filed teeth, etc.). There is huge public relations value in their rapid improved condition. Unfortunately, we cannot reject captive bears that are taken from their owners near our facility, because we face losing our moral authority. This has resulted in our being forced to care for bears we did not have funds for ($2000/bear/year). This resulted in spending money on care of captive bears rather than monitoring the wild population. It also has made it very difficult to plan how we will spend funds, because we never know when a circus will show up in Chiclayo, resulting in more bears to care for. In situations where we do have a choice, we need a policy that guides us about what animals to accept. Currently we have no funds to take care of the bears for year 2003. Tourism revenues are not

expected to match expenses for several years*.

Likewise we would like permission to cull wild animals should we be successful in increasing populations of deer and bears. We want to avoid what happened to the project to augment vicuna (*Vicugna vicugna*) in Peru between 1979 and the early 1990s. During that time the conservation community prevented the sale of vicuna hides and wool to compensate the Lucanas Community in Pampa Galeras for allowing the vicuna to multiply on their grazing lands. The population subsequently declined. We would allow hunting to control excess numbers of deer and bear. Hunting would provide additional income to the communities and incentives to preserve wildlife and habitat. Non-hunting methods to control wildlife populations are not known for bears. We cannot risk creating more crop depredation and the subsequent hatred of bears.

Conclusions

Captive bears in a natural enclosure can represent the conservation strategies of a region if the animals are part of a larger program designed to improve human welfare. Zoological parks and their supporters can become effective players for in situ conservation by becoming partners with those who know the needs of wild populations and the people who live there. We believe these partnerships are an essential way that zoological parks can expand their mission beyond their boundaries, and improve the education they offer their visitors. Likewise conservation practitioners in the field can benefit enormously by the technical advice, knowledge, and education skills that zoo professionals are known for.

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* since 2004 participants of the European breeding programme (EEP) for spectacled bears adopt the captive bears and take over maintenance costs

References

Bryant, C. and White, L.G. 1982. Managing development in the third world. Westview Press, Boulder, Colorado, USA. 322 pp.

Honadle, G., and Vansant, J. 1985. Implementation for sustainability: lessons from integrated rural development. Kumaran Press, West Hartford, Connecticut, USA. 128 pp.

Leo, M. 1993. The importance of tropical montane cloud forests for preserving vertebrate endemism in Peru: the Rio Abiseo National Park as a case study. In Hamilton, L.S., Juvik, J.O., and Scatena, F.N., (eds.) *Tropical Montane Cloud Forests*. Springer-Verlag, New York, New York, USA. 198-211

Peyton, B.; Servheen, C., and Herrero, S. 1999. An overview of bear conservation planning and implementation. In Servheen, S., Herrero, S., and Peyton, B. (compilers). *Bears, Status Survey and Conservation Action Plan*. IUCN/SSC Bear and Polar Bear Specialist Groups. IUCN, Gland, Switzerland. 8-24

Re-introduction of Orphan Brown Bear Cubs

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Introduction

The ecology of the brown bear was studied in the Central Forest Reserve, Russia between 1970 and 1985. The investigation included population size and density, as well as dispersion of individuals within the territory of the reserve. Feeding (and predatory) behaviour, patterns of defence (including the construction of day beds and winter dens), sexual behaviour and social interactions were also studied (Pazhetnov 1990).

During 1985-1990 in addition to the study of brown bear ecology in the protected part of the reserve, the data on this species in non-protected areas were obtained. In these areas intensive bear hunting took place. During this later study, several behavioural elements were described which covered habitat use, avoidance of humans and den construction. The indices of these behaviours were especially high in areas where hunting "pressure" was also especially high. In contrast to the data obtained in the reserve, the data obtained in the hunting areas revealed the high reproductive level of brown bears (yearlings constituting more than 20% of the population number). In the protected areas, however, the population size and density are more or less in equilibrium with a rather low level of reproduction (about 11-17% of the population size consisted of yearlings). In the protected areas brown bear males display some peculiarities of social interactions - during breeding season the dominant (stronger) males are sometimes able to suppress the sexual activity of subordinate males. This type of male concurrence could be the cause of the following phenomenon – that a certain proportion of sexually receptive females in the Reserve area are not able to mate (Zuirianov 1979). This was not the case in the non-protected territories.

During 1975 – 1977 we started our experiments with orphaned brown bear cubs in the reserve (eight animals). We investigated their development from the age of 3-5 days up to the age of 75-85 days. Six bear cubs were raised in an environment resembling natural habitat while two bear cubs were raised in a large cage. The development of foraging, habitat use, defensive, social and nest building behaviours were assessed. Special attention was paid to the timing of periods in which olfaction, hearing and

vision were developed and "following response", fear, defensive, predatory, and social behaviours emerged (Pazhetnov 1990).
Studies of the ecology of brown bears and experimental investigations of behaviour development in brown bears served as the basis for our special project of raising brown bear cubs and releasing them into the wild.
In Russia, a large number of very young orphaned bear cubs appear each year as the result of human activities. The main reason why these animals become orphaned is the winter bear-hunting season lasting from January to March. Bear hunting is traditional for Russians and takes place in all areas of the country. The total number of brown bears in Russia was 120.000 according to the official data for the year 2000 (Tver Regional Hunting Service, annual report, unpublished). Although it should be noted that the techniques of counting brown bear numbers are still not sophisticated. The counts of brown bears are carried out on the very large territories that include variable natural environments. This could be the source of possible errors in brown bear number estimates. The possibility also exists that local hunters intentionally elevate brown bear numbers in order to obtain a higher hunting quota. With its high commercial value the brown bear has become especially profitable for hunting. An estimate of 100,000 brown bears in Russia is more likely to be a more realistic number of population size.

About 2000 brown bears inhabit Tver oblast (84,100 square km, including 36 000 sq.km of forest). Each year the licensed hunting quota is about 200 (10%). Actually the data on legal bear killings in previous years gives a figure of 164 bears per year (8.2%). Illegal hunters kill no less than 70 bears per year (3.5%). Thus each year about 11 % of the brown bear population in Tver oblast is killed. According to our estimates this level of brown bear exploitation is, at least at the moment, not damaging the Tver population

According to these data the local Tver Hunting Organization has reason enough to maintain the current level of brown bear hunting. The brown bear winter hunting in Tver oblast usually results in about 12 orphaned bear cubs each year. All these animals are doomed to die, or to live out their lives in captivity in small cages, or to work in a circus.

Results

General data

Our work on raising orphan-bear cubs and releasing them into the wild started in 1990 at the biological station of the Reserve "Chisty Less". All bear cubs aging from one day old and up to 3.5 months old (up to the ninth of May) were accepted at the station.

During the period 1990-2000 70 bear-cubs were accepted at the station. Among these cubs six animals originated from the Kazan Zoo (Tatarstan, Russia) and four animals from Belgorod (Russia) Zoo. Some results of this work are summarized in Table 1.

The conditions for maintenance of bear cubs

Up to the age of three months bear cubs are kept in a house in which no humans live. This is necessary because of their still underdeveloped thermoregulation – animals need heating up to the age of 1.5 months.

Table 1: Data on bear cubs accepted for raising at the Biological Station "Chisty Less" in 1990-2001

Year	**Number**	**Sex**		**Date of release**	**Notes**
		M	F		
1990	5	2	3	30.06	3 animals were killed by adult male bear
1993	11	8	3	09.08 - 28.11	
1994	2	1	1	19.07	Obtained from Kazan Zoo
1995	12	5	7	21.07 - 3.09	Two animals were killed by stray dogs, 2 were left to spend the winter in the nearby forest and released on 13.04.1996 in Briansky Less
1996	8	3	5	28.07 - 23.08	3 animals obtained at the age of 2-3 days had severe pneumonia at arrival, 2 of them died. 2 animals were released in Briansky Less Reserve
1997	6	2	4	20.06 - 23.07	1 animal died after eating a poisonous plant, 3 were released in Briansky Less Reserve
1998	20	6	14	20.06 - 27.10	3 animals were killed by a wolf, 3 released in Briansky Less Reserve, 2 spent the winter in a nearby forest and left the area in the spring (14.04.1999).
1999	8	6	2	8.08 - 30.08	2 animals left the area on 5.08, 3 spent the winter in a nearby forest and left the area on 12.04.2000
2000	2	2			Left for winter in nearby forest, released with ear radio-tags on 14.04 2001
2001	7	2	5		Still kept at the Biological station
Total	81	37	44		Died due to different reasons 11, successfully released –61

The daily contact with very young bear cubs included feeding them from bottles with plastic nipples, wiping their muzzles after the meal, minimal handling and massaging of belly which is necessary to stimulate urination and defecation. The staff who attend small bear cubs, should not speak in the presence of animals, should use dark gloves

and cover their faces under dark masks (in order to cover the bright and thus conspicuous parts of body). This is necessary to minimise the possibility for a cub to learn the simple associations between food and any external stimulus, which is strong and distinct enough.
At the age of three months animals are transferred into a forest pen, in which a wooden house is constructed which imitates the bear den. Thus starting from this age, bear cubs have access to the natural environment.

The first release and "following response"
The first emergence of the bear cubs from the wooden house-den is performed as follows: first the experimenter opens the door of the wooden house and walks away from it to a distance of about 30 meters but stays invisible to the animals. The person should stay still so that the animals are not attracted to him. In the wild during the period when bear cubs leave the den for the first time the "following reaction" usually forms easily. The object perceived, (in the natural environment it is the moving mother-bear) is quickly memorised by the cub due to imprinting-like mechanisms. In the case of bear cubs coming out for the first time from the dark wooden house, they only see the other bear cubs and not any human movement.

As the orphan-bear cubs were released several times into the bright small area in front of the wooden house-den (the procedure being performed during the daytime) they gradually became oriented towards group mates. During this period the threshold for "following response" formation gradually increases. Thus the possible role of the human carer as the potential object for "following response" formation gradually declined. However, the until the age of five months probability remains rather high that the bear cub would be imprinted on humans and would learn to follow them. This should be taken into consideration while working with bear cubs.

The development of foraging behaviour
Starting from the age of 14 weeks the bear cubs have free access to the natural environment. The door of the wooden house-den stays opened for 24 hours. The cubs begin to eat grass at the age of four months (Table 2). At this time they are given **a** small amount of high energy food twice a day. This additional food assists with the normal growth and development of the cubs while the small amount provided still leaves them hungry enough to search for natural foods. At the age of five months the basic foraging behaviour of bear cubs, which provides their survival in the wild is already developed. From this age additional food is only given once a day in the evening.

Table 2: The general timing of foraging, avoidance and den construction behaviour development in brown bear cubs raised in a semi-natural environment

Type of behaviour		**Age (months)**
Foraging		3 - 4.5
Predatory behaviour (as part of foraging), small vertebrates as prey		6 - 7.5
Avoidance (defensive) Behaviour	first emergence of fear reaction	4.5 - 5
	the basic development of fear reaction	5 – 6.5
Den construction (as part of defensive behaviour)		9 – 9.5

Development of defensive behaviour

The main problem with releasing bear cubs is that they must possess the fully developed fear reaction towards humans and human activities as well as towards places of human habitation. At the age of three months they already demonstrate fear reactions when new odours, sounds and moving objects are presented. The fear reaction is usually displayed as a sudden cessation of movement, squatting and then a quick flight from the source of possible danger to swiftly climb a tree. The fear reactions are short in duration during the learning period. This could be explained by the fact that the respective neural and hormonal regulatory mechanisms of fear and anxiety are not yet fully developed. After the age of five months the fear reaction begins to emerge in all cases of new external stimulus – animals became extremely cautious and run away as soon as they perceive anything unusual. At this age the dynamics of such arousal reaction in orphan bear cubs in response to novel stimulation depends on the animals' former history. It means that it depends on the degree of their isolation from humans and human odours during their early development.

Our observations showed that fear behaviour appears in bear cubs at about the age of five months and develops quickly to reach its final form during 6-12 days. After this takes place the fear reaction persists in the brown bear behavioural repertoire forever. This is the prerequisite for the bear cub to survive independently in the wild.

The orphaned bear cubs in the group are tied together by "family bonds" based on olfactory and acoustic signals. The visual information plays little or no significant role in these cases. When the single bear cub is occasionally separated from its mates in the forest it can re-join the group quickly if it is already familiar with their common smell. If not, the animal becomes extremely frightened and is unable to join the group quickly**.** Brown bear cubs are already able to fend for themselves in the wild at about 5-6 months

of age. Orphan bear cubs released at the age of 6-7 months adapted to life in the wild successfully. Their activity has been recorded since their release.

The avoidance behaviour toward humans develops gradually at between two and five months of age. The main prerequisite for this behaviour to be formed appropriately is for the animals to have contact with just one person. Bear cubs learn the individual odour of this person easily and are able to recognise it amongst many others. In this case, the odour of other humans elicit the fear reaction in bear cubs. If the bear cub is older than three months and has had the experience of perceiving different human odours its fear reaction is not elicited further and its reaction towards human species-specific smell becomes neutral.

Orientation within the home range

The orphan bear cubs gradually acquire knowledge of the area surrounding the place where the additional food is given. In the forest area they make paths in different directions starting from the wooden house-den. At the age of 4 to 5 months the cubs are able to walk from the wooden house up to 200-400 meters. At the age of 5 to 7 months this distance increases to between 5 to 7 kilometres. Bear cubs older than six months are able to find a short cut to the wooden house by using the sun as a navigational aid.
When additional food was no longer given bear cubs usually left the area of the Biological station and started their independent life.

"Den" behaviour

At the age of 10 to 11 months (Table 2.) orphaned bear cubs were able to construct a den by themselves and spent the winter in it successfully. Surprisingly their dens are not different from those that are constructed by wild bears. Thus den construction behaviour has a rigid inborn basis that, in combination with adequate external stimulation, provides the rapid formation of a set of adaptive behavioural patterns. This behaviour is very significant for survival as it helps the animals to survive the winter when food is scarce.

"Problem" bear cubs at the Biological Station

If a bear cub arrives at the Biological station «Chisty Less», at less than 40 days old, there are usually no serious problems to raise and release it into the wild. That was also the case for animals born in captivity at the Kazan and Belgorod Zoos. There are no special difficulties in the raising process if animals are taken from the den at an older age and even kept afterwards with humans for no longer than seven days. No problems arise if bear cubs are trapped in the wild after the bear family has left the den. Problems

could emerge if bear cubs must be raised from the age of 3 months or more which have already lived with humans for more than seven days. It is well known that the small bear cubs elicit emotional reactions from humans. Usually people permit these animals to lick their hands and to suckle their bare skin, they take them to bed for night sleep, and feed them with extremely tasty food. The reinforcement of the suckling reflex by humans, the intensive tactile contacts, feeding with wrong food – all these factors cause behavioural disturbances in the future development of these animals. Such bear cubs are eager to be in contact humans and when rehabilitated to the wild they persistently visit areas of human habitation instead of avoiding it as normally raised cubs will. Such bears when arriving at the Biological station require increased attention and special measures taken in order to develop the necessary human avoidance behaviour. These special measures entail carefully removing animals from the vicinity of human habitat, prohibition for personnel and guests to have contact with these animals, etc. Sometimes these steps did not bring complete success. In these cases the "problem" animals are left in the area of the Biological Station to spend the winter there. These animals are nevertheless capable of constructing a den. Sometimes they were left for the winter in the special wooden hut placed in the forest at a distance of 300-1000 meters from human habitation. In general such huts could be placed (if necessary) inside the bear enclosure and the animals given large amounts of hay. If left in the open forest, animals use natural materials to make their own den. The threshold for eliciting defensive behaviour usually decreases after winter sleep. These "problem" animals emerge from the den at the same period as young wild bears and start their independent life on their own. If such bears spend the winter in the enclosure and there is no need to transport it to the defined release area one may open the enclosure before the animal awakes. Not a single "problem" bear cub returned to visit human habitation after hibernation.

The release of bear cubs, born in captivity

In 1994 two 4.5 month old bear cubs arrived from Kazan "Zoo-Botanical Garden". During their stay in Kazan, up to the date of their transportation they were kept together in a cage, maintaining close contact with their mother and they had no direct contact with humans. They arrived at the Central Forest Reserve locality, where they were introduced into a metallic cage (size 2.5 x 3.5 x 2 meters) placed 100 meters from the village. It appeared to be practically impossible to establish a "following response" towards humans in these animals. They almost never followed the experienced person. Some additional food was delivered to them according to the general raising protocol (see above). They ate this food but had minimal contact with the people who delivered this food to them. Human contact was necessary to ensure the continued health of the bears and check on their movements in the area. This minimal contact was enough to

permit the monitoring of their migration shortly after their release in the wild. The conclusion was that these brown bear cubs would not develop the following response towards humans as the firm "imprinting-like" connection had already been developed towards their mother during their time with her at the Kazan zoo. There were no difficulties in releasing these animals into the wild as they developed a strong avoidance of humans. These animals were successfully monitored by the protection service of the Reserve for three years at a distance of 3-12 km from the release area. In the following years other bear cubs born in captivity and delivered to the Biological station at the age of 2-3 months were also successfully raised and released into the wild.

Release area

Starting from 1997 the Biological Station has participated in a joint project, which aims to increase the Briansky Less Reserve brown bear population (middle-Russia subspecies of *Ursus arctos arctos*). This reserve is 600 km to the south of the Biological Station. The local population of brown bears in that area suffered a drastic decline over the last decades caused by intensive legal and illegal hunting, destroying the corridors between isolated forests and general neglect of the problem by the local authorities. The situation is gradually changing now – a bear protection program is in progress, which has also positively changed the general attitude of the local human population towards the protection of brown bears.

Conclusions

This investigation and development of this technique could be of use for several purposes:

1.) for saving orphaned bear cubs and teaching them to adapt to life in the wild ;
2.) for adding "fresh blood" into small local bear populations which have no contact with other populations due to the absence of adequate natural corridors permitting gene flow to and from the population;
3.) releasing into the wild bears of rare and/or extinct species and subspecies, which could be bred in zoos.

The most essential prerequisites for the successful releases of orphan bear cubs can be summarised as follow:

- the orphan bear cubs which are accepted for raising should have a history of minimal human contact.
- the area in which they are living should be situated away from human habitation.

- the rearing procedure should be implemented following the set of rules, developed on the basis of our experiment (see Pazhetnov et al. 1999).

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References

Pazhetnov V.S. 1990. The brown bear. Agropromizdat. Moscow (rus)

Pazhetnov V.S., Pazhetnov C.V., Pazhetnova S.I. 1999. The technique for raising orphan-bear-cubs for the release in the wild. Tver. IFAW. (rus).

Zuirianov A.M. 1979. The presence of fertile although non-pregnant female bears in the reserve “Stolbi”. In: Ecological bases of protection and rational uses of carnivorous mammals. Abstr., Moscow, Nauka Publ. House, 221 – 222 (rus).

Captive Management of Orphaned Black Bears (*Ursus americanus)* Intended for Release at the Cochrane Ecological Institute in Canada: A Case Report

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Introduction

Two orphaned, female, sibling black bear cubs (*Ursus americanus)*, collected from the wild by Alberta Fish & Wildlife, were transferred to the Cochrane Ecological Institute (CEI) to be raised for eventual release into their original habitat in northern Alberta The cubs' dam was killed by a vehicle on the outskirts of the town of Edson, Alberta, in early April 1999. They were transferred to CEI approximately eight days after the death of their dam. On arrival at the CEI, the cubs were found to be dehydrated and malnourished and were kept under close scrutiny. The cubs spent 45 days indoors before being moved outside to a treed enclosure (60m x 30m). In August 1999, the cubs were introduced to a one-hectare square area of wooded natural forest in order for them to learn climbing and foraging skills in preparation for their eventual release. Wild browse, berries, fruit, nuts and road-killed wild ungulates were provided to the bears, in addition to dairy produce, alfalfa, sugar beet-pulp and grains. The bears hibernated over the winter of 1999/2000. Behavioural observations of the bears were made throughout 1999 and 2000 and captive management practices, including behavioural observations, remained consistent throughout 2000. Comparisons were made between documented studies of wild black bear foraging and exploratory behavioural activities and the foraging and exploratory behavioural activities of the orphaned cubs at the CEI. Within the limits imposed by the enclosure, the foraging and exploratory behaviour of the bears developed sufficiently for them to be released in the summer of 2001.

The Bears

On 18th April 1999, two sibling, female black bear cubs were collected from the side of the highway, near the city of Edson, Alberta, by officers of the Alberta Department of the Environment. The cubs' dam had been killed by a vehicle between eight and ten days prior to the collection of the cubs. Repeated calls from the public on sighting the

cubs along the edge of the road in the vicinity of their dead dam established that she had probably been killed around April 10,1999. The cubs were dehydrated and very thin. Cub A, Jemima, weighed 4.4 kg and cub B, Juneau, weighed 4.5 kg. Shortly after collecting the cubs, the Alberta Environment officers transferred them to the care of the CEI.

Facilities

The Cochrane Ecological Institute (CEI) facility consists of five buildings and 25 enclosures within 65 hectares of fenced natural prairie/montane habitat set at 1,330 m above sea level in the foothills of the Rocky Mountains. The CEI is a conservation research centre concentrating on captive breeding for re-introduction, wildlife rehabilitation and release and the development of non-intrusive wildlife survey methods. Although it is used as an educational resource, the CEI is not open to the public.

Indoors

Within the main CEI building is a small (3 x 5m) north-facing room, which is used for orphaned or sick wildlife in need of intensive care. There are windows on the outer wall that provide natural daylight whilst windows on the two interior walls permit the observation of animals without necessarily entering the area. Upon arrival at the CEI, the cubs were put into this small treatment room. A nest box (75 x 50 cm) containing a hot water bottle wrapped in bedding was provided along with a large tree trunk. Each animal was given 60cc of electrolytes by injection. Esbilac milk formula along with fruit, meat, and cereal were then offered in a bowl, which the cubs ate willingly. Daily observations of a minimum of two hours were undertaken by four observers from both inside and outside the room. The cubs did not evince any desire to interact with the observers, nor did they exhibit fear of them. The person taking care of the bears did not spend time observing them. The cubs were fed on an *ad-lib* basis, feed bowls were replenished when empty, and feed was removed and replaced if not eaten within two hours of presentation. The food offered consisted of Esbilac milk formula, indigenous grasses, meat (wild game), boiled mixed cereals, and seasonal fruit. The Esbilac formula, meat and fruit were the preferred foodstuffs of the bears.

Small enclosure

By June 2, 1999, an outdoor enclosure had been constructed for the bear cubs. This enclosure measured 60 x 30m and was constructed from a series of 2.75m high panels with three lines of electric fencing wire (900 volt, plastic and wire twist), which were

set at 50 cm intervals along the inside. Trees occurring near the fence were cut down and removed. This enclosure was well grassed with naturally occurring vegetation indigenous to the area and contained four spruce trees (*Picea glauca)* ranging in height from 5-10m, two 10-13m high aspen trees (*Populus tremuloides)* one large platform (3 x 3m, 2.7 m above ground), a metal bath measuring 2 x 1 m and a small wooden shelter (3.2 high by 3.2 m long) insulated by two straw bales. Both the aspen trees had 1m wide aluminium collars set approximately 3m above the ground in order to prevent the bears from climbing the trees and moving to adjacent aspens on the other side of the fence. Keepers entered this enclosure to feed the bears and provide them with large rotten logs to encourage exploratory foraging behaviour. At this point there was more than one person taking care of the bears.

Large enclosure

On August 17th, 1999 the outer panels of the small enclosure were removed allowing the bears access to a larger, one-hectare enclosure. This larger enclosure was heavily treed, 20% per cent of the trees in this enclosure were spruce and 60% were aspen, a variety of native mosses, shrubs, plants, and grasses typical of western prairie aspen bluff ecosystem occurred throughout. The southwestern fence line of this enclosure was exposed to an open area of aspens, overlooked by the CEI main building and the CEI animal health center. The closest building was 120 meter from the enclosure's southwestern fence line. The other three sides of the enclosure back on to spruce woodland in the north and mixed spruce and aspen on both the eastern and western sides.

This enclosure contained an 2,5 meter diameter igloo-like artificial "cave" constructed from rubber tyres topped with flax bales, and a large galvanized metal horse/cattle trough, and several large fallen trees. Since the enclosure had been used for other species in previous years, there were large piles of brushwood in the area and six telephone poles with vertical heights ranging between 4.5 and 7.5m. In addition, the trees that had been cut down along the interior of the perimeter fence were sawed into 60 cm lengths and stacked up. Perimeter fencing consisted of 2m high game fencing, surmounted by a further 1.2 m heavy gauge weld-mesh, with a 1.2m wide strip of heavy gauge weld-mesh running along the base of the perimeter fence with large stones placed on top along its length. The electric fence encircling the enclosure consisted of metal wire carrying 900 volts and was set at heights of 60, 120 and 150 cm. The smaller enclosure was contained within the larger enclosure.

Introduction to the small enclosure

The bears were introduced to the enclosure on June 4th, 1999 when it was considered that they had gained significant weight. By this time Bear A weighed 9.3 kg and Bear B weighed 10 kg. Initially they were unafraid and exploratory. Both cubs examined the enclosure and did not stray more than 30 cm apart from one another. The first contact with the electric fence by Bear A caused Bear B, who had not touched the fence, to climb a spruce tree. Bear A, who had touched the fence, barked, ran back, then advanced repeatedly to touch it again. Bear B (in the tree) barked and hummed whenever Bear A touched the fence and barked. Both bear cubs evinced fear. Bear A repeatedly touched the electric fence until, reaching a corner; she simultaneously got a shock on her nose from deliberate contact and another shock, accidentally, on her backside. This caused her to leap upward, clearing the first and second lines of electric wire, but getting shocked again by the third line of wire. She continued to climb the fence and had to be lifted down by a keeper. She was transferred to the same tree as that occupied by her sibling and both bears were observed for the next six hours. Neither bear attempted to touch the electric fence again. Keepers were then restricted to a maximum of two individuals (one full-time and one part-time). The time spent in the enclosure was only in order to feed the bears by scattering their food over an area near the enclosure entrance. Otherwise keepers did not travel any deeper into the enclosure.

Feeding and foraging

Both individuals spent time digging along the edge of the fence, turning over rocks and eating earthworms and grubs. Throughout their time in the small enclosure the bears were provided with rotten logs of various sizes and spent a considerable time examining and demolishing them. On average, a 4 m long poplar or aspen log of 20 cm diameter would be reduced to shards in 10 to 12 hours.

Throughout the early summer both cubs spent 40% of time observed up in the spruce trees. The cubs were seldom further than 1 meter apart while on the ground. They sat in the bath each time the water was changed (daily). The pair constantly dug and turned over the ground at the base of the trees in the enclosure and stripped the upper branches of the spruce trees. A peacock (*Pavo cristatus*) that had free range of the CEI, regularly flew into the bear's enclosure to feed on the remnant feed left by the bears. Throughout 1999, the bears exhibited fear of the bird and, when it spread its train, both bears would run away from it and climb up into the spruce trees. In the autumn of 2000, one, or both, of the bears killed and ate the peacock, although the circumstances of this incident went unobserved. The peacock's remains were found inside the bear enclosure.

Introduction to the large enclosure

Initially, the bears were reluctant to leave the area that formerly comprised the smaller enclosure. The pair exhibited extreme reluctance to cross the area from which the panels had been removed in order to give them this extra space. Food, milk, boiled grain, fruit, and meat were placed in full view of the bears in the newly opened enclosure. After two hours up one of the spruce trees, the bears cautiously explored the newly opened area before moving into the larger enclosure and approaching the food dishes. Throughout both bears stayed very close together, touching one another, when entering the new area. There appeared to be no observed loss of appetite despite this somewhat stressful situation. While exploring the new area, the cubs were never further than three feet apart. Bear A was always slightly in advance of Bear B, and the cubs frequently touched one another.

The cubs showed little desire to climb the aspens, while eagerly climbing both the spruce trees and the telegraph poles. Both bears were observed to climb all the spruce trees within the first two days of access. After four days the cubs no longer showed any interest in the telegraph poles, while after one week they began to use the largest spruce tree to sleep in.

When keepers entered the bear enclosure with food, or in order to refill the water tub, the bears would behave in a confidential and social fashion, readily coming over to the keeper to examine the food provided or to watch the water tub being filled and to get into it while the hose was running. If the keeper moved any logs, or removed debris from the enclosure, the bears would walk beside the keeper and examine the area where logs had been shifted or from which objects had been taken. Feeding and watering took place on a daily basis, cleaning took place about three times per week but decreased to twice a month in the second year.

Feeding and foraging

As the weather became colder in the autumn, fewer fruit and vegetables were used in the bears' food and a greater percentage of boiled grain (oats/barley/linseed), milk, meat or fish, sugar beet pulp, and nuts were provided. The keepers, sometimes in or under logs, spread the food all over the enclosure. The bears would carry the meat or fish off, but eat the other foodstuffs on the spot. A mix consisting of boiled grain, sugar beet pulp and milk was fed in containers near the "cave". The bears frequently moved the container, up ending it and spreading it out, or carrying it off. The bears did not appear to like the boiled grain and beet pulp, choosing instead to spread these items on the ground. Preference was given to root vegetables, meat or fish, and nuts. From October

1st, 1999, food provided to the bears was reduced daily until November 15th, 1999, when no further food was provided. By December 16th, 1999 the bears had entered the igloo-like "cave" and closed the entrance with a flax bale, which they pulled in behind them.

Hibernation

Daily inspections were undertaken in the bear enclosure to check if the bears reappeared. No sign of their exit was noted until March 16th, 2000. They did not appear to have lost weight. Bear A's coat was compressed and worn on the left rear and Bear B's across the rear. Both bears showed considerable fear of their keeper and ran off to climb the large spruce that they had utilised the year before. This avoidance behaviour is similar to that reported by Pazethnov (2005) for European brown bears. The bears were fed fish/ meat, soaked alfalfa cubes, sugar beet pulp and boiled grain. The fish and meat were consumed but other food items were spread on the ground. The bears were not observed to enter the "cave" again, but spent considerable time on top of it, ripping the bales apart or dragging the bales off to a distance of approximately 3m from the "cave". The interior of the moved bales, in some cases, was still frozen. Both bears appeared to recognize the electric fence wire and avoided contact.

Behavioural changes after hibernation

Within 15 days of the bears' emergence, the aspen buds in the enclosure had started to swell. From April to mid May, the bears spent an observed average of six hours up in the top of the aspens, feeding on the buds and breaking off branches. Their foraging behaviour on the ground became more marked as they removed large stones from beneath the perimeter electric fence, ripped apart rotten aspen logs and debarked sections of older trees in the enclosure. Fresh browse was provided in the form of willow (*Salix* sp.), birch (*Betula* sp.) and rosebay willow herb (*Epilobium angustifolium*). Initial interest was shown in the browse by turning it over and eating flowers or buds, however, interest was lost within thirty minutes of the initial presentation.

When the keeper entered the bear's enclosure to fill their water tub or to provide food, the animals would remain in the trees, or if on the ground, run from the keeper and climb a tree. They would not approach the food or water until the keeper had left the enclosure.

Over a total of 51 observation hours in 14 days, no consistent activity pattern was discerned in the bear's behaviour. The bears were consistent only in sleeping in either one of the two spruce trees in the enclosure. One spruce was set in a group of 4 spruce

trees on the northern edge of the enclosure and the other spruce was among a grove of 8 spruce trees on the east side of the enclosure. Observations of the bears were reduced to daily notes by the keeper. Weekly observations, ranging in time from 4 to 8 hours at a stretch, were undertaken by an undergraduate student who the bears were not familiar with as she never entered their enclosure. Over a four-hour period the bears would spend two hours foraging, often play fighting whilst doing so and the remainder sleeping up in a tree. In general, both bears were active at the same times over the course of the observations.

Road killed ungulates were dragged into the enclosure and left in the more exposed southwestern section. If the animal were a mule deer (*Odocoileus hemionus*) or white-tailed deer (*O. virginianus*) the bears would drag the carcass off into the northern sector of the enclosure in a co-operative manner. When provided with a four-year-old male moose (*Alces alces)* carcass, the bears were unable to move it. In this case, they tried to cover it with a 2.2 x 2.2 x 3m plywood A-Frame. Several hours were spent trying to maneuver the A-frame over the moose carcass. They were not observed to leave the vicinity of the carcass for two days. Both bears would gorge on ungulate carcasses until their bellies were noticeably distended. When provided with a porcupine carcass, however the bears showed no interest.

Conclusion

The behaviour of this pair of orphaned black bear cubs, which were raised under captive conditions in a large natural enclosure developed in a manner which led us to believe that their foraging and climbing skills had developed sufficiently to enable them to survive in the wild. The first winter hibernation period appeared to be a behavioural watershed. The 1 m. wide aluminum collars on the aspen trees in the small enclosure appeared to have instilled a reluctance to climb aspens in the bears during their first year, whereas this reluctance was no longer in evidence after hibernation. Both bears continued to recognise electric fencing as dangerous before and after hibernation. Both of these bears showed a distinct wariness of their keepers after hibernation, appearing to indicate that they had gained a level of independence in stark contrast to the confidentiality of their first year. The two bears were released and their progress monitored by radio telemetry. No nuisance bears were reported in the areas surrounding the release site in 2003 or 2004. However, neither bear was relocated in spring 2004 – this may have been due to ear tag transmitters not reactivating after hibernation (Waters, 2003). This is a common occurrence with ear tag transmitters (D. Carney, pers. comm.)

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References

Pazethnov, V.S. and Pazhetnov, S.V. 2005: Re-introduction of Orphan Brown Bear Cubs. In L. Kolter and J.J. Van Dijk (eds.): Rehabilitation and release of bears. Zoologischer Garten Köln, 53-61

Waters, S. S. 2003. The rehabilitation and release of two black bears, Alberta, Canada. Int. Bear News, 12:20-21.

Potential Contributions of Zoos to Bear Conservation

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Introduction

Zoos can contribute to species conservation in four major fields: conservation education, transfer of know-how, research, and propagation of captive populations as "reserve populations" with the option of re-introducing captive-bred individuals to the wild. The conservation relevance of each of these fields differs between species and has to be assessed and outlined for each taxon separately. In the following chapters the potential of each field for bear conservation will be evaluated and outlined.

1. Conservation Education

In 2003, 125 million visitors were counted in 289 member institutions of the European Zoo Association (EAZA 2004). AZA's (American Zoo Association) website reports 134 million visitors. Main visitor groups are school classes and young families with children of up to 12-13 years of age., These are the age groups most open to new impressions and the adoption of new attitudes. Thus, there is a huge potential to transmit conservation messages to a broad audience. Attractively presented information should generate interest and curiosity, particularly when it relates to bears in a stimulating environment where they are, by their outer appearance and behaviour, convincing ambassadors for their wild conspecifics (Kolter 1994).

Attractive presentation of information

The topics of classical zoo education - the morphology, biology and behaviour of exotic animals - are increasingly supplemented by those on conservation education – species ecology, threats to species survival and habitats and consequences for protection. To transfer information and messages, interest must first be raised by stimulating curiosity or by releasing the so-called AHA effect as exemplified by Walzer and Slotta (2005).

The audience reached and the effectiveness of the information transfer differs quantitatively and qualitatively according to the method used. Direct communication in the question-answer mode during guided tours seems to make the most impression and

be long-lasting in its effects, but this method reaches only a small proportion of visitors. The audience can be increased by directly addressing visitors by booths equipped with "eye-catchers" and placed in front of an enclosure (Schiedges 1992). From a confiscated fur - on loan from conservation authorities - concern for the threats of poaching can be raised and the visitor's own responsibility as a tourist can be addressed. A bear skull in combination with bear food or a foraging bear in the enclosure is a good way to talk about the nutritional constraints of an omnivorous carnivore and its consequences for spatial and habitat requirements in the wild. Still the outreach of such an approach is limited. Among others it depends on the visitors' willingness to become involved and to interact. Whereas exhibit signs are an offer to every visitor. For example exhibit signs are available to every visitor, but nowadays they will only be appreciated if the signs are designed in an appealing way. The conventional, relatively small signs with lots of text in small letters are now changed into optically more attractive tables with headlines, drawings and photos which make the visitor eager to read the information (Dieckmann and Wolters 2001). For example, the new educational concept of Cologne aims at conveying ideas of Agenda 21 with the species as ambassadors. The information is not restricted to listings of threats and their consequences for the animals, it includes the classical information on species biology and also provides suggestions on how to contribute to sustainability and species conservation by changing one's own behaviour and re-considering attitudes. In the case of brown bears our ambiguous view on the species is demonstrated by calling for a "new bear cult" in Germany. The cuddly Teddy bear and all its accompanying requisites, which are generally welcome and appreciated in our society, are presented and the question is raised whether we would also accept wild brown bears and other large predators coming from the South and the East resettling the forested and alpine regions of Germany? (Dieckmann 2002, Dieckmann and Wolters 2001). This topic was worked out in detail as a "bear project for schools" by including different disciplines (biology, literature, art etc.) for projects lasting several days and used for classes of different levels with pupils' active involvement (Schiedges 2003). In general, children can be activated and involved when offered games and trails for young "bear researchers" (Walzer and Slotta 2005), and also by allowing them to prepare enrichment devices and watch the effects of these devices on the bears' behaviour.

In general conservation education in zoos intends to raise awareness about a species and the problems it faces, to initiate a process of re-considering own attitudes and behaviour and to encourage visitors and sponsors to support *in situ* conservation projects financially. Links between field projects and zoos are nowadays widely established in Europe and North America. Just the "flagship" species used as vehicle for the

conservation activities differ. The approach is always the same: use certain attractive species in order to raise public awareness for the support of conservation activities for the species and its habitat/ecosystem. This may be run at the level of an individual zoo, e.g. Cologne zoo supported an education campaign run by within the sun bear project of Gabriella Fredricksson (2005) and the first training workshop for the established spectacled bear project in Chaparri, Peru (Peyton and Plenge 2005, Kolter 2002). Meanwhile the support for the latter project was extended to the level of the European Breeding Programme (EEP) for the spectacled bear. Several EEP participants adopted a captive bear and thus help to maintain the enclosure at Chaparri which is the starting point for further bear related conservation work in the area and which serves as a public attraction and ambassador of the project.

Attractive presentation of bears as ambassadors for their wild conspecifics

Several features make bears per se appealing to the public. These are their ability to stand bipedally when exploring the environment but also their large size in combination with a woolly coat and apparently phlegmatic movements. To generate interest in the species, which goes beyond the first impression of a "cute animal" bears have to be kept in environments which stimulate a variety of species specific behaviours and activity budgets close to those in the wild. Tiny and bare enclosures are definitely not stimulating either for public nor for the bears. They cause feelings of pity and compassion for the enclosed animal and contribute considerably to the development of stereotypic behaviours (Ames 2000**,** Keulen-Kromhout 1978).

Bears are opportunistic feeders, who forage for about 50% percent of the day when not in hibernation (e.g. Clevenger et al. 1990, Joshi et al. 1995, Roth 1983, Schaller et al.1989). When searching for food they walk considerable distances every day, digging for roots in the ground and in rotting wood for insects and processing larger pieces into edible units with the aid of their claws, jaws and teeth. By widely scattering small food items and by hiding larger ones, captive bears are successfully stimulated to perform natural behaviours for prolonged periods of time and to decrease the percentage of stereotypic behaviours (Ames 1994, Fischbacher and Schmid 1999, Forthman et al. 1992, Kolter and Zander 1995, Langenhorst 1997, 1998). This effect is enhanced, if elements of unpredictability are included in the enrichment schedule (Schneider in prep.) It is evident that large enclosures with natural substrates and vegetation as described by Larsson (1994) are more stimulating (Grandia et al. 2001, Koene 1996) and offer more opportunities for enrichment than small bare ones. Additionally the probability of the occurrence of stereotypic behaviour decreases (Gallagher 1995, Steffen 1999). According to a recent check for the second edition of the EEP Ursid

Husbandry Guidelines the number of exemplary, naturalistic bear enclosures in Europe increased by almost 50% from 25 in 1998 to 37 at the end of 2003. Not all zoos, in particular in less developed countries, are able to build new large enclosures. Nevertheless, even old enclosures of over several hundred square meters can be considerably improved by adding wooden climbing frames and natural substrates which might even promote plant growth. Grizzly bears, sun bears, Asiatic, black and spectacled bears have been using grasses, herbs, elderberries and rose buds growing in their enclosures at Cologne zoo for the last 10 years. In 1994, a 20 - 30 cm thick layer of bark litter and soil was put on top of the concrete, a grass mixture was sown and the birds – attracted by the scatter feeds – dispersed various seeds from their droppings in each bear enclosure leading to the varied plantlife.

2. Transfer of know-how

In the last decades zoo biology has developed and diversified rapidly. Accumulated knowledge and improved techniques have raised the standards in fields like wild animal husbandry, population management, record keeping, wildlife medicine and conservation education as well as research in zoos of the wealthy regions of the Western world. The necessity to transfer this know-how to zoos and rescue facilities in less developed countries particularly to those in the developing world is emphasized by Waugh and Wemmer (1994). In these regions, biodiversity is often higher, but the threats to natural habitat and wildlife greater and thus the need to support conservation also via captive facilities is most urgent. In the case of ursids the example of the Chaparri project described by Peyton (2005) shows that bear keeping facilities might be a good starting point for conservation activities at the local level in range countries. The positive effects of a few well kept and presented captive spectacled bears obviously promoted considerable conservation efforts at the local level. They resulted in the declaration of 34 000 ha of dry forest as a private reserve owned and administrated by the community.
In many countries local zoos or rescue centres are obliged to take confiscated animals often without having appropriate facilities or sufficient knowledge to keep the species. Habitat fragmentation and loss due to human activities as well as poaching cause not only a decline of populations of wild species but also produce increasing numbers of "homeless" confiscated wild animals. This applies also to ursids, and is exemplified by sun bears (Fredricksson, 2005). There seems to be a tendency towards growing numbers of confiscated wild bears in less developed countries. This cannot yet be substantiated by hard data. It is inferred from the increasing number of requests in all fields of bear husbandry the EAZA bear TAG received from individuals and/or organisations working in developing countries. The information provided ranged from instructions on

construction and structuring of enclosures, on daily management, on grouping and methods of introducing new bears to each other, to advice concerning control of reproduction, immobilisation and transport as well as treatment of diseases.

Currently facilities for confiscated bears in range countries are run mostly by persons from Western countries. In order to get locals more involved in the field of bear conservation and husbandry, especially those in responsible positions, offering appropriate training opportunities for all levels from keeper/warden to the management/decision maker level is crucial. Training approaches which differ with respect to training sites are outlined by Waugh and Wemmer (1994). Training courses on the above mentioned topics of zoo biology are offered either at a Western zoo facility or at a zoo in a developing country. In the first case, trainees at all levels of management but from different countries can be reached and made acquainted with the topics, current techniques and results of captive animal husbandry and management. In the second case, all levels of the staff from a captive facility or facilities in one region can be addressed and instructed on the same contents, but the techniques have to be adapted to the local conditions such as availability of materials, structures, food, drugs etc. as well as organisation, logistics, and the mentality and educational levels of the trainees. This requires willingness to develop alternatives and creativity to find solutions to the problems at the pit-face in cooperation with the locals. Thus it is a process of mutual teaching and learning – for the trainees and the instructors (Waugh and Wemmer 1994). The second case is of course more restricted and concerns geographic outreach, but it has some other advantages. Apart from the potential effect of raising self-confidence when being actively involved in the process of problem solving under difficult conditions, such a training course can bring together all staff members from management to keeper level as well as decision makers from different authorities. It can promote information exchange, raise awareness for each other's situation and sensitize to the difficulties in implementing regulations and orders on the practical level. A good example of this process was the first training workshop at the field station in the Chaparri Reserve in Peru near the enclosure for confiscated spectacled bears (project description see Peyton and Plenge 2005). It brought together community members, decision makers as well as local farmers and hunters, with officials of the local and national Peruvian authorities and experts from abroad, representing different fields of captive and wild animal management and conservation. Its aims were to train and recruit future wardens and field assistants. Lectures on basic wildlife and zoo biology of bears and other wildlife occurring in the Northern Peruvian dry forest alternated with demonstrations and training sessions on captive management and field research and ended in lively discussions and information exchange on legal aspects, management and research needs for the reserve and the captive animals (Kolter

2002, Peyton 2002). Several months later the reserve donated by the local community was officially acknowledged by the Peruvian Authority for Nature Conservation.

The final goal of any training, whereever it takes place, should be to enable the trainees to act as trainers (multipliers) on their level (keeper/warden/forester/curator/director) in their country. For example, a first project on the student level was started in spring 2004 in the Chaparri reserve. One Peruvian and one German student worked together on a behavioural study on the behaviour and enclosure use of the confiscated bears.

In the case of rescue facilities, in particular if they are close to the natural habitat, the establishment of education centres would provide an infrastructure, where not only visitors but also both wildlife and captive animal management can be instructed. “Close to the problem facilities” might favour the exchange of know-how and experience and stimulate the creation of solutions appropriate to that specific region.

3. Research

Zoos as well as rescue facilities should contribute more intense and decisive to conservation related research. It might range from the collection and analyses of data on basic biological questions over the validation of methods for field studies to the performance of well-designed projects on aspects of behaviour and nutrition, which are not easily studied in wild bears. There are several ways in which zoos can contribute to conservation relevant research by using their captive populations **(**Kolter et al. 2001). Just a few examples are listed below.

It has to be emphasised that, depending on the research question, collaborative efforts might be necessary to achieve sufficiently large sample sizes to yield useful, representative results. Consequently some research projects might require the collaborative efforts of several facilities and coordination of activities to guarantee the application of valid methods and the collection of replicable data. Whoever initiates a research project, it is always advisable to contact the studbook keeper or species coordinator prior to a study which will extend over several zoos/facilities.

Box 1: Contributions of zoos to conservation relevant research: a selection

Opportunistic collection of measures and material

- To solve questions on taxonomy, anatomy/pathology, genetics, toxicology, nutrition, reproduction (e.g. Lengwinat et al. 2001);
- To validate the results of non-invasive methods, like ultrasound examination to assess the health or reproductive status of animals (e.g. Göritz et al.1997)

Systematic data recording

- Collection of mating dates to solve basic questions on reproduction like species specific duration and time of breeding season, variability of inter-oestrus intervals and of gestation length;
- Monitoring of body weights of different age and reproductive classes of a particular species to examine the effect of season, age and reproduction

Validation of field relevant methods

- By collection of different materials which might yield information on the hormonal status of bears (e.g. Knauf et al. 2003)
- By faecal monitoring of captive individuals of known reproductive status in order to interpret levels of faecal hormones in wild bears (Schwarzenberger et al. 2004)
- By faecal monitoring of corticosteroids under defined conditions in order to determine baselines and stress indicator values
- By determining the potential of different tissues for species identification (to detect illegal trade in parts of animals of CITES I species)
- By testing the validity and replicability of radio telemetry (Schoettler and Brunberg 2004; Walzer and Slotta, 2005)

Test of drugs (Walzer and Slotta, 2005)

Comparative behavioural studies

- Effect of crowding on resource use, social interactions and corticosteroids
- Mother-cub interactions in the den via hidden camera
- Behavioural ontogeny (Pazethnov, 2005)
- Sexual behaviour
- Aspects of training and aversive learning behaviour (Walzer and Slotta, 2005)

Nutritional studies

- Gut passage rates to understand the bears' role as seed dispersers
- Digestibility of food of different quality
- Estimation of nutritional needs
- The effect of food quality and quantity on weight and reproductive/life history aspects like sexual maturity, litter size and inter-birth intervals etc.

4. Considerations on the release of captive born bears for bear conservation

The authors of the re-introduction guidelines already warn that potentially dangerous captive bred animals might become a danger to local inhabitants or their livestock, when re-introduced (IUCN 1998, see appendix VII). Even wild born bears might cause these problems and subsequently generate negative attitudes towards bears and their conservation. It can be assumed that the risk is even higher for bears which come into positive contact to humans at very early ages. Several bear releases have actually ended in failure because the animals became problem bears (Clark et al. 2002). For other releases of brown and American black bears long-term data is lacking which would allow the assessment of the conservation value of these measures.

According to the considerations by Huber (2005) on behavioural ontogeny and learning behaviour and by van Dijk (2005) population dynamic releases of bears either captive or wild born have considerable potential risks for the existing population. In addition to these arguments, there are more reasons to refrain from the release of captive born bears. These are outlined below.

No immediate need for conservation relevant releases of captive bears.

Many regions where bears have become extinct in the last few hundred years no longer have large, undisturbed habitats which might be suitable for bears. Regions recently depleted of bears which still have intact, largely unfragmented "bear" habitat around, might be resettled by natural dispersion and migration provided appropriate conservation measures to protect the source population are established as in the case of brown bears in Sweden (Swenson et al. 1999). Small populations which are separate from adjoining larger populations, with a low probability of immigration sufficient to maintain genetic diversity reduce the risk of inbreeding, are preferably re-enforced by translocation from non-threatened source populations with similar genetic characteristics living in comparable habitats (IUCN 1998, see appendix VI). The results of restorations or re-introductions by translocations are summarised by Clark et al. (2002). When aspects such as age and season are considered, translocations of wild bears seem to be a promising tool for conservation. It can be assumed that they require lower numbers of released individuals than releases of captive born animals. Increased behavioural variation under relaxed selective pressures in captivity probably results in lower survival rates under natural conditions which have to be outweighed by higher numbers of released individuals (McPhee, M.E. and Silverman E.D. 2004). Higher numbers of bears would also mean higher financial impact for appropriate long term post-release monitoring to control the conservation relevant results, which should be an obligatory and integral part of release projects (IUCN 1998, see appendix VI).

Insufficient genetic quality of captive bear populations.

For re-introductions and even more for supplementation of populations it is crucial to take animals "which are genetically closely related to the original native stock and show similar ecological characteristics (morphology, physiology, behaviour, habitat preference) to the original sub-population" (IUCN 1998, see appendix VII). Genetic analyses to identify "evolutionary significant units" (ESU), which are considered to be the basic units for conservation, have only recently been initated for quite well studied bear species in Europe and America and there is no information at all for the less well studied species from other regions (Waits et al. 1999). To be on the safe side, source animals for releases from captive stock have to be restricted to individuals of known geographic origin most preferably from regions near or in the release area. However, very often, ancestors of captive stock can be traced back at best to a country not to a region within that country. In terms of costs and logistics, it would in general make sense, that captive animals for re-introduction and re-enforcement are bred in zoos of range countries. This applies even more when considering the potential to raise public awareness for conservations issues.

Just looking at EAZA studbooks and at brown bears (*U.arctos*) and Asiatic black bears (*U. thibetanus*) species naturally occurring in countries belonging to EAZA reveals that currently there is a relatively large pool of animals of unknown origin. According to the latest studbook analyses (Kok 2004) only about 40% of the brown bears kept in EAZA zoos are of known geographic origin and only 48% of the Asiatic black bears (Nikitina 2003). These animals or their ancestors mainly originate from regions in Scandinavia and Russia, where the wild bear populations are considered not to be at immediate risk. This is different for the tropical bear species, sun bears, sloth bears and spectacled bears. These species might soon face considerable risk of extinction at least on the population level due to rapid habitat loss. The only global data for a bear species is that available in the International Studbook for the spectacled bear (Rosenthal 2003). Most of the recently wild caught confiscated spectacled bears can at best be traced back to the level of country of origin. The first genetic study of wild spectacled bears provides evidence that there are at least three units which differ in their genetic make up (Ruiz-Garcia, unpubl. manuskript). According to Goldstein (pers. comm.) the differentiation might be even more fine-scaled than that supported by this first study. Thus, it may be necessary to have information on the origin of captive animals broken down to the regional level in case releases are considered. It is unrealistic to get this information post hoc. Currently the risk of releasing captive bred animals of the tropical species is relatively low as breeding success in captive facilities in spectacled bear range countries is still low (Rosenthal 2003).

Insufficient knowledge on species specific behavioural ontogeny

Even if the rearing method applied by Pazethnov (2005) could be proven successful by systematic long term monitoring, we are still lacking crucial species-specific data on the position and duration of those periods, which are considered sensible for release projects. In particular, questions on the onset of imprinting-like processes as following reaction/fear reaction toward humans have to be answered as well as how long the time windows for these developmental processes last in each species. The development of foraging patterns which enable the animals to survive in the wild is another field which might differ between species and needs closer examination by well designed studies.

Another consequence of the results of Pazethnov's studies is almost impossible to be realised under normal zoo conditions and routines: the restriction of contact between humans and bear cubs to just one person or its prevention by particularly designed keeping facilities. Stimulation of natural foraging patterns is another problem, which is not easily solved under zoo conditions.

Conclusions

Provision of bears for release is not advisable by zoos, particularly not with the current state of knowledge. Zoos' potential for the support of bear conservation is in the field of conservation education by raising awareness. Raising funds for *in situ* conservation of the species and protection of their habitats is another "expanding field" in zoos of the developed world. Efforts to transfer know how on zoo biology to bear keeping facilities in developing countries should be intensified. One goal should be that zoos in underdeveloped parts of the world are enabled to propagate their bears, which are frequently confiscated wild-caught animals, in a such a way that the bears are able to act as ambassadors and flagship species for their threatened habitats.

References

Ames, A. 1994. Object manipulation in captive polar bears. Int. Conf. Res. and Mange.,9: 443-449.

Ames, A. 2000. The Management and Behaviour of Captive Polar Bears. PhD Thesis, Open University, Milton Keynes, UK,116 pp

AZA website: www.aza.org

Clark, J.D., Huber, D. and Servheen, C. 2002. Bear Reintroduction: Lessons and Challenges. Ursus, 13: 335-345

Clevenger, A., Purroy, F.J. and Pelton, M.R. 1990. Movement and activity patterns of a European brown bear in the Cantabrian Mountains, Spain.Int.Conf.Bear Res.and Manage., 8: 205–211

Dieckmann, R. 2002. Tiere verstehen – Wie sag ich's dem Besucher. Z. Kölner Zoo, 45: 81-84

Dieckmann, R. and Wolters, J. 2001. Tiere als Botschafter der Agenda 21. Der Kölner Zoo richtet ein Umweltinformationssystem ein. Z. Kölner Zoo, 44: 159-174.

Dijk, J.J. van 2005: Considerations for the Rehabilitation and Release of Bears into the Wild. In L. Kolter and J.J. Van Dijk (eds.): Rehabilitation and release of bears. Zoologischer Garten Köln, 7-16

EAZA 2004. EAZA Statistics as of January 2004. EAZA News, 45, p. 5

Fischbacher, M. and Schmid, H.1999. Feeding enrichment and stereotypic behaviour in spectacled bears. Zoo Biology, 18: 363–371

Forthman, D.L., Elder, S.D., Bakeman, R., Kurkowski, T.W., Noble, C.C. and Winslow, S.W. 1992. Effects of Feeding Enrichment on Behavior of Three Species of Captive Bears. Zoo Biology, 11: 187-195.

Fredriksson, G. 2005: Conservation Threats Facing Sun bears, *Helarctos malayanus*, in Indonesia and Experiences with Sun Bear Re-introductions in East Kalimantan, Indonesia. In L. Kolter and J.J. Van Dijk (eds.): Rehabilitation and release of bears. Zoologischer Garten Köln, 35-42

Gallagher, M. 1995. The Asiatic Black Bear in Captivity. Master Thesis, Glasgow University, 72 pp

Göritz, F. ; Hildebrandt, T.B.; Jewgenow, K.; Wagner, N.; Hermes, R.; Trauss, G. and Myer, H.H.D. 1997. Transrectal ultrasonographic examination of the female urogenital tract in nonpregnant and pregnant captive bears (*Ursidae*). J.Reprod. Fert. 51: 303-312

Grandia, P.A. , J.J. van Dijk and P. Koene 2001. Stimulating Natural Behaviours in Captive Bears. Ursus: 12, 199-202

Huber, D. 2005. Why not to Re-introduce "Rehabilitated" Brown Bears to the Wild? In L. Kolter and J.J. Van Dijk (eds.): Rehabilitation and release. Zoologischer Garten Köln, 28-34

Joshi, A.R., Garshelis D.L. and Smith, J.D. 1995. Home ranges of sloth bears in Nepal: Implications for conservation. J. Wildl. Manage. 59: 204-214

IUCN 1998. Guidelines for Re-introductions. Prepared by the IUCN/SSC Re-introduction Specialist Group, approved by the 41st Meeting of the IUCN Council, Gland Switzerland, May 1995; publisher IUCN, Gland, Switzerland and Cambridge, UK, 10 pp [appendix VII]

Keulen-Kromhout, G. van 1978. Zoo enclosures for bears Ursidae: Their influence on captive behaviour and reproduction. Int. Zoo Yb. 18:177-186

Koene 1996. Bear Behaviour in Large Enclosures. In Koene, P. (ed): Large Bear Enclosures. An International Workshop on Captive Bear Management, Ouwehands Zoo, Rhenen, The Netherlands, June 18-20,1995, 43-50

Kolter, L. 1994. The brown bear as a flagship species for wildlife conservation and consequences for its presentation in captivity. In: G.M. Dorrestein and M.M. Kahraman (eds.): Proceedings of the International Conference on Aspects of Bear Conservation, Bursa, Turkey, 65 - 71

Kolter, L. 2002. Bären im Zoo und im Freiland unter die Lupe genommen – das Brillenbären Projekt in Chaparri. Zeitschrift des Kölner Zoo, 45: 61-66 [engl. version available]

Kolter, L., Kaumanns, W. and Herrmann, H.W. 2001. Forschung im Zoologischen Garten Köln, Z. Kölner Zoo, 44: 83-96

Kolter, L and Zander, R. 1997. Potential and limitations of environmental enrichment in managing behavioural problems of polar bears. Proceedings 2nd Conf. Environm. Enrichm., Copenhagen, 131-140

Knauf, T., Jewgenow, K., Dehnhard, M., Hildebrandt, T.B., Kolter, L., Rietschel, W., Ochs, A., Göritz, F. 2003. Comparative Investigations on Reproduction Biology in Different Bear Species – Anatomical, Ultrasonographic and Endocrine Investigations. Verh.ber. Erkrg. Zootiere, 41: 287 - 296

Kok, J. (2004): European Studbook for Brown Bears. 3rd Edition, Rhenen

Langenhorst, T. 1997. Auswirkungen eines Behavioural-Enrichment-Programms auf das stereotype Verhalten von Braunbären (*Ursus arctos*). D Zool. Garten (NF) 67: 341-354.

Langenhorst, T. 1998. Das Verhaltensrepertoire einer Braunbärengruppe (Ursus arctos) mit Behavioural-Enrichment im Tiergarten Hellbrunn/Salzburg. D Zool. Garten (NF) 68: 167-186.

Larsson, H.O. 1994. Management of brown bears in large enclosures. In: G.M. Dorrestein and M.M. Kahraman eds., Proceedings of the International Conference on Aspects of Bear Conservation, Bursa, Turkey, 43-54

Lengwinat, T.; Quest, M.; Göritz, F. ; Tscherner, W. and Kolter, L. 2001. Zur Embryonalruhe des Brillenbären (*Tremarctos ornatus,* Cuvier, 1825). Zool. Garten, N.F. 71: 137-146

McPhee, M.E. and Silverman E.D. 2004. Increased Behavioural Variation and the Calculation of Release Numbers for Reintroduction Programs. Cons. Biol., 18: 705-715

Nikitina, A. 2003. European Studbook for the Ussuri Black Bear (*Ursus thibetanus ussuricus*). Kyiv Zoological Park. 32 pp.

Pazethnov, V.S. and Pazhetnov, S.V. 2005: Re-introduction of Orphan Brown Bear Cubs. In L. Kolter and J.J. Van Dijk (eds.): Rehabilitation and release of bears. Zoologischer Garten Köln, 53-61

Peyton, B. 2002. Peru Workshop and Grassroots Success. International Bear News 11, (1), 15-17

Peyton, B. and Plenge, H. 2005. Captive Spectacled Bears, Conservation, and Community Development in Peru. In L. Kolter and J.J. Van Dijk (eds.): Rehabilitation and release of bears. Zoologischer Garten Köln, 43-52

Rauer, G. 1999. Brown Bear Conservation Action Plan for Europe (*Ursus arctos*): Austria. In C. Servheen, S. Herrero and B. Peyton (compilers): Bears. Status Survey and Conservation Action Plan. IUCN/SSC Bear and Polar Bear Specialist Groups. IUCN, Gland, Switzerland and Cambrigde, UK, 56-58

Roth, H.U. 1983. Diel activity of a remnant population of European brown bears. Int.Conf.Bear Res.and Manage., 5: 223 – 229

Rosenthal, M. 2003. International Studbook for the Andean Bear (*Tremarctos ornatus*) 2000 – 2002. Lincoln Park Zoo, Chicago, 365 pp.

Schaller, G.B.; Tang Qitao; Johnson, K.G.; Wang Xiaoming; Shen Heming and Hu Jinchu 1989. Feeding ecology of giant pandas and Asiatic black bears. In Gittleman, J.L. (ed): Carnivore behaviour, ecology and evolution. London, Chapman and Hall, 212-241

Schiedges, I. 1992. "Zoo-Mobile" – Pilotprojekt zur Besucherpädagogik Erste Erkenntnisse und Erfahrungen. Z. Kölner Zoo, 35: 29-31

Schiedges, I. 2003. Bärenkult und Bärentod – ein fachübergreifendes Unterrichtsvorhaben in Schule und Zoo.Praxis der Naturwissenschaften- Biologie in der Schule, 53 (3), 19-23.

Schöttler, A. and Brunberg, S. 2004. Testing methods used in activity studies. Abstracts of the 15.International Conference on Bear Research and Mangement, Feb. 8 – 13, 2004, San Diego, California, USA, 41.

Schwarzenberger, F., Fredriksson, G., Schaller, K. and Kolter, L. 2004. Fecal steroid analysis for monitoring reproduction in the sun bear (*Helarctos malayanus*). Theriogenology, 62: 1677-1692

Schneider, M. and Kolter, L. in prep.: Implementing unpredictability in feeding enrichment for sun bears (*Helarctos malayanus*)

Swenson, J.E., Sandegren, F.,; Bjärvall, A., Franzen, R., Söderberg, A. and Wabakken, P. 1999. Brown Bear Conservation Action Plan for Europe (*Ursus arctos*): Sweden. In C. Servheen, S. Herrero and B. Peyton (compilers): Bears. Status Survey and Conservation Action Plan. IUCN/SSC Bear and Polar Bear Specialist Groups. IUCN, Gland, Switzerland and Cambrigde, UK. 111-113

Steffen, M. 1999. Effekt von Gehegegröße und Enrichment auf Aktivität und Sozialverhalten von Brillenbären (*Tremarctos ornatus*). Staatsexamensarbeit, Universität Köln, 220pp

Waits, L. Paetkau, D. and Storbeck, C. 1999. Genetics of Bears of the Wolrd. In C. Servheen, S. Herrero and B. Peyton (compilers): Bears. Status Survey and Conservation Action Plan. IUCN/SSC Bear and Polar Bear Specialist Groups. IUCN, Gland, Switzerland and Cambrigde, UK. 25-32

Walzer, C. , Slotta-Bachmayr, L., Rauer, G. and Kaczensky, P. 2005. Support for In-Situ Projects – Examples of a Zoo's Potential Role. In L. Kolter and J.J. Van Dijk (eds.): Rehabilitation and release of bears. Zoologischer Garten Köln, 83-88

Waugh, D.R. and Wemmer, C. 1994. Training in zoo biology: Two approaches to enhance the conservation role of zoos in the tropics. In: Creative Consevation, Interactive Management od Wild and Captive Animals. Loney, P.J.s.; Mace, G.M. and Feistner, A.T.C. (Eds). Chapman and Hall, London, 207-240

Support for *in-situ* Projects – Examples of a Zoo's Potential Role

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Introduction

Zoos can provide invaluable support in solving scientific problems arising within field projects. Additionally, they can support these in-situ projects in various educational aspects. With its animal collections, on the one hand, and its scientific staff on the other, the modern zoo today provides the ideal prerequisites to solve some of the queries that arise in the wild because captivity provide more or less controlled conditions. Whereas this imposes certain limitations to ethological and ecological studies it is helpful in approaching veterinary-medical and technical solutions.
This abstract gives an overview of the support offered by the Salzburg Zoo in Austria to in-situ brown bear (*Ursus arctos*) projects in both Austria and Slovenia.

Development of novel anaesthetic protocols

Various chemical combinations have been used to anaesthetise brown bears, including xylazine - ketamine, ethorphine – acepromazine, medetomidine - ketamine and tiletamine-zolazepam. In a captive situation, especially in German speaking areas, the use of xylazine – ketamine (Hellabrunner mix) and ethorphine – acepromazine (Large Animal Immobilon®) is very popular. In free-ranging situations, driven by the countless procedures carried out every year, in North America the drug of choice has become a combination of tiletamine – zolazepam (Zoletil®). In the initial phases of the brown bear project in Slovenia and the reintroduction and subsequent management of brown bears in Austria - this combination was used successfully . One major disadvantage of this combination is the very long duration of action – the animal can sleep for up to 3 to 4 hours following the procedure. While this is not a particular problem in captivity it can cause a problem *in-situ* due to possible heat or cold stress and potential predation.

The initial approach to shorten and thus better control the duration time was to perform trials using a human benzodiazepine antagonist - flumazenil (Anexate®) for the zolazepam. These trials were performed under controlled conditions using the Salzburg

Zoo's brown bears in accordance with Austrian animal welfare legislation. While the use of flumazenil has proven useful in shortening anesthesia duration in cheetahs (Walzer and Huber 1999) and otters (Spelman et al. 1997) it did not prove as useful in bears. However, the physiological parameters were improved but the animals remained recumbent. Based on the experience gained by the B. Roeken and the Swedish Brown Bear project we performed several trials using a combination of medetomidine (60 ug/kg) and tiletamine-zolazepam (1,5 mg/kg). This combination proved to have a satisfactory induction time, provide adequate safety for the necessary procedures and was rapidly fully reversed with atipamezole (Antisedan®). In the development of these novel anaesthetic combinations the zoo proved the ideal testing ground. Due to the controlled conditions, objective decisions concerning the various relevant anaesthesia criteria could be made. The testing and establishment of a safe anaesthetic protocol for both bears and personnel is of the utmost importance for in-situ projects.

Austrian brown bear emergency team (ET's)

The emergency team is used to help control critical situations brought about by so-called "problem bears" amongst the approximately 25 wild brown bears in Austria. Such situations encompass amongst others, regularly approaching humans without fear and feeding in proximity to human settlements. The methods used by the ET are the capture and marking of "problem bears", their subsequent scaring and, if these methods fail, the killing of the bear. Personnel from WWF-Austria, the Munich Wildlife Society, the Salzburg Zoo and the Institute of Wildlife Biology of the University of Vienna form the ET. The zoo supports this management strategy by providing veterinary expertise and personnel for field operations on the one hand and on the other by providing hands-on practical training in capture and anaesthesia.

Testing anti-bear rape-oil aversive additives

In central Austria several individuals of the small population of wild brown bears have learned to feed on rape-oil. The oil is used by woodcutters as a chainsaw lubricant. Canisters and chainsaws are often left overnight on the forest floor and hence are easy prey for the bears. In the past two years the damage amounted to 55 canisters, three barrels, and 12 chainsaws. Traditional woodsmen are very reluctant to follow advice about not leaving their equipment unguarded in the forest or to hang it up between trees as hikers should do with their food in bear country in North America. The idea was to find a substance that makes rape-oil less attractive for bears if added in small quantities.
In order to test the possible aversive effects of various rape-oil additives we proceeded

to offer two captive male and one captive female brown bears a 0.5 litre PET bottle filled with 125 ml rape-oil. In the testing phase 4 ml of the test substance was added to the oil (3.2%) and additionally small amounts were applied to the outside of the bottle. The bottle was attached with a thin rope, allowing the bears freedom of manipulation but preventing the animals from disappearing out of the observer's view with the bottle. The behaviour of the bears was classified and evaluated in relation to the respective additives. In total 24 additives were tested.

From the 24 tested substances not one impeded final bottle destruction by bears. Only tea-tree oil showed a significant effect. We also found an initial learning effect. During the first days of the study, bears made longer interruptions during bottle manipulation. To exclude this experimental artefact only data from day eight till the end of the study was considered. Bottles treated with tea-tree oil were manipulated significantly later by bears. Treated bottles were handled for a shorter period, bears made significantly longer breaks and demonstrated aversive behaviour (shaking head, baring teeth etc.) more often when compared to untreated bottles. Inter-bear antagonistic behaviour in the tea-tree oil treated bottles was similar to empty bottles and significantly less than in untreated bottles filled with oil.

Verification of telemetry data

In Europe, brown bears are generally large ranging, forest dwelling and shy animals that are difficult to observe. Therefore activity patterns can only be monitored using indirect information, the most common probably being changes in the radio-signals of collared bears (Lariviere et al. 1994). Continuous 24 hour monitoring with automatic monitoring devices is difficult to realise as most bear populations are restricted to rather rugged mountainous terrain and individual bears cover several kilometres within 24 hours. Under such conditions different time sampling methods are normally applied, i.e. signals are checked at certain monitoring intervals for a short sampling period.

For free-ranging lynx (*Lynx lynx*) in Slovenia, a comparison of continuous activity monitoring with different time sampling approaches showed the best fit for a one-minute sampling period at 10 minute monitoring intervals (Reinhardt 1996). Several companies offer radio tags with integrated activity sensors that change the pulse rate in response to movement (Garshelis et al. 1982). Whereas mercury tip switches change the pulse rate when turned in a certain way, reset motion sensors extend the active pulse rate for a certain delay period. But even with activity sensors the problem of the activity criteria still remains: how many fluctuations of the radio signals are tolerable, before considering an animal to be active?

Furthermore there remains the question if the change in the pulse rate is really the best or only parameter to measure? In reset motion sensors a change in the pulse rate is triggered by any movement, including comfort movements. If a researcher defines activity mainly as activity outside the daybed it might be more appropriate to use the change in the radio signal strength as an additional parameter for the activity criteria. To determine the activity criteria we tested field methods, by simultaneously protocolling radio signals and observed behaviour of a captive radio-collared brown bear. The experiments took place in the Salzburg Zoo, where three bears share a 2500-m² enclosure. One of the bears, an adult male, was fitted with a radio collar with a position sensitive mercury tip switch (MOD-600 Telonics, USA). For 17 days, two observers monitored bear behaviour and radio-signals simultaneously. Depending on the position of the head respectively the angle of the radio collar, signal pulse rate was 90 beeps/min or 60 beeps/min.

Generally more emphasis should be put on testing equipment and calibrating methods using indirect parameters and Zoos can play an important role in this. New methods can be tested under controlled conditions and by direct observation. The animal's reaction to different treatments or equipment can be directly observed and if any undesirable side effects occur, these can easily be corrected. When well explained to the visitors, trials in the zoo environment could also raise public awareness about what is going on in the "real world".

Educational approaches

The face of a teddy bear, fluffy coat and clumsy gait, all this makes the bear very likeable for many people. But only a few people have a more in-depth knowledge of the bears way of life or its nutrition. Zoos, in particular, have great potential to facilitate the transfer of specific knowledge. In this way it is also possible to raise empathy for bears in the wild and their problems in Austria. Besides traditional signs and the distribution of folders it is important that visitors become actively involved in "bear" facts. They have the possibility to behave a little bit like a bear and this might improve the visitors understanding for the animals.

AHA – experiences to start

A life-size bear silhouette gives an impression of the real size of a bear, especially compared to one's own body size. Plaster casts of bear claws show the real paw size of bears. When the visitors have to estimate the weight of the bear living in the exhibit and are then are confronted with its real weight, the AHA experience is perfect.

What's the weight of a newborn bear ?

With the aid of three bags filled with 300g, 600g and 900g of sand, the visitors have to guess which bag corresponds to the weight of a new born bear . After arousing interest it is possible to explain that bears are born during the mothers' hibernation , how long they stay with their mothers and what young bears have to learn from them.

What odours do bears like and which do they avoid?

Containers with different odorous substances (tea tree oil, beech wood tar, meat, lavender oil, pineapple oil etc.) are presented to the visitors. After sniffing the containers people have to decide what substances are inside and what odours bears like and which they avoid. Bears like odours from fruits and herbs but it seems that they also like wood tar and avoid tea tree oil. Using this small, hands-on experiment it is possible to introduce the visitors to bear nutrition -why do they like odorous forms of fruits and herbs? What do bears eat normally? To illustrate all this, a container with the daily ration of food for a bear is also very useful. In subsequent discussions most people miss the large amounts of meat which bears are alleged to feed on. In discussing odours it is also possible to introduce the problems caused by bears due to their affinity for rape seed oil and explain some of the solutions being evaluated.

Bear telemetry

Bears are secret animals and are hard to find. How can scientists do research with bears? Therefore they are marked with a transmitter and are found through radio triangulation. It is easy to imitate this. You only have to hide an avalanche beacon (standard equipment in Austria!) and you need a second one to search for the "bear". When the young scientist is more experienced it is also possible to select one of the group to act as a bear, who will creep through the woods - locating this "bear" is harder for the rest of the group than searching for a stationary transmitter. After this introduction, themes such as bears' social system, bear research or the situation of bears in Austria can be discussed.

How bears and people live together

With the aid of a board game people can slip into the role of a bear. Looking for food the bears walks with wolf and lynx through the forest. Who is hunting for hares and roe deer? Who is looking for mice, and for what animal are insect larvae in dead trunks or honey really delicious? To make the game more interesting, a shepherd with his flock of sheep also walks through the forest - who will have enough at the end of the game? Will the shepherd bring all of his sheep home at the end of the day? All these questions will be answered after finishing the game.

These are only a few of the possibilities to motivate people to deal with bears or other predators. It is important that the visitor first of all becomes actively involved – then enthusiastic before finally being ready to receive the "hard" biological facts.

References

Arbeitsgemeinschaft Braunbär LIFE 1997. Managementplan für Braunbären in Österreich. Institut für Wildbiologie und Jagdwirtschaft, Universität für Bodenkultur (Wien), Wildbiologische Gesellschaft München (Ettal) und WWF Österreich (Wien). Im Auftrag der Bundesländer Kärnten, Niederösterreich, Oberösterreich und Steiermark sowie des Bundesministeriums für Umwelt, Jugend und Familie. 157 Seiten.

Garshelis, D.L, Quigley, H. B., C.R. Villarrubia and M. R. Pelton 1982. Assessment of telemetric motion sensors for studies of activity. Can. J. Zool. 60: 1800-1805.

Lariviere, S., J. Huot, and C. Samson 1994. Daily Activity Patterns of Female Black Bears in a Northern Mixed-Forest Environment. J. of Mammalogy, 75:613-620.

Reinhardt, I. 1996. Untersuchungen zu Aktivitätsverhalten und Zeitbudget eines Luchsweibchens (*Lynx lynx* L.) in Slowenien in der frühen Phase der Jungenaufzucht und Vergleich verschiedener Time-sampling Methoden hinsichtlich ihrer Übereinstimmung mit einer kontinuierlichen Aktivitätsaufnahme. Unveröff. Diplomarb. Univ. München, 85 Seiten.

Spelman, L. H., P. W. Sumner, W. B. Karesh and M. K. Stosskopf 1997. Tiletamine-Zolazepam anaesthesia in North American River Otters (*Lutra canadensis*) and is partial antagonism with flumazenil. Journal Zoo and Wildlife Medicine, 28: 418-423.

Walzer, C., and Huber, C. 1999. Comparison of two benzodiazepine antagonists: flumazenil and sarmazenil in the cheetah (*Acinonyx jubatus*). Verh. ber. Erkrg. Zootiere, 39: 377-382.

Appendix

APPENDIX I

The Evaluation of Bear Rehabilitation Projects from a Conservationist's Point of View: Creating a Linkage between Different Fields of Interests

26th and 27th of November 2000, Rhenen, The Netherlands

Participants of the meeting: Gerard Baars, IBF, Rhenen; Koen Brouwer, EAZA-office, Amsterdam; Verle de Bruyn, translator, Belgium; Jiska van Dijk; IBF, Rhenen; Jan van Haaften; IBF, Rhenen; Bart Hiddinga, EAZA-office, Amsterdam; Djuro Huber, IBA Eurasian Vice President, University of Zagreb; Paul Koene; IBF Rhenen; Lydia Kolter, EAZA bear TAG co-chair, Cologne Zoo; Jose Kok, Ouwehand Zoo, Rhenen; Hans-Ove Larsson, Skansen, Stockholm; Roel May, ecological consultancy De Groene Ruimte, Wageningen; Valentin Pazethnov, Biological Station "Chisty Less", Toropetz; Bernard Peyton, IBA secretary, Berkeley; Harry Reynolds, IBA council member, Fairbanks; Tanja Thomas, IBF, Rhenen; Victor Watkins, WSPA, London; Hans van Weerd, Artis, Amsterdam.

MINUTES OF THE MEETING

During the entire meeting the term **re-introduction** was used both for the release of rehabilitated bears in areas with and without an existing wild population as for the translocation of wild bears to an area from which bears had become extinct or nearly extinct. **Re-introduction** is defined in the IUCN Guidelines for Re-introductions as "an attempt to establish a species in an area which was once part of its historical range, but from which it has been extirpated or become extinct". Addition of animals to an existing population of conspecifics for *conservation purposes* is called **reinforcement** or **supplementation**. In the following these terms will be used in the context of conservation only. In all other cases we will apply the more general term **release**.

In discussions of the topic "rehabilitation and release" we emphasised that different bear species exhibit different behaviour characteristics and that what works for one species may not work for another. In case the term "bears" is used in the minutes it refers to Ursid species in general. In all other cases the species name is given when the discussion referred to a specific species.

SESSION I: METHODS AND GOALS OF REHABILITATION

Papers presented in session I:

Re-introduction attempts of sun bears in Indonesia, Gabriella Fredricksson (presented by L.Kolter)

The Appalachhian Bear Center – How do you rehabilitate a bear and keep it wild? Daryl Ratajczak (presented by T. Thomas)

Re-introduction of orphaned bear cubs. Valentin Pazhetnov & S.V. Pazhetnov

Is Rehab successful with orphaned cubs? Sally Maughan (presented by V. Watkins)

Abstracts of the papers presented were distributed to the participants of the workshop.

Features of the presented release projects are summarised in table 1 [*appendix II this proceedings*].

The following subjects were addressed during the discussions:

a. Goals of the presented release projects
b. Qualitative and quantitative criteria for success in each rehabilitation project
c. Features the successful projects have in common
d. Methodological differences between successful and unsuccessful projects
e. Behavioural differences between successfully released animals and those which had to be removed from the project

A. Goals of the presented release projects

Several goals could be derived from the presentations on rehabilitation projects of the first session. Some projects emphasised species conservation as a goal, but because of the uncertainties of survival of released bears and their potential for contribution to the existing wild population, rehabilitation might fall under the category animal welfare. It focuses on the individual bear that has an extended lifetime in the wild due to rehabilitation.

Besides animal welfare or conservation goals, rehabilitation projects may also be used to increase public awareness and promote conservation education around the project. This in turn might serve to increase the acceptance / enthusiasm of the (local) people towards the existence of bears in the wild.

B. The qualitative and quantitative criteria for success in each rehabilitation project

The criteria for success are mainly related to the goal of the considered rehabilitation project.

1.) The success of any project can be measured by the survival rate of the released bears and the incidence of problem bears. During the workshop the point was made that survival rates based on returned ear-tags, the lack of reported deaths and short term radio-tracking do not reliably reflect survival/mortality rates. This data can only be obtained by long-term data collection and it is a recommendation emphasised in the Re-introduction Guidelines of the Re-introduction Specialist Group of the IUCN SSC. Long-term monitoring is very costly and labour intensive, particularly with young and growing animals which have to be re-captured several times to exchange the radio-collars. Victor Watkins as the representative of WSPA and responsible for the Libearty Campaign, which is supporting rehabilitation and release projects for confiscated bears

in North America, was asked how he evaluates the potential to maintain the interest of the public for a sufficiently long time to financially support monitoring projects with released bears over several years. Up to now long-term monitoring was not yet supported, nevertheless there may be a good chance for public funding through producing public awareness programmes and keeping the donors updated on the ongoing project.

Apart from methods to assess the outcome of release projects, the definition of success regarding the term "survival" was discussed. 100% survival over several years can of course not be expected. The background to evaluate the outcome of bear releases, should be the age-specific survival rates of the wild bear population, into which the rehabilitated animals are released. If releases are aimed to contribute to conservation, age specific reproductive rate, again in comparison to the wild population, has to be considered.

2.) Releases of captive bears may have an enormous potential for raising public awareness for conservation issues. If the project is designed to increase public awareness, success might be related to the degree of (positive) publicity, quantity and quality of education materials which result from the project, and the number of visitors at an education centre.

Increased public awareness may have a direct effect on the bear population. In the Peruvian project (presented during session III) local people prevented poaching on wild spectacled bears in an area, where a rehabilitated bear lived.

3.) When using rehabilitated bears in research projects, success might be defined by the quantity and quality of data brought in based on the study on these semi-wild rehabilitated and released bears. For example the feeding signs left by rehabilitated sun bears are similar of those of wild sun bears, and the behaviour of some radio-collared wild bears fit well with the one observed in the released bears. Thus the database collected on the latter over several years will be suitable to define the ecological requirements of sun bears in terms of habitat quality and habitat size necessary for a viable sun bear population.

The general opinion expressed during the workshop was that despite the different definitions and criteria of success used for various rehabilitation projects, the biological success of any project requires that any release should contribute to or at least not conflict with the bear populations existing in the wild. This has to be of the highest priority.

Prevention of problem bears that have lost fear of humans is vital to all release projects. Problem bears, which occur in wild populations, may approach humans, beg for food or even raid livestock and crops or attack people, who try to defend their property. Accidents and damage caused by problem bears will reduce the positive value achieved

by any other successful step and will most probably be counterproductive for bear conservation in general. Problem bears cause rapid changes in public opinion against this large predator. As a consequence pressure on the whole population may increase. In addition such problem bears will be almost always destroyed.

C. Features of successful release projects

In the following the term success refers to the criteria and definitions set up in the different release projects – which are not necessarily identical with the long-term success as defined during the preceding discussion.

Successful projects presented during the first session of the workshop (table 1, *appendix II, this proceedings*) seemed to have three features in common:

- The released animals were less than one year and did not spent long times in close contact to humans, when they join the rehabilitator.
- The number of persons that care for the animals was restricted to 1 to a maximum of 4.
- The animals were at least partly fed with natural food and were either kept in naturalistic enclosures or were trained by being walked through natural habitat.

Two of the features did not apply to an Andean bear female in the Peruvian project (session III):

1.)The animal was released (escaped) at the age of 2. It is living in the wild since more than one year without negative interference with humans.

2.) It grew up until the age of 1,5 years in a family in close contact to the family members.

The point was made, that the above mentioned aspects were not only common to the successful projects reported here, but that all these features applied also to the method used by D. Huber in Croatia. This project was not successful, as most of the released European brown bears joined humans, despite being in a good physical condition and having learned to forage on natural food. In order to prevent these bears to negatively influence the whole population, they were recaptured and brought to a zoo.

Obviously the different species react differently under very similar conditions.

Therefore it was suggested to treat each bear species separately, because there may be no features and criteria common to all bear species.

Based on these results, the question of whether releases of bears kept under human care for some time can be successful at all, became an issue that was emphasised again and again during the discussions. The following opposite standpoints were maintained during the whole workshop:

a) successful rehabilitation is possible when the factors listed above are controlled (animals' age, restricted number of caretakers, natural food),

b) successful rehabilitation is almost impossible, because the probability to produce problem bears is much higher in rehabilitated than in wild bears.

D. Methodological differences between successful and unsuccessful release projects

Animals older than one year, which have been in captivity as cubs without contact to natural conditions, are obviously unsuitable.

V. Pazhetnov does not take brown bear cubs older than 3 months for rehabilitation, because animals beyond that age are difficult to train for release. On the other hand D. Huber sees some chances for survival of those orphaned cubs, which could have accompanied the mother for at least several months. If these animals are taken into captivity, it is sufficient to do a medical check-up provide them with some food and release them immediately before they lose fear from humans.

Comparing the two rehabilitation projects in North America the results of the releases of American black bears seem neither related to the degree of human care – as long as it restricted to one person - or to the extend of feeding natural food . When the American black bears had contacts with the rehabilitator (Idaho Black Bear Rehab of Sally Maughan) it seems to be crucial that they do not meet humans in the first two weeks after release. Otherwise they may try to join them and may become a nuisance.

For the European brown bears released in Russia remote places are chosen to prevent contact to humans after release.

E. Differences in the behaviour between successfully and unsuccessfully released bears

The differences could not be assessed. They may be related to the presence or absence of avoidance behaviour towards humans during a certain developmental phase or to the easy potential of bears habituating to human presence. For the rehabilitator it may be crucial to encourage avoidance behaviour and not to try to reward behaviours which could result in the animals' habituation. The onset and the duration of the period of developing avoidance behaviour towards humans during the ontogeny may differ between species.

The point was made that cubs accompanying their mothers usually learn many behaviours during this association, but cannot learn "everything" concerning potential food resources, denning and resting sites, use of substrates or best strategies to deal with conspecifics. This is particularly true for male offspring, which leave the home range of its mother and may migrate over hundreds of kilometres into completely different habitats, with different food sources and population structures. Thus they have to acquire and process information on their environment continuously in order to exploit it to their own advantage and not only during childhood. The role of the mothers during

early childhood for proper development of learning behaviour and temporal aspects of the development of the different fields of behaviour and its interrelationships with the environment (sensible phases) remained unclear. The experience with the sun bear cubs and with the Andean bear female clearly revealed that several behaviours related to foraging and food processing are innate patterns.

SESSION II: RE-INTRODUCTION OF REHABILITATED BEARS AS A CONSERVATION METHOD?

Papers presented in session II:

What should we know when re-introducing "rehabilitated" bears? Djuro Huber

The differences and similarities in characteristics of population dynamics, habitat use and behaviour between wild and rehabilitated brown bear populations. Jiska van Dijk

Re-introduction of bears for species conservation in North America. Harry Reynolds

Abstracts of the papers presented were distributed to the participants of the workshop.

The following aspects were highlighted:

a. is it desirable to develop methods for re-introducing bears?
    * Priorities in bear conservation
    * Scenarios in which bear re-introductions may contribute to the conservation of the species
    * Selection criteria for source animals
    * Scenarios in which bear releases jeopardise resident populations, and should – not for any reason - be considered
    * Criteria for "success", in case releases are considered as a conservation tool

b. what should we know and what should we do?

A. Is it desirable to develop methods for re-introducing bears?

D. Huber presented good reasons for an increased probability of orphaned, rehabilitated bears to become nuisance bears. It is directly related to their highly opportunistic nature, which guarantees survival and reproduction of this large omnivorous carnivore under undisturbed conditions in an unfragmented sufficiently large and highly diverse habitat. When getting older and more powerful nuisance bears may turn to problem bears and may become dangerous, with all the negative consequences already summarised above. Therefore it is not desirable to develop methods to re-introduce rehabilitated bears.

In the course of the discussions it became clear that a stringent position against re-introduction/release may be appropriate in case of aggressive and very powerful bear species (sloth bear, polar bear and brown bear). This is particularly the case when they are re-introduced in densely populated areas. However it may be worthwhile to develop

proper release methods for species like spectacled bears which show less aggressive behaviour or for release of animals of the other more aggressive species into remote areas. Another argument for continuing rehabilitation efforts is that we may lose conservation options for the future, when not pursuing the development of proper release methods for bears during the period they are still relatively abundant. Of course for this argument it should be stated that it is only worthwhile when more co-ordination between projects is provided, long term commitment of the involved parties is guaranteed and the results and experiences are collected and analysed for the benefit of future projects.

All participants agreed that the preservation of habitat and direct *in-situ* species conservation are of highest priority. Managing these wild populations for conservation is already difficult enough and we should not lose time, energy and money in the re-introduction/release of rehabilitated bears. At the current state of knowledge and experience there was a strong recommendation not to use captive-bred or wild orphaned rehabilitated animals in re-introduction projects. By definition the goal of re-introductions is to re-establish a self sustaining population in an area from which bears were extirpated. Re-introductions should be done according to the guidelines of the IUCN-RSG and use only animals of known genetic origin, which are as closely related as possible to the extinct population. A good example for this is the re-introduction plan for Grizzly bears in the Bitterroot area of Montana and Idaho, which was presented by H. Reynolds. It includes not only careful planning of all aspects of the different phases of re-introduction, but also the careful selection of source animals from a wild population. Age and sex distribution of the selected animals have to be considered during the release period, which is divided in several steps. It was pointed out that particularly for a small population the selection of healthy animals without a history as nuisance bears and of known genetic source is as important as the long term post release monitoring and management.

Scenarios were discussed in which at least releases of rehabilitated bears may contribute to the conservation of the species and compensate for the expenses incurred by conservation programmes. These may be releases for purposes of research projects (sun bears), or for creating possible links between sub-populations that will result in meta-populations (which is important to the re-introduction of wild Grizzly bears in the Bitterroot area). The release of rehabilitated bears might also serve as fundraising tool that brings in money for habitat preservation or for creating jobs, which may increase the public acceptance of such a project.

Releases of rehabilitated bears into large existing populations in remote areas may support the conservation of the wild bears. Such bears may also serve as easy targets for hunters and thus help saving wild bears. However, releases of rehabilitated bears

into small resident populations, which are already at risk, may be detrimental to the population due to the uncertainties mentioned above and should not at all be done. Particularly when taking into account that at least in third-world countries the origin of confiscated bears very often cannot be traced there may be a substantial risk of genetic pollution of a resident population.

The debate on criteria for success was resumed and the matter of biological success versus social success/acceptance by local people reconsidered. The question was raised whether and to which degree acceptance by the local people can be separated from biological success? Re-introduction in general and release of rehabilitated bears in particular may never succeed if there is not enough public awareness and social acceptance. Without acceptance by local people, problems like hunting/poaching may be pre-programmed.

B. What should we know and what should we do?

On the basis of the IUCN-RSG Re-introductions Guidelines and the IUCN-RSG Guidelines for the Placement of Confiscated Live Animals J. van Dijk outlined a potential approach to this question. It is assumed that successfully rehabilitated bears do differ from their wild counterparts because of the contact with humans during the rehabilitation period and due to the loss of their wild mother from which typical bear behaviour and survival skills are learned. The questions that need to be answered are how much rehabilitated bears differ from wild bears, how these differences affect their ecological and behavioural competence and whether these differences are in conflict with the wild population in such way that the wild population becomes threatened and cannot be preserved? These questions can only be answered by long-term monitoring studies as of both the rehabilitated bears and their wild counterparts. When the degree of difference is defined and the potential conflict with or role in the wild population is evaluated, the rehabilitation and release of bears can either be accepted or rejected as a conservation method.

It was emphasised again that different species may react very differently and that some species may be more suitable for release projects than others. Any well designed, planned and monitored experimental release projects should have the option to remove animals with aberrant behaviour before they become a risk to humans.

SESSION III: RESEARCH AND EDUCATION AS A LINKAGE BETWEEN CAPTIVE AND FIELD SITUATION

Papers presented during session III:

Andean bear conservation and community development in Peru. Bernard Peyton & Heinz Plenge

Some ideas on potential contributions of zoos to bear conservation. Lydia Kolter

A comparative activity study on brown bear (*Ursus arctos*) – wild female bears with and without cubs vs zoo female bears with and without cubs – during and after mating season. Hans-Ove Larsson & Sara Spendrup

Abstracts of the papers presented were distributed to the participants of the workshop.

The question "how can conservation education directly support conservation in countries with wild bear populations" was illustrated by B. Peyton with an example from Peru. A project which started with the construction of a naturalistic enclosure for confiscated Andean bears in Northern Peru, generated so much public awareness and enthusiasm that a conservation project was initiated. The unique feature of this project is, that it is mainly community based. This includes the maintenance of the captive bears, which serve for conservation education of tourists and the adjacent communities. More important, the community donated land to connect two reserves where wild spectacled bears are also living. Jobs were created to manage the captive bears and the newly established reserve.

A direct information flow (e.g. via internet) between conservation projects and zoos in non-range countries would help to keep their visitors updated and interested on the situation in the field. This would improve conservation education and facilitate fundraising to support the projects.

Not only conservation education and the offer to transfer know-how between zoos in range and non-range countries, but also research in zoos may contribute to bear conservation as L. Kolter pointed out. Among others zoos can provide material and use zoo animals to validate field relevant non-invasive methods on hormonal status or genetic questions or to do (non-invasive) experiments e.g. to clarify relationships between nutrition and reproductive parameters.

The example of a study on behaviour of wild and zoo bears presented by H.-O. Larsson showed how field and zoo research can be combined and may yield benefits for both sides.

The value research on zoo animals may have for conservation and field research was not doubted. It was emphasised that the exchange of expertise and knowledge should be intensified, for example in the field of testing and using drugs.

FINAL DISCUSSION AND RESULTS

For the final discussion the participants were asked to give a short overview of their opinion on rehabilitation and re-introduction/release of bears, and on research and education as a linkage between captive and field situation.

As already mentioned, the controversy about the feasibility of successful rehabilitation of orphans could not be resolved. Two opinions throughout the final discussion were maintained:

- Successful rehabilitation is possible in case factors like age, training and the avoidance of habituation to humans are taken into account
- Rehabilitation cannot be successful and should therefore no longer take place, because at least in brown bears it may threaten conservation efforts.

There was overall agreement on the following topics:

- As rehabilitation mostly concerns orphaned cubs, situations which are most likely to produce orphans should be removed/restricted by, for example, working out policies on logging near dens, and by reinforcement of hunting laws to stop hunting at dens.
- Bears have to be preserved in the wild and thus protection of habitat and enforcement of laws against poaching are of utmost importance.
- Releases for conservation purposes like re-introductions, where populations are extinct, or reinforcements of small populations should exclusively use wild bears, which fit genetically and behaviourally. These should be done according to the IUCN-RSG guidelines, which means among others long-term monitoring and research on the released animals and the receiver population.
- The overall opinion was that at the moment bears originating from zoos should not be used as a possible source for release projects. At the time being there are still too many questions on the impact and consequences of rehabilitation/release projects on orphaned wild bears. However there will be no closed door in this aspect. Zoo populations should be managed adequately in such way that in case it might be necessary in the future, zoo bears of known origin and in a "(genetically/behaviourally) sound condition" may be used for release purposes under clearly defined goals.

Despite the strong recommendations against using captive born or wild born orphaned bears for re-introductions or reinforcement of threatened bear populations, the fact that releases of rehabilitated orphaned bears occur at many locations all over the world has

to be considered. Therefore this topic was addressed during the final discussion by the participants of the workshop.

Regarding rehabilitation and release of bears the following suggestions were made:

- Naïve and/or inappropriate rehabilitation methods without long-term monitoring of released animals and the wild original population should be discouraged.
- In ALL cases of rehabilitation of bears, the recommendations of the IUCN-RSG should be regarded. Organisations which plan to release bears should also provide funding for long-term post-release monitoring to define the fate of the released bears. Long-term studies enable to define survival rate but definitely also to define the consequences for the existing wild population and the consequences for (local) species conservation.
- Experimental release projects, which consider all aspects laid down in the IUCN-RSG, which take into account potential species-specific differences and which are done scientifically based on well defined research questions and appropriate methods, will help resolve the above mentioned controversy and may generate guidelines for proper release of different bear species.

If rehabilitation THEN,

→ a pre-release investigation should take place on the status of the wild population;
→ public interest should be considered;
→ local authorities/communities should be involved in the programme.
→ sufficient funding for the entire project including pre- and post-release activities, should be available;
→ both rehabilitated bears and wild bears should be monitored.

- A database (of rehabilitation projects and their results) should be set up to get a better overview on existing rehabilitation efforts and to broaden our knowledge on rehabilitation methods.
- Rehabilitation of bears should not be a welfare issue but a conservation issue. In case individual bears are saved rather than an effort is made towards the conservation of a population it may be recommended to shift one's attention to direct species (habitat) conservation.

Regarding research and education as a linkage between captive and field situation:

- There should be a better exchange of bear specialists with wide ranging expertise and knowledge. With better co-operation between zoo and field researchers both fields of interests may gain from it by using the other.
- Zoos have great experience in conservation education as well as in dealing with the media and should provide training and exchange of expertise to the field situation.
- For setting up appropriate conservation education projects in both captive and field situation, one should learn from earlier mistakes (in similar situations/projects) and people with experience should be used.
- Use threats (species, habitat etc.) as opportunities for presenting your 'story' and for making conservation education 'attractive' to the public.
- Support field projects.

Action plan

- Planning a workshop on education and research as linkage between wild and zoo situation, preferably at the 13th IBA conference in Wyoming spring 2001;
- Preparing an endorsement for the IBA council on their approach / opinion on the matter of bear rehabilitation and release projects;
- Suggesting to the IBA council to set up policies and recommendations to minimise the occurrence of orphaned bears
- Setting up a working group on rehabilitation projects (gathering information / setting up database / etc. as active eye-watcher on such projects);
- Broaden financial sources for long term studies on experimental rehabilitation projects.

APPENDIX II

Tab.1: Summary of methods and results of bear rehabilitation projects presented during the workshop

Species	**Sun Bear**		**Europ. Brown Bear**	**American Black Bear**	**American Black Bear**
	1. attempt	**2. attempt**			
Author	Fredricksson	Fredricksson	Pazethnov	Maughan	Appalachian Bear Centre
Number of animals	5	3 (1,2)	76 (45,31)	43 (24,19)	???
Origin/history	wild born; as cubs in captivity; kept as pets, confiscated, placed in a rehab centre for orang utans	wild born; as cubs in captivity, confiscated, placed in a rehab centre for orang utans	wild born; orphaned and captive born, placed at the biological station "Clear Forest" at < 3 months	wild born/orphaned, placed into the Idaho Black Bear Centre	wild born/orphaned or injured adults, placed into the Appalachian Bear Centre
Individuals caring for the animals in captivity	several/changing	at maximum 4; mainly 2	1 – 2	1	no direct contacts; naturalistic enclosures; food provision from "blinds"
Food in captivity	unknown	fruits/milk/porridge; natural food when walked in the forest	milk/porridge; natural food in outside enclosure and when walked in the forest	milk mixture; natural food, commercial dog food, beef, fruits and vegetables	natural food and commercial dog food
Time in captivity	several years	few months	6 to 8 months	up to 12 months	Depending on weight
Release site	reserve with resident wild bears	reserve with resident wild bears	in & outside conservation areas; resident wild bears	in areas with resident wild bears	in areas, where the individuals were captured
Age at release	2,5 – 5 years	2 – 7 months	7 – 11 months	~ 10 – 11 months	???
Field training period	no	taken out in the forest over months or even years	taken out in the forest	no	no
Additional support after release	no	caged and fed at night for varying time spans; offer of food, at return to the camp	no	no	no
Monitoring released animals	implanted radio-transmitters	daily close observations; radio-collared when no longer caged at night	ear-tagged; record of returned ear tags or reports on problem bears	most individuals ear-tagged, some radio-collared	radio-collared
Criteria for success	survival	survival, avoidance of humans	no reports on dead or problem bears	no reports on dead or nuisance bears	survival 6 months post release
Results	3 died within one month; 1 was rescued when raiding crops; one disappeared	2 avoid humans and live independent; **1*** follows strange humans	1 returned ear-tag and no complaints	1 problem bear removed; 1 animal relocated	???
Goal/purpose/ Background	welfare? lack of other choices	within a research project on the biology and ecology of sun bears	conservation? reinforce-ment of wild populations?	welfare; gaining rehabilitation skills	welfare

1*: meanwhile killed (June 2001) had followed some illegal loggers and seemed to be caught in a snare. Just the collar was found.

APPENDIX III

Workshop at the 14th IBA conference (Norway, 2002): Limitations for releasing rehabilitated bears

Chaired by Jiska van Dijk and Djuro Huber

The workshop on defining the limitations on the release of rehabilitated bears was carefully prepared to provoke a fruitful but also constructive discussion. This was done with help of logically ranked statements, but the participants of the workshop were so enthusiastic that the discussion covered the different statements more or less following the discussion rather than following the provoking statements given.

First a short introduction was given on the topic "rehabilitation and release". An overview was given on the current situation at the different rehabilitation centers in North America and Russia, the releases of bears in South America, Asia and Europe. Rehabilitation is for example carried out with bears that are traffic victims from different ages or with orphaned bear cubs found in the first few months of their lives. The similarity in the different cases is that bears are kept in captivity over a period of time. However it is the age of bears and the treatment or care that differs per rehabilitation program. Some rehabilitators minimize human contact as much as possible while others see themselves as foster parents in which human contact is not minimized. All these differences have their impact on the eventually released bears and therefore also on the wild population. Its conservation value is therefore debatable and the aim of the workshop was to define the limitations for releases of rehabilitated bears to minimize its possible negative impact on bear conservation.

After the introduction Joe Clark was asked to give a short presentation of his experiences with reintroduction programs and of his ideas about the release of rehabilitated bears and its consequences for bear conservation. According to Joe one of the topics that needs attention to create a broadly based acceptance, is the involvement of the public. This is a necessity for the success of both reintroduction programs and releases of rehabilitated bears. He also asked three different questions that according to him needed to be kept at the back of one's mind during the workshop. Those questions were:

- *Should we, IBA members and IBA as an organization, rule out the possibilities for rehabilitators?*

- *Should we, IBA members and IBA as an organization, be dictating agencies for policies?*
- *Do we have sufficient knowledge about the development of the different bear behaviors and about how to "reprogram" the behavior of habituated bears?*

Djuro Huber outlined his experiences with rehabilitation and releasing bears that later became nuisance, and eventually forming a severe threat to the conservation of the wild bear population. There is a significant risk that rehabilitated bears will become nuisance bears, especially in the densely populated countries of Europe. Djuro argued in favor of preventing bears coming in hands of humans and emphasized on diminished logging activities in certain areas during the winter months which may disturb mother bears, leaving orphaned bear cubs behind. He also argued in favor of leaving bear cubs alone when found in July or later. There is a chance that those bears will survive and should therefore be left alone. Djuro gave an example in which bears coming into captivity can serve very well as tool for conservation education. By placing those bears for life in a large sanctuary that is open to the public, people can learn about bear conservation issues.

Several statements were offered by Jiska van Dijk to provoke discussion. The first statement, "*releases of captive bears without any kind of rehabilitation should not be done at all*", was rejected by all participants due to the fact that the form of captivity should be defined. Human interactions should be limited, but again this depends on how long the bear has been in captivity and what kind of treatment or care the bear has had. The polar bears roaming through Churchill and taken into captivity, are left unrewarded and without food in captivity over a few weeks before released back into the wild. There are no human interactions and the bears do not become habituated. Following up on this example a participant proposed the idea that maybe one should not rehabilitate bears at all, because as soon as rehabilitation has to be taken place, it is already too late and the bear will get human attention resulting in the possibility of habituation. At the moment it is difficult and almost impossible to change a habituated bear into a bear that will stay away from human activities.

The second statement, "*from a conservation point of view it is advisable to recommend against releases of rehabilitated bears"*, was broadly accepted. Also from a population perspective it is not reasonable to release rehabilitated bears. Rehabilitators might however not be interested in wildlife conservation, so that rehabilitation and release is

more of an issue related to animal welfare rather than to animal conservation. Rehabilitation and releases may still cause risks to wildlife conservation or may even be directly contradictory to conservation attempt, due to the creation of problem bears. The occurrence of problem bears poses a negative impact on public acceptance and rouse anti-conservation opposition.

Directly linked to its contribution to or its counteraction with wildlife conservation is the discussion around what to define as success of a rehabilitation and release program. The degree of success in terms of biological success (survival rate and behavioral aspects) differ for the different bear species and one should look at the specific species when talking about limitations for rehabilitation and releases. Success in terms of gaining public awareness through rehabilitation and release also differs per region. On the other hand one should not forget that people all over the world like to believe that a particular bear has survived because of their action. It makes people feel good and it is easy to forget about the consequences for this particular bear in the long term but also for the entire wild bear population. A realistic approach to survival rate is necessary. Releasing bears just before hibernation, monitoring them over winter, and saying that they all survived does not give a true picture on the capability of the bears to survive throughout the rest of the year, through the following years and to take part in reproduction. On should strive for intensively monitoring of all released bears. The biological success of releases should be carefully measured based on scientific methods.

The fact is however, that it is often easier to get funds for animal welfare related issues then for nature conservation projects. If enough funds are available to rehabilitate bears and release them back into the wild, to monitor them adequately and to monitor the wild bear population, then releases can be carried out in terms of experiments. In this way we might be able to gain insight in how to increase the biological success and its possible contribution to bear conservation.

Whenever funds are or are not adequately available, the IUCN reintroduction guidelines that were set up in 1998, should be used in all cases and followed as much as possible. Also the rehabilitation methods should always include a kind of procedure that includes negative conditioning towards human activities. Therefore it is a must that more knowledge on behavioral aspects is obtained. Also more knowledge should be available on the ontogeny of bear cubs and on different behavior stages the bears go through to perform for instance avoidance behavior. The problem at the moment is that rehabilitators have a lot of knowledge on these issues but there is no exchange of knowledge nor is there a uniformity within this knowledge. Rehabilitators in general are

not used to communicate on a scientific level and therefore it is difficult to compare data.

The third statement, "*released rehabilitated bears are more vulnerable to be killed by hunters then wild bears and therefore contribute to the conservation of the wild population*", was rejected with the argument that hunted populations are often big enough to be hunted and release of captive bears to such populations is questionable. Illegal hunting within small endangered populations wasn't considered within the discussion.

If there are only few animals left in an endangered population then a single individual might be important for the conservation of this population and therefore releases of captive bears might be possible in specific situations and under certain conditions. There might however, be a high risk when problem bears occur posing a strong negative impact on public acceptance and rouse anti-conservation opposition. Also in the case of releasing into an endangered population, monitoring is highly recommended. The biological success of releases should also be compared with the population dynamic parameters of the wild population.

After the discussion there was a need of combining all that was said and to define certain concluding statements to which the participants agreed. By the end of the workshop five concluding statements were accepted. Those five statements are:

- **If a bear is found, that is in need of help because of human actions, it should be released back into the wild before it is habituated.**
- **If bears are to be released, it should be done for the benefit of the conservation of the wild population only. Such action should not be based on just human emotions.**
- **Attempts to rehabilitate bears for reintroduction purposes are only justified in cases when there is no other source of wild bears to be taken.**
- **If releases of rehabilitated bears take place, careful monitoring of the released bears is highly recommended.**
- **One should emphasis on information exchange between the different rehabilitators and bear biologists.**

(*minutes by Jiska van Dijk, 15-10-2002*)

APPENDIX IV

Suggestions for Bear Rehabilitation and Releases

The problem

In countries where wild bears exist, bears come into captivity. Cubs usually come into captivity when their mothers are killed illegally by poachers including for the pet trade, killed legally in areas where regulations allow females with cubs to be hunted, through accidents on highways or train tracks, or when they are captured as nuisance bears. They may also be orphaned or separated from their mothers following disturbances at dens during human activities such as logging. Older bears usually come into captivity as nuisance bears that are causing threats to human safety or depredation to agriculture. All of these causes are more likely to occur when bear populations suffer from habitat loss or fragmentation by human activities.

The options for the placement of these wild captured animals are:

1 Indefinite captivity and use for educational purposes
2 Euthanasia
3 Release[1] back into the wild

Suitable spaces to keep bears in indefinite captivity (zoos and private sanctuaries) become available only infrequently and unpredictably. Because bears breed readily in captivity and are long-lived, demand in such facilities is very low. Breeding of captives may even produce a surplus of bears in excess of zoo needs. In addition, the number of

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[1] **Definitions**

See IUCN/SSC Guidelines for Re-Introductions, prepared by the SSC Re-introduction Specialist Group and approved by the 41st Meeting of the IUCN Council, in 1995.

Re-introduction: an attempt to establish a species in an area which was once part of its historical range, but from which it has been extirpated or become extinct ("Re-establishment" is a synonym, but implies that the re-introduction has been successful).

Translocation: deliberate and mediated movement of wild individuals or populations from one part of their range to another.

Reinforcement/Supplementation: addition of individuals to an existing population of conspecifics.

Conservation/Benign Introductions: an attempt to establish a species, for the purpose of conservation, outside its recorded distribution but within an appropriate habitat and eco-geographical area. This is a feasible conservation tool only when there is no remaining suitable habitat that can practically be occupied within a species' historic range.

Other relevant terms

Rehabilitation: restore to behavioral and biological condition as occurs in the wild without habituation to humans (especially after being held in captivity) or restore to physical health following injury or disease.

Release: set free. The term "release" is often used in the context of (re)placing the animal into a wild population or metapopulation of which it was once a member.

bears that come into captivity for reasons discussed above or are confiscated because they were held illegally is comparatively high.

Euthanasia of wild captured animals is not favored by the general public or by animal welfare organizations organisations. However, proper facilities are often not available for care of bears for the rest of their potentially long lives and the release into the wild is appropriate only under very specific conditions as those outlined in this document. Therefore, when other options should not be considered, euthanasia may be the only humane alternative.

Release of bears habituated to human presence or held in captivity long enough to develop a strong attachment to humans might have genetic, health or behavioural consequences for wild populations. Poorly considered or monitored releases can result in negative ecological consequences, for public safety or for public acceptance of nearby wild bear populations. Therefore, the release of any bear held in captivity needs to be based on much more than the welfare of individual bears, however important it is to take welfare into account. Releases should be considered only after an established set of conditions and biological criteria is met that address potential effects from the release on the recipient population and describes how negative social and biological consequences would be minimised to the maximum practical extent.

Approach to the problem

There are two controversial and mutual exclusive options concerning the feasibility of successful rehabilitation and release of bears:

1 Rehabilitation and/or releases of cubs, yearlings and older bears, have the greatest chance for success when the following factors are carefully controlled and taken into account: human handling is minimised (cubs may be handled differently up to a certain age and during specific stages of behavioural development), and "survival" skills are instilled in the bears so they avoid humans and human development. If these goals are accomplished, rehabilitation and release of those bears could benefit conservation of the species. They could even be utilized as supplementary bears in case reinforcement of small populations is necessary or as founders when re-introduction becomes necessary[2].

2 Rehabilitation of animals kept for more than a few days under human care implies a strong risk of insufficiently developed "survival" skills and

[2] However because of problems associated with habituation to human presence or conditioning to human foods, releases of bears older than cubs cannot be recommended, even in this option.

changed behaviour towards humans (i.e. approaching humans instead of avoiding humans). The latter makes released bears vulnerable to become problem bears and predictably lowers their probability of survival. Bears that become dangers to human safety or property may result in negative public attitude against the species as a whole and thus counteract conservation efforts for any bear population.

Two sets of hypotheses can be tested to address the efficacy of these options:

1 Rehabilitated bears do not differ from wild bears in their behaviour towards humans, their survival rates, and in their use of appropriate habitat. There are no negative consequences for the conservation of the wild population. Therefore rehabilitation and release may be appropriate.

2 Rehabilitated bears get easily habituated to humans, have lower survival and use different habitats than wild counterparts in the same area. There is a negative consequence for the conservation of the wild population. Therefore rehabilitation and release will not be done.

If the first hypothesis is accepted (in which rehabilitated bears are released), but proven to be wrong in the future, the damage to the conservation of the wild population is more severe than if the second hypothesis is accepted (in which rehabilitated bears are not released), but proven wrong in the future.

To achieve the greatest benefit for bear conservation it is advisable to recommend against rehabilitation and release of orphaned bear cubs, sub-adult or adult bears unless a clear need can be shown and the release can be justified under the SSC guidelines. Even then, radiocollaring and monitoring of released bears should be a crucial and required condition of any release program. Any bears released must be collared with radiotransmitters so that the bears can be more easily recaptured if they become hazards to human safety or cause depredation to livestock of local people.

It should be emphasised that:

- Populations composed of wild bears in their natural state are most likely to persist and survive. Therefore conservation of existing bear populations, the habitat necessary to ensure the population's persistence, and enforcement of laws designed to conserve the bear population are of utmost importance.
- Situations which are most likely to produce orphaned bear cubs have to be statutorily restricted by working out policies on logging near dens, enforcement or changes in appropriate hunting laws including measures to protect females, making it illegal to hunt at dens or poaching for pet trade.

- Any actions including releases for conservation purposes, re-introductions or reinforcements of small populations should only be done according to the IUCN-SSC Guidelines. This means to use exclusively wild bears that fit genetically and behaviourally.
- At the current state of knowledge, bears kept for prolonged periods under human care or bred in captivity, should not be used as a possible source for release projects. Nevertheless breeding populations in zoos should be managed properly so that they may serve, if future circumstances warrant, as genetically and behaviourally adequate reserve populations.
- If any releases of rehabilitated bears are allowed, bears must be fitted with radio transmitters so that the fate of the bears and their contact with humans can be monitored. Any releases that occur should be conducted as experiments with well defined research questions. Released animals and the methods and techniques chosen for handling, monitoring and research should have minimum to zero impact on the survival of the receiver population in case the release fails. The IUCN-SSC Guidelines for Re-introductions are laid out along these lines and must be followed when releasing rehabilitated bears.
- In addition, a standardized measure of what constitutes survival and success of any release should be adopted. In recent studies/case histories, the period defining survival or success has been widely variable. As a result studies exploring improvements of release efficacy and portraying survival following release are not comparable. A minimum time period of one year should be the accepted standard of measure.

Several conditions EXCLUDE the release of rehabilitated bears:

- Rehabilitated bears that are of unknown origin;
- Rehabilitated bears that are from a population which might have different adaptations (i.e. phenotypic differences) than the receiver population;
- The receiver population is small and at risk of extinction or its status is unknown.

If rehabilitation and release is planned THEN the following should be done:

→ a pre-release investigation has to take place on the status of the wild population, and only if benefits outweigh risks should it serve as receiver population;

→ public interest has to be considered: if the attitudes towards bears or towards a release is negative the release must not take place until efforts to change it have been shown to be successful;

→ local authorities/communities have to agree and to be involved in the programme;
→ sufficient funding for the entire project including pre- and post-release activities, has to be available;
→ criteria for success have to be conservation relevant and have to be based on positive (scientifically based) evidence, not just on the absence of reports on negative interference with humans or the absence of reports on deaths;
→ both rehabilitated bears and wild bears have to be monitored in the long term to allow comparable records on survival and reproduction;
→ all released bears must be radio-collared to facilitate recapture of any specific bear that becomes a hazard to human safety or causes depredation to livestock of local people.
→ there has to be clear policy on how to deal with released bears which become nuisance or problem bears;
→ all aspects of any rehabilitation/release project must be documented prior to the approval of any program, including all activities to be conducted, time frame, methods and criteria of success.

Actions to be taken

- A database on hunting laws and their degree of enforcement in countries where wild bears exist should be set up, to enable bear conservationists to better suggest strategies to minimise the occurrence of orphaned cubs.
- Information on ages at natural weaning, ages and conditions of self-sufficiency of orphaned cubs should be collected for the different species/populations in order to help the involved authorities to make informed decisions when orphaned cubs are reported.
- A database of rehabilitation projects should be set up:
  - → to maintain an effective overview on existing rehabilitation efforts
  - → to broaden knowledge on rehabilitation methods and related results
  - → to evaluate release/rehabilitation as a tool for bear conservation

worked out by Lydia Kolter[1], Jiska van Dijk[2], Djuro Huber[3] & Harry Reynolds[4]

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APPENDIX V

Literature list relevant to bear releases and rehabilitation

Introduction

The following list contains 140 references which are relevant to release and rehabilitation of bears. The content of the publications range from general aspects as laid down in the IUCN guidelines for the placement of confiscated animals and those for re-introductions to very specific behavioural and management aspects of bear rehabilitation or details of release procedures. Summaries of workshops on pro and con of bear rehabilitation and releases are included in the list as well as articles on translocations of wild bears – either for removal of nuisance bears or for augmentation or re-introduction of bear populations. Other publications deal with topics which are as different as age of self-sufficiency of brown and American black bears or public attitudes towards bear re-introductions.

The references are sorted in two different lists: the one for newsletters (*International Bear News* and *Re-introduction News*) and another one for book chapters, reports, contributions to proceedings and articles in revised journals.
63 of the references are brief reports published in the *International Bear News,* 4 are from the *Re-introduction News*. 29 of these deal with translocations (6: nuisance bears; 10: re-introductions; 13: augmentation). 26 have rehabilitation as major topic, 20 of these report on results and techniques of bear releases. The newsletter articles are in general short reports on the status of ongoing projects. Reports on different stages of the same project might occur in several issues.

77 of the references are either book chapters, reports from universities, authorities or NGOs or from reviewed journals. Occasionally the final results of projects reported in the newsletters are published in this section. 42 deal with translocations (13: nuisance bears; 5: re-introductions; 17: augmentation). Rehabilitation is represented in 16 articles (14: releases).

The majority of articles report on brown bears (*U. arctos*) (53) and on American black bears (*U. americanus*) (67).

This reference list does not claim completeness, it is intended just as a starting point. To improve the list and to keep it updated, everybody who can contribute with additional references or corrections to the list is encouraged to send these to lkolter@zoo-koeln.de. Please refer to “reference list bear releases and rehabilitation”. A brief summary would be appreciated.

References from *International Bear News* and *Re-introduction News*

Anonymous 1994. Dens Ready for Orhphan Black Bear Cubs (reprinteded from *Inside Track*). *Int. Bear News* **3,** 9.

Beausoleil, R. 2002. New Mexico Conducts "Operation Bear Den". *Int. Bear News* **11,** 18.

Camarra, J.J. 1996. Slovenian Bears Moved to Pyrenees. *Int. Bear News* **5,** 6.

Castellanos, A.X. 2003. Ecology of re-introduced Andean bears in the Maquipucuna Biological Reserve, Ecuador: conservation implications. *Re-introduction News* **23,** 32-34.

Castellanos, A.X. 2005. Ecuador Andean Bear Project. *Int. Bear News* **14,** 26.

Castellanos, A.X. 2005. Reinforcement of Andean bear populations in the Alto Chaco Reserve and neighbouring areas, Northern Ecuador. *Re-introduction News* **24,** 12-13.

Clark, J. 1993. Arkansas. *Int. Bear News* **2,** 9.

Clark, J. 1995. Bear Rehabilitation Center. *Int. Bear News* **4,** 17-18.

Clark, J. 1995. Bear Reintroduction at Big South Fork. *Int. Bear News* **4,** 25-26.

Clark, J. 1996. Reintroduction Effort Begun. *Int. Bear News* **5,** 20.

Clark, J. 1997. Reuniting Black Bear Cubs and Mothers. *Int. Bear News* **6,** 17.

Dijk, v.J.J. 2002. Brown Bears on the Move in Serbia, Slovakia and Turkey. *Int. Bear News* **11,** 8.

Dijk, v.J.J. 2002. Reintroduction and Augmentation - Report from the 14th IBA Conference Steinkjer. *Int. Bear News* **11,** 11.

Dijk, v.J.J. & Huber, D. 2002. Limitations for Releasing Rehabilitated Bears Workshop - Summary. *Int. Bear News* **11,** 18.

Eastridge, R. 2002. Arkansas Bear Restoration. *Int. Bear News* **11,** 16.

Eastridge, R. 2000. Felsenthal National Wildlife Refuge, Arkansas . *Int. Bear News* **9,** 23.

Eastridge, R. & Clark, J.D. 1999. Black bear re-introduction in Kentucky and Tennesseee, USA. *Re-introduction News* **18,** 22.

Genovesi, P. 1999. Italian Alps Brown Bear Re-introduction. *Int. Bear News* **8,** 7.

Genovesi, P. 2000. Kirka & Masun Update. *Int. Bear News* **9,** 20.

Genovesi, P., Dupré, E. & Pedrotti, L. 1999. Brown Bear: Translocation of the brown bears in the Italian Central Alps. *Re-introduction News* **18,** 21-22.

Ginger, S. 2003. Louisiana Black Bear Restoration. *Int. Bear News* **12,** 17.

Goad, D. 1999. Arkansas Bear Restoration & Spring Den Work. *Int. Bear News* **8,** 26.

Goad, D. 1999. Big South Fork Black Bear Reintroduction. *Int. Bear News* **8,** 16.

Goad, D. 1999. Felsenthal Black Bear Restoration & White River NWR Study. *Int. Bear News* **8,** 16.

Goad, D. 1998. Winter Black Bear Translocation in Louisiana. *Int. Bear News* **7,** 33-34.

Gunther, K.A., Tonnessen, K., Dratch, P. & Servheen, C. 2004. Habituated Grizzly Bears Workshop - Summary. *Int. Bear News* **13,** 17-18.

Jorgenson, J.P. 1998. Rehab-Release Efforts & Bear Release. *Int. Bear News* **7,** 21.

Koch, D. 1995. Yosemite National Park. *Int. Bear News* **4,** 16.

Kolter, L. & Dijk, v.J.J. 2001. Workshop on Evaluating Bear Releases and Making the Zoo/Field Connection. *Int. Bear News* **10,** 21-22.

Kovach, S.D. & Shideler, D. 2001. Release of Grizzly Bear 012. *Int. Bear News* **10,** 23.

Maughan, S. 1995. 1994 Black Bear Cub Rehabilitation. *Int. Bear News* **4,** 18.

Maughan, S. 2005. Idaho Black Bear Rehab . *Int. Bear News* **14,** 36.

Maughan, S. 1997. Idaho Black Bear Rehab Needs Help. *Int. Bear News* **6,** 21.

Maughan, S. 2003. Idaho Black Bear Rehab Update. *Int. Bear News* **12,** 24.

Maughan, S. 1994. Rehabber Seeks Cause in Death of Black Bear Cubs. *Int. Bear News* **3,** 17-18.

Maughan, S. 1994. Rehabilitation and Release of Orphaned Black Bear Cubs in Idaho. *Int. Bear News* **3,** 8.

Mertzanis, G., Amaslidis, A., Giannatos, G., Karachalios, Tr. & Papaioannu, H. 1995. First Relocation and Monitoring of a Problem Bear in Greece. *Int. Bear News* **4,** 12.

Mertzanis, G., Amaslidis, A. & Papadopoulos, Eg. 1996. First Reintroduction of a Yearling European Brown Bear in Greece. *Int. Bear News* **5,** 10-11.

Morgan, C. 1997. Bear Rehab Info Needed. *Int. Bear News* **6,** 24.

Mustoni, A. & Genovesi, P. 2001. Brown Bears in the Italian Central Alps. *Int. Bear News* **10,** 20.

Noyce, K. 1993. Wisconsin . *Int. Bear News* **2,** 8.

Noyce, K. 1997. Wisconsin - Orphan Cubs. *Int. Bear News* **6,** 13.

Pajetnov, V.S. & Pajetnov, S.V. 2003. Brown Bear Rehabilitation at Toropetsky Biological Station . *Int. Bear News* **12,** 22-23.

Pazhetnov V.S. & Pazhetnov S.V. 2005. Female Brown Bear with Six Cubs. *Int. Bear News* **14,** 17.

Pazhetnov V.S., Pazhetnova S.I. & Pazhetnov S.V. 1997. Captive Russian Brown Bear Cubs Released in the Wild. *Int. Bear News* **6,** 9.

Peyton, B. 1997. Ecuador Bear Rehab. *Int. Bear News* **6,** 5-6.

Peyton, B. 1996. Ecuador - Captive Bears Escape. *Int. Bear News* **5,** 8.

Quenette, P.Y. 1998. Bears in the Central Pyrenees. *Int. Bear News* **7,** 27.

Quenette, P.Y. 2002. Pyrenees Brown Bear Restoration: Five Years After the First Release. *Int. Bear News* **11,** 11-12.

Quenette, P.Y. 2003. Restoration of Brown Bears in the Pyrenees: the controversy. *Int. Bear News* **12,** 20.

Quenette, P.Y. 2003. Which future for the Brown Bear Population in the Pyrenees? *Int. Bear News* **12,** 20.

Ratajczak, D.R. 1997. Cades Cove Release. *Int. Bear News* **6,** 17.

Rauer, G. 2002. Genetic Analyses Improves Austrian Brown Bear Monitoring. *Int. Bear News* **11,** 13.

Reagan, S., Shively, S. & Davidson, P. 2001. Louisiana Bears Relocated. *Int. Bear News* **10,** 23.

Reynolds McKinney, B. & Delgadillo Villalobos, J. 2003. Mexican Black Bear Rehab Facility. *Int. Bear News* **12,** 23.

Schoettler, A. 2005. Reintroduction of Bears in France. *Int. Bear News* **14,** 23.

Simek, S. 2005. Florida Nuisance Research. *Int. Bear News* **14,** 29.

Soorae, P. 1997. Bear Re-introduction & Habitat Analysis Evaluation - what can we learn for the future (Summary of the Workshop during the IBA conference in Graz 1997). *Int. Bear News* **6,** 9.

Stringham, S.F. 2003. Are Rehabilitated Bears Especially Dangerous. *Int. Bear News* **12,** 17.

Waters, S.S. 2003. The rehabilitation and release of two black bears, Alberta, Canada. *Int. Bear News* **12,** 20-21.

Wathen, G. 1999. Big South Fork Bears. *Int. Bear News* **8,** 22.

Whaley, K. 1999. Manitoba Traveling Bad Black Bears. *Int. Bear News Int. Bear News* **8,** 15.

Yerena, E. 1994. Andean Bear Conservation. *Int. Bear News* **3,** 8.

References from book chapters, reports, proceedings and journals

Alt, G. & Beecham, J. 1984. Reintroduction of orphaned black bear cubs into the wild. *Wildlife Society Bulletin* **12,** 169-174.

Alt, G. L.1995. Black bear population establishment in southwestern Pennsylvania. Final Report for Job 06233, Pennsylvania Game Commission. Harrisburg, Pennsylvania, USA.

Alt, G.L., Matula, J., Alt, F.W. & Lindzey, J.S. 1977. Movements of translocated nuisance black bears of northern Pennsylvania. *Transactions of the Northeastern Fish and Wildlife Conference* **34,** 119-126.

Beeman, L.E. & Pelton, M.R. 1976. Homing of black bears in the Great Smoky Mountains National Park. *Int. Conf. Bear Res. and Manage.* **3,** 87-95.

Black, L.E. 1996. South American bear rehabilitation; a spectacular sight. *Wildlife Rehabilitation Today* **7,** 22-26.

Blanchard, B.M. & Knight, R.R. 1995. Biological consequences of relocating grizzly bears in the Yellowstone ecosystem. *J. Wildlife. Manage.* **37,** 560-565.

Boyer, D.A. & Brown, R.D. 1988. A survey of translocations of mammals in the United States. In: *Translocation of Large Mammals* (Ed. by L. Nielsen & R.D. Brown), pp. 1-11. Milwaukee, Wisconsin, USA, Wisconsin Humane Society.

Brannon, R.D. 1987. Nuisance grizzly bear, *Ursus arctos*, translocations in the Greater Yellowstone Area. *Canadian Field-Naturalist* **101,** 569-575.

Buchalczyk, T. 1980. The brown bear in Poland. *Int. Conf. Bear Res. and Manage.* **4,** 229-232.

Carney, D.W. & Vaughan, M.R. 1987. Survival of introduced black bear cubs in Shenandoah National Park, Virginia. *Int. Conf. Bear Res. and Manage.* **7,** 83-85.

Clark, D.J. 1985. Notes on the death of an introduced bear in Arkansas. *Proceedings of the Arkansas Academy of Science* **34,** 121.

Clark, J.D., Clapp, D.L., Smith, K.G. & Wigley, T.B. 1991. Black bear damage and landowner attitudes toward bears in Arkansas. *Proceedings of the Southeastern Association of Fish and Wildlife Agencies* **45,** 208-217.

Clark, J.D., Huber, D. & Servheen, C. 2002. Bear Reintroduction: Lessons and Challenges. *Ursus* **13 ,** 335-345.

Clark, J.E. 1999. Capture and on-Site Release of Nuisance Black Bears and Survival of Orphaned Black Bears Released in the Great Smoky Mountains. Thesis, University of Tennessee, Knoxville.

Clark, J.E., Pelton, M.R., Wear, B.J. & Ratajczak, D.R. 2002. Survival of orphaned black bears released in the Smoky Mountains. *Ursus* **13,** 269-273.

Clarke, S.H., O'Pezio, J. & Hackford, C. 1980. Fostering black bear cubs in the wild. *Int. Conf. Bear Res. and Manage.* **4,** 163-166.

Comley, L.M. 1999. Survival, Reproduction, and Movements of Translocated Nuisance Black Bears in Virginia. Virignia Polytechnic Institute and State University, Blacksburg.

Dijk, v.J.J. 2005. Considerations for Rehabilitation and Release of Bears into the Wild. In: *Rehabilitation and Release of Bears* (Ed. by L. Kolter & J.J. van Dijk), pp. 7-16. Köln, Zoologischer Garten Köln.

Eastridge, R. 2000. Experimental Repatriation of Black Bears to the Big South Fork Area of Kentucky and Tennessee. Thesis, University of Tennessee, Knoxville.

Eastridge, R. & Clark, J.D. 2001. Evaluation of 2 soft-release techniques to reintroduce black bears . *Wildlife Society Bulletin* **29,** 1163-1174.

Erickson, A.W. 1959. The age of self-sufficiency in the black bear. *J. Wildlife. Manage.* **23,** 401-405.

Fies, M.L., Martin, D.D. & Blank, Jr.G.T. 1987. Movements and rates of return of translocated black bears in Virginia. *Int. Conf. Bear Res. and Manage.* **7,** 369-372.

Fredriksson, G. 2005. Conservation Threats Facing Sun Bears, *Helarctos malayanus*, in Indonesia and Experiences with Sun Bear Reintroductions in East Kalimantan, Indonesia. In: *Rehabilitation and Release of Bears* (Ed. by L. Kolter & J.J. van Dijk), pp. 35-42. Köln, Zoologischer Garten Köln.

Griffith, B., Scott, J.M., Carpenter, J.W. & Reed, C. 1989. Translocation as a species conservation tool: status and strategy. *Science* **245,** 477-480.

Griffiths, H.I., Davison, A. & Birks, J. 1996. Species reintroductions. *Conservation Biology* **10,** 923-930.

Harger, E.M. 1970. A Study of Homing Behavior of Black Bears. M.A.Thesis, Northern Michigin University, Marquette.

Huber, D. 2005. Why not to Re-introduce "Rehabilitated" Brown Bears to the Wild. In: *Rehabilitation and Release of Bears* (Ed. by L. Kolter & J.J. van Dijk), pp. 28-34. Köln, Zoologischer Garten Köln.

Huber, D., Dabanovic, V., Kusak, J. & Frkovic A. 1994. Reintroduction of hand-reared brown bears into the wild: experiences, problems, chances. In: *Proceedings of the International Conference on Aspects of Bear Conservation, Bursa, Turkey* (Ed. by G.M. Dorrestein & M. Kahraman), pp. 179-186.

Huber, D., Kulier, I., Poljak, A. & Devčić-Kuhar, B. 1993. Food intake and mass gain of hand-reared brown bear cubs. *Zoo Biology* **12,** 525-533.

Hugie, R.D. 1982. Black Bear Ecology and Management in the Northern Conifer-Deciduous Forests of Maine. Thesis, University of Montana, Missoula.

IUCN 1998. *Guidelines for Re-Introductions. Prepared by the IUCN/SSC Re-Introduction Specialist Group* . Gland Switzerland and Cambridge, UK, IUCN.

IUCN 2002. *Guidelines for the Placement of Confiscated Animals. Prepared by the IUCN/SSC Re-Introduction Specialist Group*. Gland Switzerland and ERWDA, Abu Dahabi, UAE, IUCN.

Johnson, L.J. & LeRoux, P. 1973. Age of self-sufficiency in brown/grizzly bear in Alaska. *J. Wildlife. Manage.* **37,** 122-123.

Jonkel, C., Husby, P., Russel, R. & Beecham, J. 1980. The reintroduction of orphaned grizzly bear cubs into the wild. *Int. Conf. Bear Res. and Manage.* **4,** 369-372.

Judd, S. & Knight, R.R. 1980. Movements of radio-instrumented grizzly bears within the Yellowstone transport area. *Int. Conf. Bear Res. and Manage.* **4,** 359-367.

Kasworm, W.F., Thier, T.J. & Servheen, C. 1999. Cabinet Mountains Grizzly Bear Population Augmentation. *Progress Report, USFWS, Grizzly Bear Recovery Co-ordinator's Office, University of Montana, USA.*

Kolter, L. & van Dijk, J.J. 2005. *Rehabilitation and Release of Bears - For the Welfare of Conservation or for the Conservation of Welfare?* Köln, Zoologischer Garten Köln.

Loyal, J.J. & LeRoux, P. 1973. Age of self-sufficiency in brown/grizzly bear in Alaska. *J. Wildlife. Manage.* **37,** 122-123.

Maguire, L. & Servheen, C. 1991. Integrating biological and social concerns in endangered species management augmentation of grizzly bear populations. *Conservation Biology* **6,** 426-434.

Manen, van F. T. 1990. A feasibility study for the potential reintroduction of black bears into the Big South Fort Area of Kentucky and Tennessee. Tennessee Wildlife Resources Agency, Technical Report 91-3. Nashville, Tennessee, USA.

Massopust, H.L. & Anderson, R.K. 1984. Homing tendencies of translocated nuisance black bears in northern Wisconsin. *Eastern Workshop on Black bear Research and Management* **7,** 66-73.

Maughan, S. 2000. *Handbook*. edn. Garden City, Idaho, USA: .

McArthur, K.L. 1981. Factors contributing to the effectiveness of black bear transplants. *J. Wildlife. Manage.* **45,** 102-110.

McCollum, M. T. 1974. Research and management of black bears in Crater Lake National Park, Oregon. U.S. Natl. Park Serv. Prog. Report, Crater Lake, Oreg.

McLaughlin, C. R., Baker, C. J., Sallade, A., and Tamblyn, J. 1981. Characteristics and movements of translocated nuisance black bears in northcentral Pennsylvania. Pa. Game Comm. Rep. Harrisburg.

Miller, D.A., Hallerman, E.M. & Vaughan, M.R. 1998. Genetic variation in black bear populations from Louisiana and Arkansas: examining the potential influence of reintroductions from Minnesota. *Ursus* **10,** 335-341.

Miller, S.D. & Ballard, W.B. 1982. Homing of transplanted Alaskan brown bears. *J. Wildlife. Manage.* **46,** 869-876.

Mundy, K. R. D. and Flook, D. R.Background for managing grizzly bears in the national parks of Canada. 73. Can. Wildl. Serv. Rep. Ser. 22.

Osti, F. 1999. *L'Orso Bruno Nel Trentino*. edn. Trento, Italy: Arca Press.

Pajetnov, V.S. & Pajetnov, S.V. 1998. Food competition and grouping behavior of orphaned brown bear cubs in Russia. *Ursus* **1,** 571-574.

Payne, N.F. 1975. Unusual movements of Newfoundland black bears. *J. Wildlife. Manage.* **39,** 812-813.

Pazhetnov V.S., Pazhetnov C.V. & Pazhetnova S.I. 1999. The technique for raising orphan-bear cubs for the release in the wild. *Tver. IFAW. (rus).*

Pazhetnov V.S. & Pazhetnov S.V. 2005. Reintroduction of Orphan Brown Bear Cubs. In: *Rehabilitation and Release of Bears* (Ed. by L. Kolter & J.J. van Dijk), pp. 53-61. Köln, Zoologischer Garten Köln.

Pearson, A. M. 1975. The northern interior grizzly bear *Ursus arctos* L. Can. Wildlife Rep. Ser. 34.

Peyton, B. & Plenge, H. 2005. Captive Spectacled Bears, Conservation, and Community Development in Peru. In: *Rehabilitation and Release of Bears* (Ed. by L. Kolter & J.J. van Dijk), pp. 43-52. Köln, Zoologischer Garten Köln.

Quenette, P.Y., Alonso, M., Chayron, L., Cluzel, P., Dubarry, E., Dubreuil, D., Palazon, S. & Pomarol, M. 2001. Preliminary results of the first transplantation of brown bears in the French Pyrenees. *Ursus* **12,** 115-120.

Rauer, G. 1997. First experiences with the release of 2 female brown bears in the Alps of Eastern Austria. *Int. Conf. Bear Res. and Manage.* **9,** 91-95.

Riley, S.J., Aune, K., Mace, R.D. & Madel, M.J. 1994. Translocation of nuisance grizzly bears in Northwestern Montana. *Int. Conf. Bear Res. and Manage* **9,** 567-573.

Robbins, C.T., Schwartz, C.C. & Felicetti, L.A. 2004. Nutritional ecology of ursids: a review of newer methods and management implications. *Ursus* **15,** 161-171.

Rogers, L.L. 1986. Effects of translocation distance on frequency of return by adult black bears . *Wildlife Society Bulletin* **14,** 76-80.

Rogers, L.L. 1988. Homing tendencies of large mammals: a review. In: *Translocation of Large Mammals* (Ed. by L. Nielsen & R.D. Brown), pp. 76-92. Milwaukee, Wisconsin, USA, Wisconsin Humane Society.

Rogers, M.J. 1973. Movements and reproductive success of black bears introduced into Arkansas. *Proceedings of the Southeastern Association of Fish and Wildlife Agencies* **27,** 307-308.

Seddon, P.J. & Soorae, P. 1999. Guidelines for subspecific substitutions in wildlife restoration projects. *Conservation Biology* **13,** 177-184.

Servheen, C., Kasworm, W. & Christensen, A. 1987. Approaches to augmenting the grizzly bear population in the Cabinet Mountains of Montana. *Int. Conf. Bear Res. and Manage.* **7,** 363-367.

Servheen, C., Kasworm, W. & Their, T.J. 1995. Transplanting grizzly bears *Ursus arctos horribilis* as a management tool - results from the Cabinet Mountains, Montana, USA. *Biological Conservation* **71,** 261-268.

Smeeton, C. & Waters, S.S. 2005. Captive Management of Orphaned Black Bears (*Ursus americanus*) Intended for Release at the Cochrane Ecological Institute in Canada: A Case Report. In: *Rehabilitation and Release of Bears* (Ed. by L. Kolter & J.J. van Dijk), pp. 62-69. Köln, Zoologischer Garten Köln.

Smith, K.G. & Clark, J.D. 1994. Black bears in Arkansas: characteristics of a successful translocation. *Journal of Mammology* **75,** 309-320.

Smith, K.G., Clark, J.D. & Gipson, P.S. 1990. History of black bears in Arkansas: over-exploitation, near elimination, and successful reintroduction. *Eastern Workshop on Black bear Research and Management* **10,** 5-14.

Snyder, N.F.R., Derrickson, S.R., Beissinger, S.R., Wiley, J.W., Smith, T.B., Toone, W.D. & Miller, B. 1996. Limitations of Captive Breeding in Endangered Species Recovery. *Conservation Biology* **10 ,** 338-348.

Soorae, P. 2005. Placement of confiscated animals. In: *Rehabilitation and Release of Bears* (Ed. by L. Kolter & J. van Dijk), pp. 17-27. Köln, Zoologischer Garten Köln.

Stirling, I., Jonkel, C., Smith, P., Robertson, R., and Cross, D. 1977. The ecology of the polar bear (*Ursus maritimus*) along the western coast of Hudson Bay. Can. Wildl. Serv.Occas. Pap. 33.

Stiver, W.H. 1991. Population Dynamics and Movements of Problem Black Bears in Great Smoky Mountains National Park. Thesis, University of Tennessee, Knoxville.

Stiver, W.H., Pelton, M.R. & Scott, C.D. 1997. Use of pen-reared black bears for augmentation or reintroductions. *Int. Conf. Bear Res. and Manage.* **9,** 145-150.

Swenson, J.E., Franzén, R., Segerström, P. & Sandegren, F. 1998. On the age of self-sufficiency in Scandinavian brown bears. *Acta Theriologica* **43,** 213-218.

Thier, T. J. and Sizemore, D. 1981. An evaluation of grizzly relocations in the border grizzly area, 1975-1980. Border Grizzly Proj.Spec. Rep.; Univ. Montana, Missoula.

Vickery, S.S. & Mason, G.J. 2003. Behavioral persistence in captive bears: implications for reintroduction. *Ursus* **14,** 35-43.

Zedrosser, A., Gerstl, N., and Rauer, G. 1999. Brown Bears in Austria. Wien , Umweltbundesamt.

APPENDIX VI

WAZA Guidelines for the Acceptance of Seized or Confiscated Animals

With courtesy of WAZA

WAZA Guidelines on the acceptance of seized or confiscated animals

Introduction

1. Live wild animals are seized and confiscated by local, regional and national authorities for a variety of reasons. After seizure, the authorities must ensure that the animals are temporarily placed at a facility where they are housed, fed and cared for according to animal welfare requirements. By the subsequent act of confiscation, the authorities become the owners of the animals and have to dispose of them in a responsible, timely and efficient manner, taking into account practical, legal, animal welfare and conservation aspects.

2. The authorities are assumed to take into account the following guidelines when disposing of confiscated animals:
   a. the CITES Guidelines for the Disposal of Confiscated Live Specimens of Species included in the Appendices (Resolution Conf. 10. 7, adopted at the 10th Meeting of the Conference of the Parties, Harare (Zimbabwe), 9 to 20 June 1997);
   b. the IUCN Guidelines for the Placement of Confiscated Animals (approved by the 51st Meeting of the IUCN Council, Gland, Switzerland, February 2000).

   Both Guidelines refer to zoos and aquariums as suitable recipients of confiscated animals. They recognise, however, that zoos and aquariums generally cannot accommodate large numbers of animals that become available through confiscations and that, in particular for species with lower conservation value, the authorities may also have to explore other options, such as rescue centres, life-time care facilities, specialist societies, humane societies, commercial captive breeders, or research institutions.

   Further guidance is provided to the authorities by
   c. the IUCN Guidelines for Re-introductions (approved by the 41st Meeting of the IUCN Council, Gland, Switzerland, May 1995); and
   d. the IUCN Guidelines for the Prevention of Biodiversity Loss Caused by Alien Invasive Species (approved by the 51st Meeting of the IUCN Council, Gland, Switzerland, February 2000).

Acceptance of seized animals

3. Whenever possible, zoos and aquariums should support the efforts of their authorities by accepting to temporarily house, feed and care for seized animals. Institutions accepting such animals may request that their expenses will be reimbursed. It is strongly recommended that arrangements be made under which the costs will be charged to the confiscating authority rather than directly to the importer or owner of the animals.

Advice to authorities regarding placement of animals

4. When confiscating animals, the authorities will have to take the basic decision whether the animals should
   a. be returned to the wild;
   b. be maintained in human care for the remainder of their natural lives;
   c. be euthanised.

5. To facilitate this basic decision, both the CITES and IUCN Guidelines contain decision trees. WAZA and its association members will not interfere with this stage of the decision making process. Individual zoos and aquariums will also refrain from influencing the authorities, unless they are (part of) the CITES Scientific Authority or belong to another government established consultative body and are approached by the authorities in that capacity.

Acceptance of confiscated animals for permanent keeping

6. Zoos and aquariums will accept confiscated animals only if they have the necessary expertise and can ensure appropriate care and accommodation of the animals in the long term.

7. The animals may be accepted under a permanent loan agreement or as donations. A permanent loan agreement should also define the ownership of the offspring.

8. While the receiving institutions may pay for transportation costs, they should refrain from buying the animals.

9. Zoos and aquariums accepting animals will do so only if the transaction will not result in any benefits to the person or institution from which the animals were confiscated.

10. If the animals belong to a species for which a coordinated regional conservation breeding programme exists, they should be integrated into that programme, if appropriate.

Acceptance of confiscated animals for returning them to the wild

11. If zoos or aquariums are requested by the confiscating authority to accept animals for returning them to the wild, they will accept only if the requirements of the IUCN Guidelines for Re-introductions are met. They will make sure that, during the whole process, these guidelines will be fully respected.

Creating awareness and fundraising for conservation

12. Zoos and aquariums having confiscated animals on display should take the opportunity to inform the public about the reason, which led to the confiscation. In particular, they should make the public aware of the threats unsustainable and illegal trade poses to wild species and of the role CITES plays in combating such trade.

13. Efforts should be made to raise funds for supporting *in situ* projects for the species concerned, especially in the case of high profile species, such as primates, large carnivores, elephants, rhinos, parrots, or marine turtles etc.

Adopted at the WAZA Plenary Session of 20 November 2003 – 58th Annual Meeting, held at San José, Costa Rica, 2003.

APPENDIX VII

IUCN Guidelines for Re-introductions

With courtesy of the IUCN/SSC Re-introduction Specialist Group

IUCN/SSC Guidelines For Re-Introductions

Prepared by the SSC Re-introduction Specialist Group *
Approved by the 41st Meeting of the IUCN Council, Gland Switzerland, May 1995

INTRODUCTION

These policy guidelines have been drafted by the Re-introduction Specialist Group of the IUCN's Species Survival Commission (1), in response to the increasing occurrence of re-introduction projects worldwide, and consequently, to the growing need for specific policy guidelines to help ensure that the re-introductions achieve their intended conservation benefit, and do not cause adverse side-effects of greater impact. Although IUCN developed a Position Statement on the Translocation of Living Organisms in 1987, more detailed guidelines were felt to be essential in providing more comprehensive coverage of the various factors involved in re-introduction exercises. These guidelines are intended to act as a guide for procedures useful to re-introduction programmes and do not represent an inflexible code of conduct. Many of the points are more relevant to re-introductions using captive-bred individuals than to translocations of wild species. Others are especially relevant to globally endangered species with limited numbers of founders. Each re-introduction proposal should be rigorously reviewed on its individual merits. It should be noted that re-introduction is always a very lengthy, complex and expensive process.

Re-introductions or translocations of species for short-term, sporting or commercial purposes - where there is no intention to establish a viable population - are a different issue and beyond the scope of these guidelines. These include fishing and hunting activities.

This document has been written to encompass the full range of plant and animal taxa and is therefore general. It will be regularly revised. Handbooks for re-introducing individual groups of animals and plants will be developed in future.

CONTEXT

The increasing number of re-introductions and translocations led to the establishment of the IUCN/SSC Species Survival Commission's Re-introduction Specialist Group. A priority of the Group has been to update IUCN's 1987 Position Statement on the Translocation of Living Organisms, in consultation with IUCN's other commissions.

It is important that the Guidelines are implemented in the context of IUCN's broader policies pertaining to biodiversity conservation and sustainable management of natural resources. The philosophy for environmental conservation and management of IUCN and other conservation bodies is stated in key documents such as "Caring for the Earth" and "Global Biodiversity Strategy" which cover the broad themes of the need for approaches with community involvement and participation in sustainable natural resource conservation, an overall enhanced quality of human life and the need to conserve and, where necessary, restore ecosystems. With regards to the latter, the re-introduction of a species is one specific instance of restoration where, in general, only this species is missing. Full restoration of an array of plant and animal species has rarely been tried to date.

Restoration of single species of plants and animals is becoming more frequent around the world. Some succeed, many fail. As this form of ecological management is increasingly common, it is a priority for the Species Survival Commission's Re-introduction Specialist Group to develop guidelines so that re-introductions are both

justifiable and likely to succeed, and that the conservation world can learn from each initiative, whether successful or not. It is hoped that these Guidelines, based on extensive review of case - histories and wide consultation across a range of disciplines will introduce more rigour into the concepts, design, feasibility and implementation of re-introductions despite the wide diversity of species and conditions involved.
Thus the priority has been to develop guidelines that are of direct, practical assistance to those planning, approving or carrying out re-introductions. The primary audience of these guidelines is, therefore, the practitioners (usually managers or scientists), rather than decision makers in governments. Guidelines directed towards the latter group would inevitably have to go into greater depth on legal and policy issues.

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1. DEFINITION OF TERMS

"Re-introduction": an attempt to establish a species(2) in an area which was once part of its historical range, but from which it has been extirpated or become extinct (3) ("Re-establishment" is a synonym, but implies that the re-introduction has been successful).
"Translocation": deliberate and mediated movement of wild individuals or populations from one part of their range to another.
"Re-inforcement/Supplementation": addition of individuals to an existing population of conspecifics.
"Conservation/Benign Introductions": an attempt to establish a species, for the purpose of conservation, outside its recorded distribution but within an appropriate habitat and eco-geographical area. This is a feasible conservation tool only when there is no remaining area left within a species' historic range.

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2. AIMS AND OBJECTIVES OF RE-INTRODUCTION

a. Aims:
The principle aim of any re-introduction should be to establish a viable, free-ranging population in the wild, of a species, subspecies or race, which has become globally or locally extinct, or extirpated, in the wild. It should be re-introduced within the species' former natural habitat and range and should require minimal long-term management.
b. Objectives:
The objectives of a re-introduction may include: to enhance the long-term survival of a species; to re-establish a keystone species (in the ecological or cultural sense) in an ecosystem; to maintain and/or restore natural biodiversity; to provide long-term economic benefits to the local and/or national economy; to promote conservation awareness; or a combination of these.

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3. MULTIDISCIPLINARY APPROACH

A re-introduction requires a multidisciplinary approach involving a team of persons drawn from a variety of backgrounds. As well as government personnel, they may include persons from governmental natural resource management agencies; non-governmental organisations; funding bodies; universities; veterinary institutions; zoos (and private animal breeders) and/or botanic gardens, with a full range of suitable expertise. Team leaders should be responsible for coordination between the various bodies and provision should be made for publicity and public education about the project.

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4. PRE-PROJECT ACTIVITIES

4a. BIOLOGICAL

(i) Feasibility study and background research

- An assessment should be made of the taxonomic status of individuals to be re-introduced. They should preferably be of the same subspecies or race as those which were extirpated, unless adequate numbers are not available. An investigation of historical information about the loss and fate of individuals from the re-introduction area, as well as molecular genetic studies, should be undertaken in case of doubt as to individuals' taxonomic status. A study of genetic variation within and between populations of this and related taxa can also be helpful. Special care is needed when the population has long been extinct.
- Detailed studies should be made of the status and biology of wild populations(if they exist) to determine the species' critical needs. For animals, this would include descriptions of habitat preferences, intraspecific variation and adaptations to local ecological conditions, social behaviour, group composition, home range size, shelter and food requirements, foraging and feeding behaviour, predators and diseases. For migratory species, studies should include the potential migratory areas. For plants, it would include biotic and abiotic habitat requirements, dispersal mechanisms, reproductive biology, symbiotic relationships (e.g. with mycorrhizae, pollinators), insect pests and diseases. Overall, a firm knowledge of the natural history of the species in question is crucial to the entire re-introduction scheme.
- The species, if any, that has filled the void created by the loss of the species concerned, should be determined; an understanding of the effect the re-introduced species will have on the ecosystem is important for ascertaining the success of the re-introduced population.
- The build-up of the released population should be modelled under various sets of conditions, in order to specify the optimal number and composition of individuals to be released per year and the numbers of years necessary to promote establishment of a viable population.
- A Population and Habitat Viability Analysis will aid in identifying significant environmental and population variables and assessing their potential interactions, which would guide long-term population management.

(ii) Previous Re-introductions

- Thorough research into previous re-introductions of the same or similar species and wide-ranging contacts with persons having relevant expertise should be conducted prior to and while developing re-introduction protocol.

(iii) Choice of release site and type

- Site should be within the historic range of the species. For an initial re-inforcement there should be few remnant wild individuals. For a re-introduction, there should be no remnant population to prevent disease spread, social disruption and introduction of alien genes. In some circumstances, a re-introduction or re-inforcement may have to be made into an area which is fenced or otherwise delimited, but it should be within the species' former natural habitat and range.
- A conservation/ benign introduction should be undertaken only as a last resort when no opportunities for re-introduction into the original site or range exist and

only when a significant contribution to the conservation of the species will result.

- The re-introduction area should have assured, long-term protection (whether formal or otherwise).

(iv) Evaluation of re-introduction site

- Availability of suitable habitat: re-introductions should only take place where the habitat and landscape requirements of the species are satisfied, and likely to be sustained for the for-seeable future. The possibility of natural habitat change since extirpation must be considered. Likewise, a change in the legal/ political or cultural environment since species extirpation needs to be ascertained and evaluated as a possible constraint. The area should have sufficient carrying capacity to sustain growth of the re-introduced population and support a viable (self-sustaining) population in the long run.
- Identification and elimination, or reduction to a sufficient level, of previous causes of decline: could include disease; over-hunting; over-collection; pollution; poisoning; competition with or predation by introduced species; habitat loss; adverse effects of earlier research or management programmes; competition with domestic livestock, which may be seasonal. Where the release site has undergone substantial degradation caused by human activity, a habitat restoration programme should be initiated before the re-introduction is carried out.

(v) Availability of suitable release stock

- It is desirable that source animals come from wild populations. If there is a choice of wild populations to supply founder stock for translocation, the source population should ideally be closely related genetically to the original native stock and show similar ecological characteristics (morphology, physiology, behaviour, habitat preference) to the original sub-population.
- Removal of individuals for re-introduction must not endanger the captive stock population or the wild source population. Stock must be guaranteed available on a regular and predictable basis, meeting specifications of the project protocol.
- Individuals should only be removed from a wild population after the effects of translocation on the donor population have been assessed, and after it is guaranteed that these effects will not be negative.
- If captive or artificially propagated stock is to be used, it must be from a population which has been soundly managed both demographically and genetically, according to the principles of contemporary conservation biology.
- Re-introductions should not be carried out merely because captive stocks exist, nor solely as a means of disposing of surplus stock.
- Prospective release stock, including stock that is a gift between governments, must be subjected to a thorough veterinary screening process before shipment from original source. Any animals found to be infected or which test positive for non-endemic or contagious pathogens with a potential impact on population levels, must be removed from the consignment, and the uninfected, negative remainder must be placed in strict quarantine for a suitable period before retest. If clear after retesting, the animals may be placed for shipment.
- Since infection with serious disease can be acquired during shipment, especially if this is intercontinental, great care must be taken to minimize this risk.

- Stock must meet all health regulations prescribed by the veterinary authorities of the recipient country and adequate provisions must be made for quarantine if necessary.

(vi) Release of captive stock

- Most species of mammal and birds rely heavily on individual experience and learning as juveniles for their survival; they should be given the opportunity to acquire the necessary information to enable survival in the wild, through training in their captive environment; a captive bred individual's probability of survival should approximate that of a wild counterpart.
- Care should be taken to ensure that potentially dangerous captive bred animals (such as large carnivores or primates) are not so confident in the presence of humans that they might be a danger to local inhabitants and/or their livestock.

4b. SOCIO-ECONOMIC AND LEGAL REQUIREMENTS

- Re-introductions are generally long-term projects that require the commitment of long-term financial and political support.
- Socio-economic studies should be made to assess impacts, costs and benefits of the re-introduction programme to local human populations.
- A thorough assessment of attitudes of local people to the proposed project is necessary to ensure long term protection of the re-introduced population, especially if the cause of species' decline was due to human factors (e.g. over-hunting, over-collection, loss or alteration of habitat). The programme should be fully understood, accepted and supported by local communities.
- Where the security of the re-introduced population is at risk from human activities, measures should be taken to minimise these in the re-introduction area. If these measures are inadequate, the re-introduction should be abandoned or alternative release areas sought.
- The policy of the country to re-introductions and to the species concerned should be assessed. This might include checking existing provincial, national and international legislation and regulations, and provision of new measures and required permits as necessary.
- Re-introduction must take place with the full permission and involvement of all relevant government agencies of the recipient or host country. This is particularly important in re-introductions in border areas, or involving more than one state or when a re-introduced population can expand into other states, provinces or territories.
- If the species poses potential risk to life or property, these risks should be minimised and adequate provision made for compensation where necessary; where all other solutions fail, removal or destruction of the released individual should be considered. In the case of migratory/mobile species, provisions should be made for crossing of international/state boundaries.

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5. PLANNING, PREPARATION AND RELEASE STAGES

- Approval of relevant government agencies and land owners, and coordination with national and international conservation organizations.
- Construction of a multidisciplinary team with access to expert technical advice for all phases of the programme.

- Identification of short- and long-term success indicators and prediction of programme duration, in context of agreed aims and objectives.
- Securing adequate funding for all programme phases.
- Design of pre- and post- release monitoring programme so that each re-introduction is a carefully designed experiment, with the capability to test methodology with scientifically collected data. Monitoring the health of individuals, as well as the survival, is important; intervention may be necessary if the situation proves unforseeably favourable.
- Appropriate health and genetic screening of release stock, including stock that is a gift between governments. Health screening of closely related species in the re-introduction area.
- If release stock is wild-caught, care must be taken to ensure that: a) the stock is free from infectious or contagious pathogens and parasites before shipment and b) the stock will not be exposed to vectors of disease agents which may be present at the release site (and absent at the source site) and to which it may have no acquired immunity.
- If vaccination prior to release, against local endemic or epidemic diseases of wild stock or domestic livestock at the release site, is deemed appropriate, this must be carried out during the "Preparation Stage" so as to allow sufficient time for the development of the required immunity.
- Appropriate veterinary or horticultural measures as required to ensure health of released stock throughout the programme. This is to include adequate quarantine arrangements, especially where founder stock travels far or crosses international boundaries to the release site.
- Development of transport plans for delivery of stock to the country and site of re-introduction, with special emphasis on ways to minimize stress on the individuals during transport.
- Determination of release strategy (acclimatization of release stock to release area; behavioural training - including hunting and feeding; group composition, number, release patterns and techniques; timing).
- Establishment of policies on interventions (see below).
- Development of conservation education for long-term support; professional training of individuals involved in the long-term programme; public relations through the mass media and in local community; involvement where possible of local people in the programme.
- The welfare of animals for release is of paramount concern through all these stages.

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6. POST-RELEASE ACTIVITIES

- Post release monitoring is required of all (or sample of) individuals. This most vital aspect may be by direct (e.g. tagging, telemetry) or indirect (e.g. spoor, informants) methods as suitable.
- Demographic, ecological and behavioural studies of released stock must be undertaken.
- Study of processes of long-term adaptation by individuals and the population.
- Collection and investigation of mortalities.

- Interventions (e.g. supplemental feeding; veterinary aid; horticultural aid) when necessary.
- Decisions for revision, rescheduling, or discontinuation of programme where necessary.
- Habitat protection or restoration to continue where necessary.
- Continuing public relations activities, including education and mass media coverage.
- Evaluation of cost-effectiveness and success of re- introduction techniques.
- Regular publications in scientific and popular literature.

Footnotes:

1 Guidelines for determining procedures for disposal of species confiscated in trade are being developed separately by IUCN.

2 The taxonomic unit referred to throughout the document is species; it may be a lower taxonomic unit (e.g. subspecies or race) as long as it can be unambiguously defined.

3 A taxon is extinct when there is no reasonable doubt that the last individual has died

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The IUCN/SSC Re-introduction Specialist Group (RSG) is a disciplinary group (as opposed to most SSC Specialist Groups which deal with single taxonomic groups), covering a wide range of plant and animal species. The RSG has an extensive international network, a re-introduction projects database and re-introduction library. The RSG publishes a bi-annual newsletter RE-INTRODUCTION NEWS.

If you are a re-introduction practitioner or interested in re-introductions please contact:

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APPENDIX VIII

IUCN Guidelines for the Placement of Confiscated Animals

With courtesy of the IUCN/SSC Re-introduction Specialist Group

IUCN GUIDELINES FOR THE PLACEMENT OF CONFISCATED ANIMALS

Approved by the 51st Meeting of the IUCN Council, Gland, Switzerland, February 2000

EXECUTIVE SUMMARY

Live wild animals are confiscated by local, regional, and national authorities for a variety of reasons. Once they have taken possession of these animals, these authorities must dispose of them responsibly, in a timely and efficient manner. Prevailing legislation, cultural practices, and economic conditions will influence decisions on appropriate disposition of confiscated animals. Within a conservation context, there are several possible options from which to choose:

1) to maintain the animals in captivity for the remainder of their natural lives;
2) to return the animals to the wild;
3) to euthanize the animals, i.e., humanely destroy them

The IUCN Guidelines for the Placement of Confiscated Animals discuss the benefits and risks involved in each of these options. These Guidelines should be read in conjunction with the IUCN Guidelines for Re-introductions (IUCN 1998). They should also be read with reference to the CITES Guidelines for the Disposal of Confiscated Live Species of Species Included in the Appendices (Resolution Conf. 10.7) and the IUCN Guidelines for the Prevention of Biodiversity Loss Caused by Alien Invasive Species.

Returning confiscated animals to the wild is often considered the most popular option for a confiscating agency and can garner strong public support. However, such action poses real risks and problems and generally confers few benefits. These risks and problems include, but are not limited to, the following.

1. The mortality of animals released from captivity is usually high. Confiscated mammals and birds captured as juveniles have not learned the skills they need to survive in the wild. Other animals may be weakened or otherwise affected by their time in captivity and, thus, less able to survive. Finally, there is little chance of survival if the animals are released at a site that is not appropriate for the ecology or behavior of the species.
2. Animals released into the wild outside of their natural range – if they survive at all – have the potential to become pests or invasive. The effects of invasive alien species are a major cause of biodiversity loss, as such species compete with native species and in other ways compromise the ecological integrity of the habitats in which they have become established.
3. Having been in trade or a holding facility often in association with other wild animals and, in some instances, domesticated ones, confiscated wild animals are likely to have been exposed to diseases and parasites. If returned to the wild, these animals may infect other wild animals, thus causing serious, and potentially irreversible, problems.
4. In many instances, confiscated wild animals have been moved great distances from the site of capture and changed hands several times, such that their actual provenance is unknown. It may, therefore, be impossible or very difficult to establish an appropriate site for return to the wild that takes into account the ecological needs of the species, the animals' genetic make-up, and other attributes that are important to minimize risks (e.g., competition, hybridization) to wild populations at a release site.
5. in cases where the provenance is known, the ecological niche vacated by that animal may already be filled by other individuals and replacing the animal could result in further undesired disturbance of the ecosystem

6. Responsible programs to return animals to the wild (c.f. IUCN 1998) are long-term endeavors that require substantial human and financial resources; hence, they can divert scarce resources away from other more effective conservation activities.

If returning confiscated animals to the wild is to be consistent with conservation principles and practice, it should a) *only* be into a site outside of the species' natural range if such an action is in accordance with the IUCN Guidelines for Re-introductions for a conservation introduction; and b) only be practiced in cases where the animals are of high conservation value and/or the release is part of a management programme. Any release to the wild must include the necessary screening and monitoring to address potential negative impacts, as set forth in the IUCN Guidelines for Re-introductions (IUCN 1998).

Retaining confiscated wild animals in captivity is a clear – and, in most cases, preferable - alternative to returning them to the wild. Clearly, returning animals to their owners will be required in cases of theft. There are a number of options for keeping animals in captivity; however, each of these also has costs and risks.

- As confiscated animals are likely to have been exposed to diseases and parasites, if held in captivity, they may infect other captive animals, causing serious, and potentially irreversible, problems.
- Finding an appropriate home for confiscated animals can be time-consuming, and caring for the animals during that time can be expensive.
- Wild animals have specific nutritional requirements and require specific care. Short-term and long-term humane care of confiscated wild animals requires space, finances and expertise not readily available in many countries.
- Transfer of ownership from a confiscating government authority to a private entity – individual or non-commercial or commercial care facility – can raise complicated legal and ethical issues, which are difficult – and time-consuming - to address. Sale or transfer of ownership may – or may be seen to - stimulate demand for these animals and exacerbate any threat that trade may pose to the species. It may also give the appearance that the government condones illegal or irregular trade or, in the case of actual sale, is benefiting from such trade.

In addition to avoiding risks to wild populations engendered by return to the wild, keeping confiscated animals in captivity provides other benefits, for example:

- Confiscated animals can be used to educate people about wildlife and conservation, as well as the consequences of trade in live wildlife.
- Confiscated animals placed in captivity can provide breeding stock for zoos, aquariums, and other facilities, thus potentially reducing the demand for wild-caught animals although the opposite effect may also occur.
- In specific instances where the provenance of the confiscated specimens is known, these animals can provide the nucleus, and breeding stock, for possible reintroduction programs.
- Confiscated animals can be the subject of a range of non-invasive research, training and teaching programs with important potential benefits for conservation.

Euthanasia must be considered a valid alternative to placing animals in captivity or returning them to the wild. Although it may appear counter-intuitive to employ euthanasia, it is by definition a humane act and can be wholly consistent with both conservation and animal welfare considerations. Further, although many confiscating authorities may be wary of

criticism elicited by a decision to euthanize confiscated animals, there are a number of reasons to justify its use, including the following:

- In many, if not most, circumstances, euthanasia offers the most humane alternative for dealing with confiscated wild animals.
- Euthanasia eliminates the genetic, ecological, and other risks that release to the wild may pose to wild populations and ecosystems.
- Euthanasia eliminates the serious risk of spreading disease to wild or captive populations of animals.
- Euthanasia will often be the least costly option.

Establishment of an overall policy framework, with specific procedures for confiscating authorities, will facilitate consideration of the above three options for disposition, including the logistical, legal, and ethical questions that these authorities must address.

IUCN Guidelines for the Placement of Confiscated Animals

Statement of Principle

When live wild animals[3] are confiscated by government authorities, these authorities have a responsibility to dispose of them appropriately. Within a conservation context, and the confines of national and international law, the ultimate decision on placement of confiscated animals must achieve three goals: 1) to maximise the conservation value of the animals without in any way endangering the health, behavioural repertoire, genetic characteristics, or conservation status of wild or captive populations of the species[4] or any other wild living organism; 2) to discourage further illegal or irregular[5] trade in the species; and 3) to provide a humane solution, whether this involves maintaining the animals in captivity, returning them to the wild, or employing euthanasia to destroy them.

Statement of Need

Increased regulation of trade in wildlife and enforcement of these laws and regulations have resulted in an increase in the number of live wild animals that are confiscated by government agencies as a result of non-compliance with these regulations. In some instances, the confiscation is a result of patently illegal trade; in others, it is in response to other irregularities. While in some cases the number of confiscated animals is small, in many others the number is in the hundreds or greater. The large numbers involved, and the need to care for and dispose of them responsibly, have placed serious pressures on confiscating authorities, many of whom lack the technical, financial or human resources or the necessary frameworks to address these situations adequately.

In many countries, the practice has generally been to donate confiscated[6] animals to zoos or aquaria. However, this option is proving less viable. Zoos and aquaria generally cannot accommodate large numbers of animals that become available through confiscations. In addition to the resources required to house them and administer veterinary and other care, these institutions are usually less interested in the common species that comprise the vast proportion of wildlife confiscations. The international zoo community has recognized that placing animals of low conservation priority in limited cage space may benefit those individuals but may also detract from conservation efforts as a whole. Therefore, they are setting priorities for cage space (IUDZG/CBSG 1993), thus reducing their availability to receive confiscated animals.

There has been an increasing tendency to address the problem of disposition of confiscated animals by releasing them back into the wild. In some cases, release of confiscated animals

[3]In these Guidelines, unless stated otherwise, confiscated animals should be understood to refer to live wild animals, not those that have been captive-bred.

[4]Although this document refers to species, in the case of species with well-defined subspecies , the issues addressed will apply to lower taxonomic units.

[5]Irregular trade in a species refers to, for example, insufficient or incomplete paperwork from the exporting country or poor packing that has comprised the welfare of the live animals in the shipment.

[6]Although not discussed here, it should be understood that, depending on the statutory authority of the agencies involved, animals may first be seized and then confiscated only on completion of legal proceedings resulting in forfeiture by the individual having previously claimed ownership of the animals.

into existing wild populations has been made after careful evaluation and with due regard for existing general guidelines (IUCN 1987, IUCN 1998). In other cases, such releases have not been well planned and have been inconsistent with general conservation objectives and humane considerations. Animals released in inappropriate habitat are usually doomed to starvation or death from other causes that the animals are not equipped or adapted against. In addition to humane concerns, release into wild populations may also have strong negative conservation value by threatening existing wild populations for the following reasons.

1) Animals released into the wild outside their natural range can become pests or invasive, thus threatening agriculture and other sectors, native species, and the ecological integrity of the area in which they become established. The effects of invasive alien species are a major cause of global biodiversity loss.
2) The former home range of a confiscated animal may be quickly occupied by other individuals and releasing the confiscated animal could lead to further disruption of the animal's social ecology.
3) Diseases and parasites acquired by confiscated animals while held in captivity can easily spread into existing wild populations if these animals are released.
4) Individuals released into existing populations, or in areas near to existing populations, that are not of the same race or sub-species as those in the wild population, results in mixing of distinct genetic lineages.
5) Animals held in captivity, particularly immature animals, can acquire an inappropriate behavioural repertoire from individuals of other species, and/or lose certain behaviours or not develop the full behavioural repertoire necessary for survival in the wild. It is also possible that release of animals could result in inter-specific hybridisation, a problem also to be avoided.

In light of these trends, there is an increasing demand -- and urgent need -- for information and advice on considerations relating to responsible placement of confiscated animals. There is also a pressing need for technical expertise and assistance in assessing the veterinary, husbandry and other questions that must be addressed in this process. Recognizing this problem, the Parties to the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) have adopted guidelines for Disposal of Confiscated Live Specimens of Species Included in the Appendices (Resolution Conf. 10.7), applicable to both plants and animals. These IUCN guidelines build on and supplement those drawn up by CITES to apply more broadly to confiscated animals and confiscation situations.

Disposition of confiscated animals is not a simple or straightforward process. Only on rare occasions will the optimum course be obvious or result in an action of conservation value. Options for disposition of confiscated animals have thus far been influenced by the public's perception that returning animals to the wild is the optimal solution in terms of both animal welfare and conservation. However, a growing body of scientific study of re-introduction of captive animals, the nature and dynamics of wildlife diseases, and the nature and extent of the problems associated with invasive species suggests that such actions may be among the least appropriate options for many reasons, including those enumerated above. This recognition requires that the options available to confiscating authorities for disposition be carefully reviewed.

Management Options

In deciding on the disposition of confiscated animals, there is a need to ensure both the humane treatment of the animals and the conservation and welfare of existing wild populations. Options for disposition fall into three principal categories: 1) maintenance of the individual(s) in captivity; 2) returning the individual(s) in question to the wild; and 3) euthanasia.

Within a conservation perspective, by far the most important consideration in reviewing the options for disposition of confiscated animals is the conservation status of the species concerned. Where the animals represent an endangered or threatened species or are otherwise of high conservation value[7], particular effort should be directed towards evaluating whether and how these animals might contribute to a conservation programme for the species. The expense and difficulty of returning animals to the wild as part of a conservation (c.f. IUCN 1998) or management programme or pursuing certain captive options will generally only be justified for species of high conservation value. How to allocate resources to the large numbers of confiscated animals representing common species is one of the fundamental policy questions that confiscating authorities must address.

The decision as to which option to employ in the disposition of confiscated animals will depend on various legal, social, economic and biological factors. The "Decision Tree" provided in the present guidelines is intended to facilitate consideration of these options. The tree has been designed so that it may be used for both threatened and common species. However, it recognizes that that conservation value of the species will be the primary consideration affecting the options available for placement. International networks of experts, such as the IUCN Species Survival Commission Specialist Groups (see Annex 3 for contact details), should be able to assist confiscating authorities in their deliberations as to the appropriate disposition of confiscated animals.

In some instances, in the case of international trade, there may be a demand for confiscated animals to be returned to their country of origin, and the government authorities of that country may request their return. CITES has established guidelines on this question through Resolution Conf. 10.7. It should be noted that it is often difficult to establish the true origin (including country of origin) of many animals in trade. Moreover, final disposition of confiscated animals upon their return to the country of origin will require consideration of the same options presented here. There is a need for cooperative efforts to review these options in order to ensure that repatriation is not undertaken simply to shift the burden of addressing the problem to the country of origin.

Option 1 -- Captivity

Confiscated animals are already in captivity; there are numerous options for maintaining them there. Depending on the circumstances and the prevailing legal or policy prescriptions, animals. can be donated, loaned, or sold, to public or private facilities, commercial or non-commercial, and to private individuals. Placement can be in the country of origin (or export), country of confiscation, or a country with adequate and/or specialized facilities for the species or animals in question. If animals are maintained in captivity, in preference to being returned to the wild or euthanized, they must be afforded humane conditions and ensured proper care for their natural lives.

Zoos and aquaria are the captive facilities most commonly considered for placement of animals, but these institutions are generally less willing and available to receive such animals than is assumed. As most confiscated animals are common species, the full range of captive options should be considered. These include zoos and aquaria as well as the following:

[7] It is recognized that “conservation value” may not always be easy to assess and may be a function of species’ status at national or regional level as much as international level (e.g., listed as threatened by IUCN).

- **Rescue centers**, established specifically to treat injured or confiscated animals;

- **Life-time care facilities** devoted to the care of confiscated animals;

- **Specialist societies** or clubs devoted to the study and care of single species or species groups (e.g., reptiles, amphibians, birds) have provided an avenue for the disposition of confiscated animals through placement with these societies or individual members.

- **Humane societies** established to care and seek owners for abandoned animals may be in a position to assist with placement of confiscated animals with private individuals who can provide life-time care.

- **Commercial captive breeders** may be willing to receive and care for animals as well as to incorporate them into captive breeding activities. Such facilities, although commercial in nature, are likely to have the technical expertise and other resources to care for the animals. In addition, production of animals from captive breeding operations may reduce the demand for wild-caught animals.

- **Research institutions** maintain collections of exotic animals for many kinds of research (e.g. behavioural, ecological, physiological, psychological, medical and veterinary). Some research programmes have direct relevance to conservation. Attitudes towards vivisection or, in some instances, the non-invasive use of animals in research programmes as captive study populations vary widely from country to country and even within countries. These attitudes are likely to affect consideration of such programmes as an option for confiscated animals. However, it should be noted that transfer to facilities involved in research conducted under humane conditions may offer an alternative - and one that may eventually contribute information relevant to the species' conservation.

Choosing amongst these options will depend on the conservation value of the animals involved, the condition of the animals, the circumstances of trade in the species, and other factors. As a general rule, where confiscated animals are of high conservation value, an effort should be made to place them in a captive facility that ensures their availability for conservation efforts over the long term, such as with a zoo, ex-situ research programme, or an established captive breeding program or facility.

Captivity – Sale, Loan or Donation

Animals can be placed with an institution or individual in a number of ways. It is critical to consider two issues: the ownership of the animals and/or their progeny, and the payment of any fees as part of transfer of ownership. Confiscating authorities and individuals or organizations involved in the placement of confiscated specimens must clarify ownership, both of the specimens being transferred and any progeny. They must also consider the possible implications of payment of fees in terms of public perception and for achieving the purpose of confiscation, which is to penalize and, in so doing, deter illegal and irregular trade. The following points should considered.

Transfer of ownership/custody**.** Unless specific legal provisions apply, the confiscating authority should consider including in an agreement to transfer ownership or custody the conditions under which the transfer is made, such as any restrictions on use (e.g., exhibition, education, captive breeding, commercial or non-commercial) or obligations concerning use (breeding efforts), that the animals may be put to. Such an agreement may set forth conditions relating to:

- subsequent transfer of ownership or custody;
- changes in the use of the animals by the new owner or custodian; and
- consequences of violation of the terms of transfer by the new owner or custodian.

Payment of fees. There may be cases where captive facilities are willing to receive and commit to care for confiscated animals providing payment is made by the confiscating authority against those costs. More frequently, the confiscating authority may seek to recoup the costs of caring for the animals prior to placement by levying a fee as part of transfer of ownership. Such payment of fees is problematic for many reasons, including the following:

- it may weaken the impact of the confiscation as a deterrent;
- it may risk creating a public perception that the confiscating authority is perpetuating or benefiting from illegal or irregular trade; or
- depending on the level of the fees proposed, it may work against finding a suitable option for maintaining the animals in captivity.

It is important that confiscating authorities be prepared to make public the conditions under which ownership of confiscated animals has been transferred and, where applicable, the basis for any payments involved.

Captivity – Benefits

In addition to avoiding the risks associated with attempting to return them to the wild, there are numerous benefits of placing confiscated animals in a facility that will provide life-time care under humane conditions. These include:

a) educational value in terms of possible exhibition or other use;
b) the satisfaction to be derived from the increased chances for survival of the animals;
c) the potential for the animals to be used in a captive breeding programme to replace wild-caught animals as a source for trade;
d) the potential for captive breeding for possible re-introduction or other conservation programmes; and
e) the potential for use in conservation and other valuable research programs.

Captivity - Concerns

The concerns raised by placing animals in captivity include:

A) DISEASE. Confiscated animals may serve as vectors for disease, which can affect con-specifics and other species held in captivity. As many diseases cannot be screened for, even the strictest quarantine and most extensive screening for disease cannot ensure that an animal is disease-free. Where quarantine cannot adequately ensure that an individual is disease-free, isolation for an indefinite period, or euthanasia, must be carried out.

B) CAPTIVE ANIMALS MAINTAINED OUTSIDE THEIR RANGE CAN ESCAPE from captivity and become pests or invasive. Unintentionally introduced exotic species have become invasive

in many countries, causing tremendous damage to agriculture, fisheries, and transport, but also to native animal populations. The decline of the European mink (*Mustela lutreola*), listed as Endangered by IUCN, is in part a result of competition from American mink (*Mustela vison*) escaped from fur farms, while the negative effects of competition from introduced North American red-eared slider turtles (*Trachemys scripta elegans)*, originally imported as pets, have been raised in relation to European and Asian freshwater turtles.

C) COST OF PLACEMENT. Providing housing and veterinary and other care to confiscated animals can be expensive; as a result, it may be difficult to identify institutions or individuals willing to assume these costs.

D) POTENTIAL TO ENCOURAGE UNDESIRED TRADE. As is discussed above, transfer of ownership of confiscated animals to individuals or institutions, whether it involves loan, donation, or sale, is problematic. Some have argued that any transfer of ownership - whether commercial or non-commercial - of confiscated animals risks promoting a market for these species and creating a perception of the confiscating authority's being involved in illegal or irregular trade. These risks must be weighed in relation to the benefits, in particular that maintenance in captivity offers over return to the wild or euthanasia. Some factors that might be considered in assessing the degree to which transfer of ownership – and sale - might promoted undesired trade are:

1) whether the animals in question are already available for sale legally in the confiscating country in commercial quantities; and
2) whether wildlife traders under indictment for, or convicted of, crimes related to illegal or irregular trade in wildlife can be prevented from purchasing the animals in question.
3) the monetary/ commercial value of the animals in question

As regards the latter question, it should be noted that experience in selling confiscated animals suggests that it is virtually impossible to ensure that commercial dealers suspected or implicated in illegal or irregular trade are excluded, directly or indirectly, in purchasing confiscated animals.

In certain circumstances, transfer to commercial captive breeders may have a clearer potential for the conservation of the species, or welfare of the individuals, than non-commercial disposition or euthanasia. In the case of common species, commercial breeders may be a particularly attractive option; in the case of species of high conservation value, this option should be carefully assessed. There may be a risk of stimulating demand from wild populations through increased availability of the species, and it may be difficult to secure access to these animals for future conservation activities.

Option 2 -- Return to the Wild

Because of the serious risks posed to wild animal populations from released confiscated animals, return to the wild is considered here to be a desirable option in only a very small number of instances and under very specific circumstances. The IUCN Guidelines for Re-introductions (IUCN 1998) make a clear distinction between the different options for returning animals to the wild to meet conservation objectives and discuss the purposes, rationale and procedures relating to these options.

The present Guidelines do not consider a viable option the return of animals to the wild except in accordance with the IUCN Guidelines for Re-introductions. Poorly planned or

executed release or (re-)introduction programmes are no better than dumping animals in the wild and should be vigorously opposed on both conservation and humane grounds.

A) **Re-introduction**: an attempt to establish a population in an area that was once part of the range of the species but from which it has become extirpated.

Some of the best known re-introductions have been of species that had become extinct in the wild. Examples include: Père David's deer (*Elaphurus davidanus*) and the Arabian oryx (*Oryx leucoryx*). Other re-introduction programmes have involved species that persist in some parts of their historical range but have been eliminated from others; the aim of these programmes is to re-establish a population in an area, or region, from which the species has disappeared. An example of this type of re-introduction is the recent re-introduction of the swift fox (*Vulpes velox*) in Canada.

B) **Reinforcement of an Existing Population** (also referred to as Supplementation): the addition of individuals to an existing population of the same species.

Reinforcement can be a powerful conservation tool when natural populations are diminished by a process which, at least in theory, can be reversed. One of the few examples of a successful reinforcement project involves the golden lion tamarin (*Leontopithecus rosalia*) in Brazil. Habitat loss, coupled with capture of live animals for pets, resulted in a rapid decline of the golden lion tamarin. When reserves were expanded, and capture for trade curbed, captive-bred golden lion tamarins were then used to supplement depleted wild populations.

Reinforcement has been most widely pursued in the context of rehabilitation programmes, i.e., when individual injured animals have been provided with veterinary care and released. Such activities are common in many countries, and specific programmes exist for species as diverse as hedgehogs and birds of prey. However common an activity, reinforcement carries with it the very grave risk that individuals held in captivity, even temporarily, are potential vectors for the introduction of disease or infectious organisms into wild populations.

Because of disease and other risks to wild populations, as well as the costs of screening and post-release monitoring, reinforcement should only be employed in instances where there is a direct and measurable conservation benefit (demographically and/or genetically, and/or to enhance conservation in the public's eye), or, at least, where the presumed benefits clearly outweigh these risks.

C) **Conservation Introductions** (also referred to as Beneficial or Benign Introductions): an attempt to establish a species, for the purpose of conservation, outside its recorded distribution but within an appropriate habitat and eco-geographical area. This is a feasible conservation tool only when there is no remaining area left within a species' historic range.

Extensive use of conservation introductions has been made in New Zealand, where endangered birds have been transferred to off-shore islands that were adjacent to, but not part of, the animals' original range. Conservation introductions can also be a component of a larger programme of re-introduction, an example being the breeding of red wolves (*Canis rufus*) on islands outside their natural range and subsequent transfer to mainland range areas.

Return to the Wild - Benefits

There are benefits of returning confiscated animals to the wild, providing the pre-requisite veterinary, genetic, and other screening is undertaken and post-release monitoring programmes are established (as per IUCN 1998).

a) In situations where the existing population is severely threatened, re-introduction might improve the long-term conservation potential of the species as a whole, or of a local population of the species (e.g., golden lion tamarins).

b) Return to the wild makes a strong political/educational statement concerning the fate of animals and may serve to promote local conservation values. However, as part of any education or public awareness programmes, the costs and difficulties associated with the return to the wild must be emphasized.

c) Species returned to the wild have the possibility of continuing to fulfill their biological and ecological roles.

Return to the Wild - Concerns

As indicated above, because of the risk of biological invasion, these guidelines do not consider it a viable option to return animals to the wild outside of their natural range in any but the most exceptional circumstances. Before return to the wild (as per IUCN 1998) of confiscated animals is considered, several issues of concern must be considered in general terms: welfare, conservation value, cost, and disease.

A) WELFARE. While some consider return to the wild to be humane, ill-conceived projects may return animals to the wild which then die from starvation or do not adapt to an unfamiliar or inappropriate environment. Humane considerations require that each effort to return confiscated animals to the wild be thoroughly researched and carefully planned. Re-introduction projects also require long-term commitment in terms of monitoring the fate of released individuals.

In order for return to the wild to be seriously considered on welfare grounds, some have advocated

> that the survival prospects for released animals must at least approximate those of wild animals of the same sex and age. While such demographic data on wild populations are rarely available, the spirit of this suggestion should be respected -- there must be humane treatment of confiscated animals when attempting to return them to the wild, and there should be a reasonable assessment of the survival prospects of the animals to justify the risks involved.

B) CONSERVATION VALUE AND COST. In cases where returning confiscated animals to the wild appears to be the most humane option, such action can only be undertaken if it does not threaten existing populations of con-specifics or populations of other interacting species, or the ecological integrity of the area in which they live. The conservation of the species as a whole, and of other animals already living free, must take precedent over the welfare of individual animals that are already in captivity.

Before animals are used in programmes in which existing populations are reinforced, or new populations are established, it must be determined that returning these individuals to the wild

will make a significant contribution to the conservation of the species, or populations of other interacting species, or it must serve a purpose directly related to the conservation and management of the species or ecosystem involved. Based solely on demographic considerations, large populations are less likely to go extinct, and, therefore, reinforcing existing very small wild populations may reduce the probability of extinction. In very small populations, a lack of males or females may result in reduced population growth or population decline and, therefore, reinforcing a very small population lacking animals of a particular sex may also improve prospects for survival of that population. However, genetic and behavioural considerations, as well as the possibility of disease introduction, also play a fundamental role in determining the long-term survival of a population. The potential conservation benefit of the re-introduction should clearly outweigh the risks.

The cost of returning animals to the wild in a responsible manner can be prohibitive, suggesting that this option should only be pursued when species are of high conservation value. Exceptions to this rule may be instances where the confiscated animals are not of high conservation value, but the circumstances and technical and other resources are available to ensure re-introduction is undertaken in accordance with conservation guidelines (e.g., IUCN 1998)

C) DISEASE. Animals held in captivity and/or transported, even for a very short time, may be exposed to a variety of pathogens. Release of these animals to the wild may result in introduction of disease to con-specifics or unrelated species with potentially catastrophic effects. Even if there is a very small risk that confiscated animals have been infected by exotic pathogens, the potential effects of introduced diseases on wild populations are often so great that this should preclude returning confiscated animals to the wild.

Release into the wild of any animal that has been held in captivity is risky. Animals held in captivity are more likely to acquire diseases and parasites. While some of these diseases can be tested for, tests do not exist for many animal diseases. Furthermore, animals held in captivity are frequently exposed to diseases not usually encountered in their natural habitat. Veterinarians and quarantine officers, thinking that the species in question is only susceptible to certain diseases, might not test for the diseases picked up in captivity. It should be assumed that all diseases are potentially contagious.

In assessing the possibilities for disease, it may be particularly helpful to consider the known or presumed circumstances of trade, including:

a) the time and distance from point of capture; the number of stages of trade and types of transport;
b) whether the animals have been held or transported in proximity to wild or domesticated animals of the same or other species and what specific diseases have been known to be carried by such animals.

D) SOURCE OF INDIVIDUALS. If the precise provenance of the confiscated animals is not known (they may be from several different sites of origin), or if there is any question of the source of animals, supplementation may lead to inadvertent pollution of distinct genetic races or subspecies. If particular local races or sub-species show specific adaptation to their local environments, mixing in individuals from other races or sub-species may be damaging to the local population. Where the origin and habitat and ecological requirements of the species are unknown, introducing an individual or individuals into the wrong habitat type may also doom them to death.

Given that any release incurs some risk, the following "precautionary principle" should be adopted: ***if there is no conservation value in releasing confiscated animals to the wild or no management programme exists within which such release can be undertaken according to conservation guidelines, the possibility of accidentally introducing a disease, or behavioural and genetic aberrations that are not already present into the environment, however unlikely, should rule out returning confiscated specimens to the wild as a placement option.***

Option 3 -- Euthanasia

Euthanasia -- the killing of animals carried out according to humane guidelines -- is a valid alternative to maintaining animals in captivity or returning them to the wild. Although it may appear counter-intuitive to employ euthanasia, it is, by definition, humane, and, thus can be wholly consistent with conservation and animal considerations. In many cases, it may be the most feasible option for conservation and humane, as well as economic, reasons. It is recognized that euthanasia is unlikely to be a popular option amongst confiscating authorities for disposition of confiscated animals. However, it cannot be overstressed that it may be the most responsible option. In many cases, authorities confiscating live animals will encounter the following situations:

a) In the course of trade or while held in captivity, the animals have contracted a chronic disease that is incurable and poses a risk to other animals, whether held in captivity or in the wild.

b) The actual provenance of the animals is unknown, and there is evidence to suggest that there may be genetic or other differences between them and presumed con-specifics in the wild, which could compromise the integrity of wild and captive populations, including those involved in breeding or conservation research activities.

c) There are insufficient resources to return the animals to the wild in accordance with biological (e.g., IUCN 1998) and animal welfare (e.g., International Academy of Animal Welfare Sciences 1992) guidelines.

d) There are no feasible options for maintaining the animals in captivity.

In these instances, euthanasia may be the only responsible option and, thus, should be employed.

Euthanasia-- Benefits

a) With respect to the conservation of the species in question and of captive and wild populations of animals, euthanasia carries far fewer risks (e.g. disease, genetic pollution, biological invasion) than maintenance in captivity or return to the wild.

b) Euthanasia may be the best (and only) possible solution to an acute problem with confiscated animals. Many possibilities for maintenance in captivity may not guarantee the animals' welfare over the long term, and the survival prospects of animals returned to the wild are generally not high, as, depending on the circumstances, such animals often die of starvation, disease or predation.

c) Euthanasia acts to discourage the activities that gave rise to confiscation, as the animals in question are completely lost to the trade, with no chance of recovery by the traders involved. This removes any potential monetary gain from illegal trade. In

addition, euthanasia may serve as a broader deterrent, in educating the public and other sectors about the serious and complex problems that can arise from trade in live wild animals.

d) The choice of euthanasia over maintenance in captivity or return to the wild offers an opportunity for confiscating authorities and other agencies to educate the public about more esoteric conservation problems, including those relating to invasive species and the potential negative consequences of releasing animals to the wild without adequate safeguards. Increased public awareness may generate additional ideas on placement of confiscated animals.

e) Euthanasia can be inexpensive as compared to other options. As such, it does not divert human and financial resources that could be allocated to other conservation or related activities, such as re-introduction or lifetime care of other animals, or the conservation of threatened species in the wild.

When animals are euthanized, or die in captivity, an effort should be made to make the best use of the dead specimens for scientific purposes, such as placing them in a reference collection in a university or research institute, which are very important for the study of biodiversity, or making them available for pathology or other research.

Euthansia- Risks

A) Just as there is potential positive educational value in employing euthanasia, there is a problem that it may give rise to negative perceptions of the confiscating authority for having taken that decision over other options. In such instances, there is a need to foresee such criticism and offer the rationale for the decision to euthanize.

B) There is a risk of losing unique behavioural, genetic and ecological material within an individual or group of individuals that represents variation within a species and may be of value for the conservation of the species.

Establishing the Necessary Frameworks

In order for prospective confiscating agencies to address the logistical, legal and other difficulties resulting from the seizure of wild animals, their eventual confiscation, and responsible disposition based on the above three options, there should be established an overall policy framework and specific procedures that *inter alia*:

- Identify the authority or authorities with responsibility for confiscation and placement of wild animals;
- Identify or provide the basis for establishing the facilities that will receive and, as necessary, quarantine, seized animals and hold them until final disposition is decided;
- Identify government or non-government agencies and experts that can assist in the identification, care, and screening of the seized or confiscated animals and assist in the process of deciding on appropriate disposition;
- Identify institutions, agencies, and private individuals and societies who can provide assistance to confiscating authorities in disposing of confiscated animals (including humane euthanasia) or can receive such animals;
- Elaborate on and provide for the implementation of the above guidelines in terms of specific legal and regulatory provisions and administrative procedures concerning

transfer of ownership (including sale) of confiscated animals, short-term (e.g., upon seizure) and long-term (e.g., post-confiscation) care, levying of fees and other payments for care of confiscated animals, and other considerations that may be required to ensure that confiscated wild animals are disposed of responsibly in terms of both their welfare and the conservation.

- Produce and implement written policies on disposal of confiscated wildlife, taking steps to ensure that all enforcement personnel are provided the necessary resources to implement the policy.

Decision Tree Analysis

For decision trees dealing with "Return to the Wild" and "Captive Options," the confiscating party must first ask the question:

Question 1: Will "Return to the Wild" make a significant contribution to the conservation of the species? Is there a management programme that has sufficient resources to enable return according to IUCN Re-introduction Guidelines?

The most important consideration in deciding on placement of confiscated specimens is the conservation value of the specimen in question. Conservation interests are best served by ensuring the survival of as many individuals as possible; hence, the re-introduction of confiscated animals must improve the prospects for survival of the wild population. Re-introducing animals that have been held in captivity will always involve some level of risk to populations of the same or other species in the ecosystem, because there can never be absolute certainty that a confiscated animal is disease- and parasite-free. If the specimen is not of conservation value, the costs of re-introducing the animals to the wild may divert resources away from conservation programmes for other species or more effective conservation activities. In most instances, the benefits of return to the wild will be outweighed by the costs and risks of such an action. If returning animals to the wild is not of conservation value, captive options pose fewer risks and may offer more humane alternatives.

Q1 Answer: **Yes:** Investigate "Return to the Wild" Options.
NO: Investigate "Captive Options".

DECISION TREE ANALYSIS - CAPTIVITY

The decision to maintain confiscated animals in captivity involves a simpler set of considerations than that involving attempts to return confiscated animals to the wild.

Question 2: Have animals been subjected to comprehensive veterinary screening and quarantine?

Animals that may be transferred to captive facilities must have a clean bill of health because of the risk of introducing disease to captive populations. This should be established through quarantine and screening.

Q2 Answer: Yes: Proceed to Question 3.
No: Quarantine and screen, and proceed to Question 3

Question 3: Have animals been found to be disease-free by comprehensive veterinary screening and quarantine, or can they be treated for any infection discovered?

If, during quarantine, the animals are found to harbour diseases that cannot reasonably be cured, they must be euthanized to prevent infection of other animals. If the animals are suspected to have come into contact with diseases for which screening is impossible, extended quarantine, transfer to a research facility, or euthanasia must be considered.

Q3 Answer: Yes: Proceed to Question 4
No: If chronic and incurable infection exists, first offer animals to research institutions. If impossible to place in such institutions, euthanize.

Question 4: Are there grounds for concern that certain options for transfer will stimulate further illegal or irregular trade or reduce the effectiveness of confiscation as a deterrent to such trade?

As much as possible, the confiscating authority should be satisfied that:

1) those involved in the illegal or irregular transaction that gave rise to confiscation cannot obtain the animals proposed for transfer;
2) the transfer does not compromise the objective of confiscation; and
3) the transfer will not increase illegal, irregular or otherwise undesired trade in the species.

What options can guarantee this will depend on the conservation status of the species in question, the nature of the trade in that species, and the circumstances of the specific incident that gave rise to confiscation. The payment of fees – to or by the confiscating authority – will complicate this assessment. Confiscating authorities must consider the various options for transfer in light of these concerns and weigh them against potential benefits that certain options might offer.

Answer: Yes: Proceed to Question 5a.
No: Proceed to Question 5b.

Question 5a: Is space available with a captive facility where the benefits of placement will outweigh concerns about the risks associated with transfer?

Question 5b: Is space available in a captive facility that offers particular benefits for the animals in question or the species?

There are a range of options for placement of confiscated animals in captivity, including public and private facilities, either commercial or non-commercial, specialist societies and individuals. Where several options for placement exist, it may be helpful to consider which offers the opportunity to maximize the conservation value of the animals, such as involvement in a conservation education or research programme or a captive-breeding programme. The conservation potential must be carefully weighed against the risk of stimulating trade that could exert further pressure on the wild population of the species.

Although placement with a commercial captive-breeding operation has the potential to reduce demand for wild-caught animals, this option should be carefully assessed: it may be difficult to monitor these facilities, and such programmes may, unintentionally or intentionally, stimulate trade in wild animals. In many countries, there are active specialist societies or clubs of individuals with considerable expertise in the husbandry and breeding of individual species or groups of species. Such societies can assist in finding homes for confiscated animals with individuals who have expertise in the husbandry of those species

When a choice must be made between several options, the paramount consideration should be which option can:

1) offer the opportunity for the animals to participate in a programme that may benefit the conservation of the species;
2) provide the most consistent care; and
3) ensure the welfare of the animals.

In instances, where no facilities are available in the country in which animals are confiscated, transfer to a captive facility outside the country of confiscation may be possible. Whether to pursue this will depend on the conservation value of the species or the extent of interest in it. An important consideration in assessing this option is the cost involved and the extent to which these resources may be more effectively allocated to other conservation efforts.

The confiscating authorities should conclude an agreement to transfer confiscated animals to captive facilities. This agreement should set forth the terms and conditions of the transfer, including:

a) restrictions on any use (e.g., exhibition, education, captive breeding), commercial or non-commercial, that the animals may be put to;
b) a commitment to ensure life-time care or, in the event that this becomes impossible, transfer to another facility that can ensure life-time care, or to euthanize the animals; and
c) conditions regarding subsequent transfer of ownership, including sale, of the animals or their offspring.

Q5 Answer: Yes: Execute agreement and sell.
No: Proceed to Question 6.

Question 6: Are institutions interested in animals for research under humane conditions?

Many research institutions maintain collections of exotic animals for research conducted under humane conditions. If these animals are kept in conditions that ensure their welfare, transfer to such institutions may provide an acceptable alternative to other options, such as transfer to another captive facility or euthanasia. As in the preceding instances, such transfer should be subject to terms and conditions agreed with the confiscating authority; in addition to those already suggested, it may be advisable to include terms that stipulate the types of research the confiscating authority considers permissible. If no placement is possible, the animals should be euthanized.

Q6 Answer: Yes: Execute Agreement and Transfer.
No: Euthanize.

DECISION TREE ANALYSIS -- RETURN TO THE WILD

Question 2: Have animals been subjected to a comprehensive veterinary screening and quarantine?

Because of the risk of introducing disease to wild populations, confiscated animals that may be released must have a clean bill of health. The animals must be placed in quarantine to determine if they are disease-free before being considered for released.

Q2 Answer: Yes: Proceed to Question 3.
No: Quarantine and screen, and proceed to Question 3.

Question 3: Have animals been found to be disease-free by comprehensive veterinary screening and quarantine, or can they be treated for any infection discovered?

If, during quarantine, the confiscated animals are found to harbour diseases that cannot reasonably be cured, unless any institutions are interested in the animals for research under humane conditions, they must be euthanized to prevent infection of other animals. If the animals are suspected to have come into contact with diseases for which screening is impossible, extended quarantine, donation to a research facility, or ethanasia must be considered.

Q3 Answer: Yes: Proceed to Question 4
No: If chronic and incurable infection exists, first offer animals to research institutions. If impossible to place in such institutions, euthanize.

Question 4: Can the country of origin and site of capture be confirmed?

The geographical location from which confiscated animals have been removed from the wild must be determined if these individuals are to be used to re-inforce existing wild populations. As a general rule, animals should only be returned to the population from which they were taken, or from populations that are known to have natural exchange of individuals with this population.

If provenance of the animals is not known, release for reinforcement may lead to inadvertent hybridisation of distinct genetic races or sub-species. Related species of animals that may live in sympatry in the wild and never hybridise have been known to hybridise when held in captivity in multi-species groups. This type of generalisation of species recognition under abnormal conditions can result in behavioural problems, which can compromise the success of any future release and also pose a threat to wild populations by artificially destroying reproductive isolation that is behaviourally mediated.

Q4 Answer: Yes: Proceed to Question 5.
No: Pursue 'Captive Options'.

Question 5: Do the animals exhibit behavioural abnormalities that might make them unsuitable for return to the wild?

Behavioural abnormalities as a result of captivity can render animals unsuitable for release into the wild. A wide variety of behavioural traits and specific behavioural skills are necessary for survival, in the short-term for the individual, and in the long-term for the population. Skills for hunting, avoiding predators, food selectivity, etc. are necessary to ensure survival.

Q5 Answer: Yes: Pursue 'Captive Options'.
No: Proceed to Question 6.

Question 6: Can the animals be returned expeditiously to their site of origin (specific location), and will benefits to conservation of the species outweigh any risks of such action?

Return of the animals to the wild through reinforcement of the wild population should follow the IUCN Re-introduction Guidelines and will only be an option under certain conditions, including:

a) appropriate habitat for such an operation still exists in the specific location that the individual was removed from; and
b) sufficient funds are available, or can be made available.

Q6 Answer: Yes: Re-inforce at origin (specific location) following IUCN Guidelines.
No: Proceed to Question 7.

Question 7: For the species in question, does a generally recognized programme exist the aim of which is conservation of the species and eventual return to the wild of confiscated individuals and/or their progeny? *Contact IUCN/SSC, IIUDZG, Studbook Keeper, or Breeding Programme Coordinator (See Annex 3).*

In the case of species for which active captive breeding and/or re-introduction programmes exist, and for which further breeding stock/founders are required, confiscated animals should be transferred to such programmes after consultation with the appropriate scientific authorities. If the species in question is part of a captive breeding programme, but the taxon (sub-species or race) is not part of this programme, other methods of disposition must be considered. Particular attention should be paid to genetic screening to avoid jeopardizing captive breeding programmes through inadvertent hybridisation.

Q7 Answer: Yes: Execute agreement and transfer to existing programme.
No: Proceed to Question 8.

Question 8: Is there a need, and is it feasible to establish a new re-introduction programme *following IUCN Guidelines*?

In cases where individuals cannot be transferred to existing re-introduction programmes, re-introduction following IUCN Guidelines, may be possible, providing:

a) appropriate habitat exists for such an operation;
b) sufficient funds are available, or can be made available, to support a programme over the many years that (re)introduction will require; and
c) sufficient numbers of animals are available so that re-introduction efforts are potentially viable.

In the majority of cases, at least one, if not all, of these requirements will fail to be met. In this instance, either conservation introductions outside the historical range of the species or other options for disposition of the animals must be considered.

If a particular species is confiscated with some frequency, consideration should be made as to whether to establish a re-introduction, reinforcement, or introduction programme for that species. Animals should not be held by the confiscating authority indefinitely while such programmes are planned, but should be transferred to a holding facility after consultation with the organization which is establishing the new programme.

Q8 Answer: Yes: Execute agreement and transfer to holding facility or new programme.
No: Pursue 'Captive Options'.

Relevant Documents

CITES. 1997. Resolution Conf. 10.7: Disposal of Confiscated Live Specimens of Species Included in the Appendices. Adopted at the Tenth Meeting of the Conference of the Parties to the Convention on International Trade in Endangered Species of Wild Fauna and Flora (Harare, 1997).
(Available from CITES Secretariat or from http://www.cites.org)

IUCN. 1987. *The IUCN position statement on translocation of living organisms: introductions, re-introductions and restocking*. IUCN, Gland, Switzerland.
(Available from IUCN/SSC or from http://iucn.org/themes/ssc/PUBS/POLICY/INDEX.HTM)

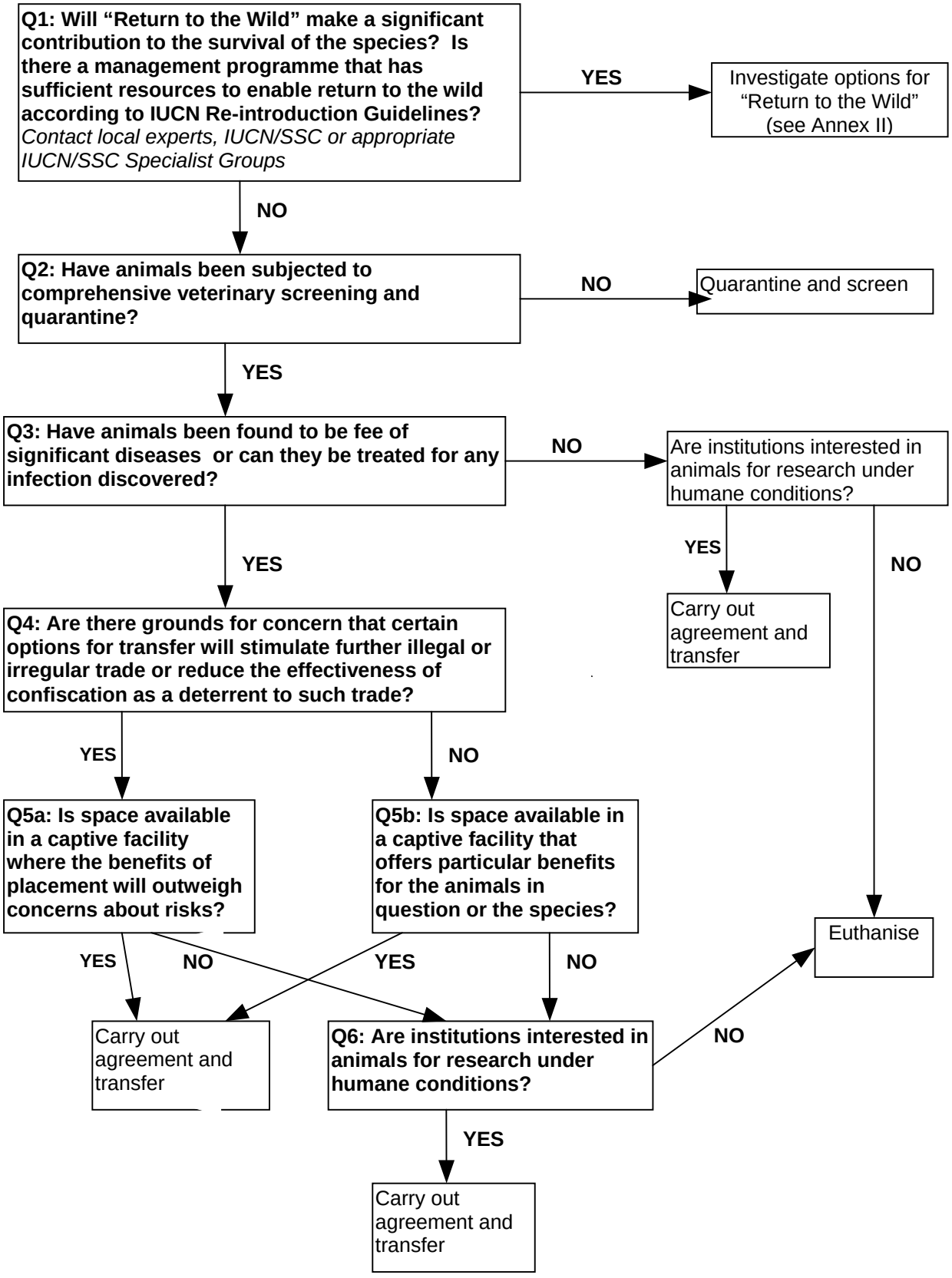
IUCN. 1998. *IUCN Guidelines for Re-introductions.* Prepared by the IUCN/SSC Reintroductions Specialist Group. IUCN, Gland Switzerland and Cambridge, UK.
(Available from IUCN Publications Services Unit or from
http://iucn.org./themes/ssc/PUBS/POLICY/INDEX.HTM)

IUCN. IUCN Guidelines for the Prevention of Biodiversity Loss Caused by Alien Invasive Species. Prepared by the IUCN/SSC Invasive Species Specialist Group. IUCN, Gland, Switzerland.
Available from http://iucn.org/themes/ssc/pubs/policy/invasivesEng.htm

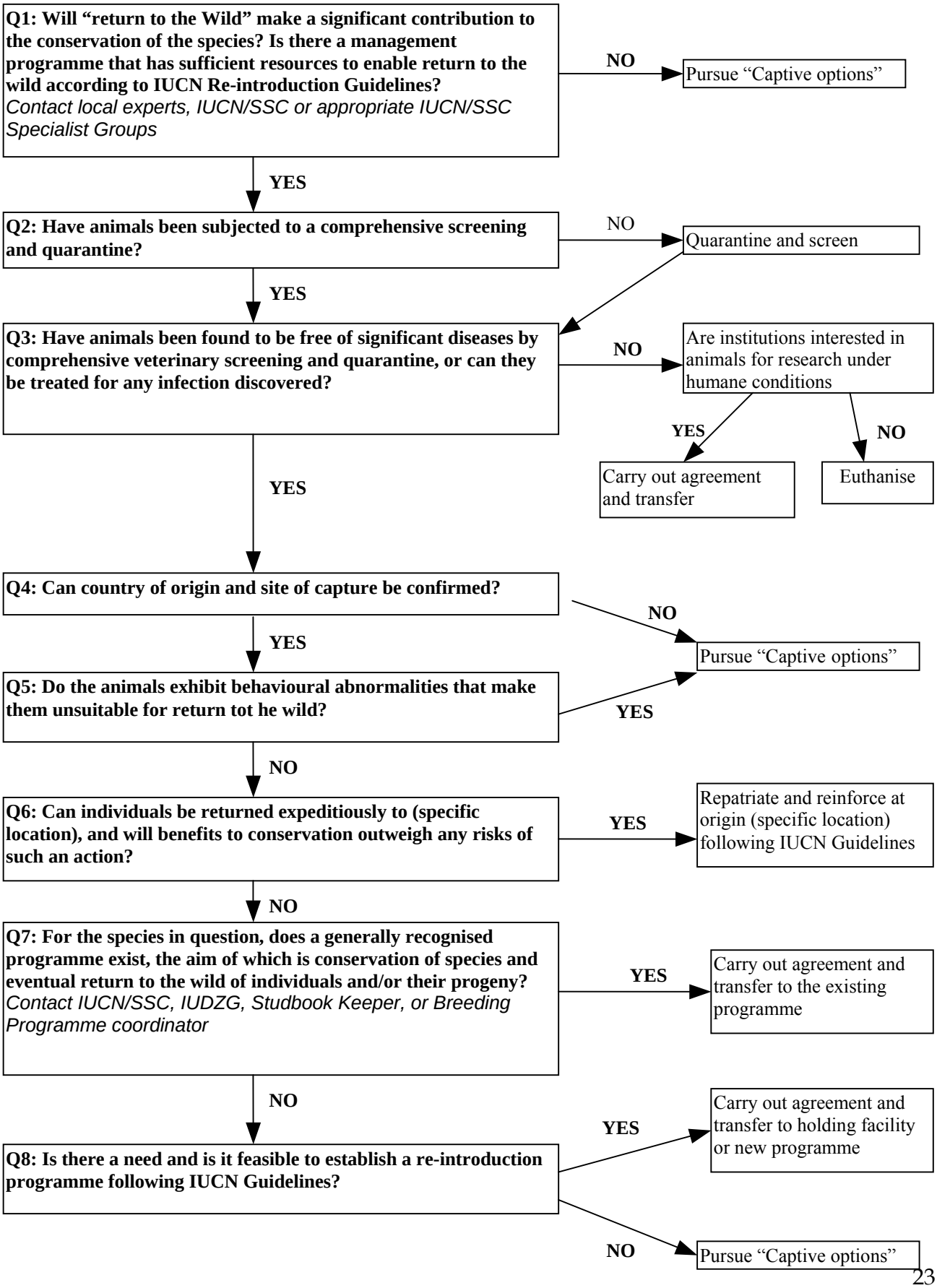
IUDZG/CBSG. 1993. *The World Zoo Conservation Strategy. The Role of Zoos and Aquaria of the World in Global Conservation*. IUDZG-the World Zoo Organization.

Annexes

Annex 1- Decision Tree for Captive Options



Annex 2 - Decision Tree for Return to the Wild



Annex 3 - Key Contacts

IUCN Species Survival Commission

Contact: Species Survival Programme
IUCN-The World Conservation Union
Rue Mauverney 28
1196 Gland
Switzerland
Tel: 41/22.999.0153
Fax: 41/22.999.00 15
Email: ssc@iucn.org
Website: http://www.iucn.org/themes/ssc/index.htm

Taxonomic Specialist Groups

Contact details for individual taxonomic specialist groups of SSC are available through IUCN at the contact details and IUCN website address provided above.

Disciplinary Specialist Groups

Conservation Breeding Specialist Group
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