

ORPHAN BEAR CUBS

Rehabilitation And Release Guidelines



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Preface

The following information was developed based on the experience of the author in raising and releasing American black bears in Idaho between 1972 and the present, from information derived from the scientific literature and from the observations and experience of many bear rehabilitators who responded in 2005 to a survey of bear rehabilitation centers around the world. The World Society for the Protection of Animals (WSPA) funded the survey. It was sent electronically to 40 individuals with experience raising and/or releasing orphan bear cubs. They were asked to identify critical components of the rehabilitation process associated with successful releases. Twenty-three individuals representing seven countries responded to the survey, providing information on the methods they used to raise, release and monitor the survival of six species of bears. Specific topics addressed in the survey included the physical characteristics of the rehabilitation facility, handling and care of the cubs, funding sources and release and monitoring protocols. A short follow-up survey was sent to selected individuals to gather additional information about the fates of released bears.

Acknowledgements

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The efforts of these individuals have laid the foundation for future bear releases that will contribute to the long-term conservation potential for bear species in many parts of the world.

Summary

Rehabilitation and release of bear cubs—a viable option for many cubs

- ❖ Rehabilitation and release programs originally were established as an alternative to euthanizing orphaned cubs or maintaining them in captivity for the remainder of their natural lives.
- ❖ Bear cubs are orphaned due to a variety of causes. Some of the more common reasons include commercial land use activities, regulated and non-regulated hunting, weather events, road/train accidents, abandonment as a result of food shortages, and nuisance situations.
- ❖ Four options most frequently considered by wildlife officials to address orphaned cubs are:
 1. to leave the cubs in the wild to fend for themselves;
 2. to capture them and place them permanently in a zoo or research facility;
 3. to capture them and place them temporarily in a rehabilitation facility;
 4. to euthanize them.
- ❖ However, every bear has its own personality (much like people), so decisions regarding the suitability of a cub for rehabilitation are probably best delayed until the bear is ready for release.

Rehabilitation facilities

- ❖ Larger enclosures containing natural vegetation and habitat enrichment may decrease the probability that bears will develop stereotypic behaviors and increase bears' chances of successfully adapting to life in the wild.
- ❖ Bears to be released into winter dens should be provided with denning structures in the enclosure that permit easy access by the release team, so the animals can be tranquilized with minimal disturbance before they are transported to the release site.

- ❖ During a bear's hibernation period, it is important to minimize disturbance around its enclosure.

Caring for bear cubs during rehabilitation

- ❖ Cubs do not need to learn survival skills from their mother (or their human caretakers). Therefore, cubs should be exposed to minimal contact with humans during the rehabilitation process.
- ❖ Allowing cubs to socialize with other cubs may be the single most important factor in reducing the level of habituation of cubs raised in captivity. Minimizing contact between a cub and its caretakers, post-weaning, appears to be an important consideration when raising **single** cubs.
- ❖ Minimizing the number of caretakers and limiting their feeding and care interactions with the bears appears to be very important in creating and maintaining the bears' avoidance behavior for people other than their caretaker.
- ❖ Research has shown that a formula composed of 24% fat, 12% protein, and very few carbohydrates simulates the caloric quality of bear milk and results in faster growth rates than a diet high in carbohydrates.

Releasing rehabilitated bear cubs—the technique

- ❖ The first consideration in choosing a release site is its habitat: whether the potential site is within the species' historic range, is currently good bear habitat and is large enough to support a bear population.
- ❖ Observations suggest that bears should be released in areas (and at times of the year) where it is unlikely the bears will encounter people during the first two weeks after their release.
- ❖ It is advisable to avoid releasing orphaned bears during active hunting seasons for bears or other large mammals.
- ❖ It is imperative that bear releases occur in areas with adequate natural food resources and that the release team is aware of potential attractants

in the area that could result in high mortality rates from human-bear conflicts. Steps should be taken to avoid releasing bears where there is a high probability they will become involved in conflict situations.

The release of rehabilitated bear cubs—other important considerations

- ❖ The issue of genetic “pollution” is not a relevant factor for releases if the orphaned cub’s provenance (capture location) is known and the proposed release location is within the geographical range of the orphaned cub. In situations where the cub’s provenance is unknown, genetic testing of the cub and the recipient bear population is the only safe, ethical approach for releasing the cub.
- ❖ The risk of introducing either disease or parasites into wild populations is unacceptable. All bears must be thoroughly examined and tested for disease exposure and parasitic infestation by a licensed veterinarian prior to release.
- ❖ The ability to construct or use natural cavities for denning appears to be an innate behavior common to bears, regardless of their age when they enter a rehabilitation facility. This suggests that providing them with natural or artificial dens may be unnecessary in some instances. However, bears released in areas where the ground is frozen would benefit from being placed in a den at the time of release.
- ❖ In advance of releasing bears from a rehabilitation facility, it is advisable to develop an intervention plan that addresses any conflicts that may develop if a released bear becomes involved in a nuisance situation or acts aggressively towards people.
- ❖ Releasing orphaned bears back to the wild has the potential to create a great deal of controversy in nearby communities unless public relations efforts are planned and carried out prior to the release.
- ❖ To better understand the dynamics between successful and failed release efforts, rehabilitators need to cooperate more in documenting methods of raising and releasing bears and monitoring their fates after release.

Rehabilitation and Release Guidelines for Orphan Bear Cubs

I. Introduction

Bears have played an important cultural role in many human societies for centuries. Much of their mystique is due to:

- ❖ Lack of knowledge about the ecology of these shy animals, which tend to avoid encounters with people;
- ❖ Their appearance and behaviors, which are similar to humans’;
- ❖ The perception that bears are large, potentially dangerous threats to people living, working and recreating in bear habitat.

The mystique tends to generate very strong feelings in humans, ranging from a strong desire to be close to them to a palpable fear of harm. Fortunately, most people recognize that bears pose little threat to them and they are strong supporters of efforts to maintain viable bear populations in the wild.

Bear cubs weigh from 225-565 g (8 to 20 oz) at birth and depend on their mothers for 17 to 29 months. During this time, they are subject to relatively high mortality rates, especially if their mothers are killed. Occasionally, orphaned cubs are rescued from the wild and placed in wildlife rehabilitation facilities. Initial attempts to rehabilitate orphaned bear cubs demonstrated some success and encouraged other rehabilitators to attempt releases of cubs back to the wild. These initial rehabilitation efforts were and continue to be an animal welfare issue for many people: They do not want to see orphaned cubs die of starvation or kept in captivity under inhumane conditions.

The successful release of orphaned bears to the wild has generated interest in starting rehabilitation programs in many countries. In 2006, programs were in place for seven of the eight species of bears. The rationale for release efforts has shifted to include the potential conservation benefits of maintaining small, isolated bear populations or re-introducing bears into previously occupied habitat. The first attempt at releasing captive-bred panda bears back to the wild occurred in China during 2006.

For more than three decades, biologists and rehabilitators in the United States and Canada have been involved in releasing orphaned American black bear cubs (refer to Appendix B

for scientific names) into occupied bear habitat.^{1,2,3,4} During that time, several hundred orphaned black bear cubs were returned to the wild using a variety of techniques, ranging from fostering them to lactating female bears in their winter dens to pen-raising the cubs and releasing them at about 5 months of age, when they were considered self-sufficient and capable of surviving on their own.^{1,2}

In one Pennsylvania study, foster mothers readily adopted orphaned cubs placed in dens prior to mid-April. After that date, they were frequently killed or abandoned unless the female was drugged and Vicks VapoRub was placed in her nostrils, or she was separated from her natural cubs for more than 2 hours and then reunited with her cubs and the orphan cubs. Another study, in Tennessee, evaluated the short-term survival of 11 rehabilitated American black bear cubs released at 11 to 18 months of age.⁵ Two radio collars failed, but no mortalities were documented for the other nine cubs through 180 days of monitoring. In central Ontario, Canada, the survival and movements of 60 radio-collared, orphaned American black bear yearlings from three rehabilitation centers were monitored for two years.⁶ These bears dispersed an average of 34 km (21 mi) from their release site, with a maximum dispersal distance of over 400 km (248 mi). Survival through two years was comparable to survival rates experienced by wild yearling black bears.

In the past 15 years, biologists have experimented with releasing brown bears in the U.S., Croatia and Romania; Asiatic black bears in the Russian Far East (RFE) and South Korea; sun bears in Indonesia; and Andean bears in Ecuador.^{10,11,12,13,14}



Figure 1. Cubs rarely starve when released at more than 7 months of age.

Very little information is available on the success of these releases, but the information that does exist suggests that some releases were successful. Others did not fare as well, resulting in the animals being recaptured and returned to captivity. It is unclear why some of these releases were not successful, but handling methods may not have been ideal, including the exposure of the cubs to an unknown number of caretakers and the public while the cubs were in captivity.

The first orphaned brown bear cub release in the U.S. occurred in Montana in 1975, when a female cub was placed in an artificial winter den.⁷ Although this bear removed its collar in the den, it was observed in the release area

the following spring and never was implicated in any nuisance situations after release. Two female brown bear cubs were ear-tagged and released in north central British Columbia in 1996. One of these brown bear cubs was observed two years after its release, but the second has not been observed since it was released⁸. Researchers involved in the unsuccessful release of three brown bear cubs in Croatia concluded that the methods used to raise the cubs, not nutritional factors, caused the releases to fail, since all three cubs were in good physical condition when they were recaptured.¹⁵ Since 1982, more than 130 orphaned European brown bears have been released in western Russia.⁹ Although attempts to determine the fates of these bears have been sporadic, no released orphans were involved in nuisance activities after release, and five bears were known to survive > 4 years.

II. Conservation Implications

Of the eight recognized species of bears in the world, seven are thought to be in decline in all or parts of their historical range as a result of human activities. Only the American black bear appears to be stable. Habitat fragmentation and loss is a major factor in the decline of bear populations throughout the world. Other human activities that severely impact bears include killing bears to protect life and property, unregulated hunting and commercial exploitation for body parts or the pet trade.¹⁶ Global warming may be a factor affecting polar bear habitat in the Arctic.

Many human activities result in the orphaning of bear cubs. Rehabilitation and release programs originally were established as an alternative to euthanizing these cubs or to maintaining them in captivity for the remainder of their natural lives. Rehabilitation programs also have provided positive educational and public relations value to governmental entities charged with managing wild bear populations. Rehabilitation programs also provide wildlife managers with an opportunity to use released animals, as surrogates for threatened bear species, to evaluate long-term strategies for managing small bear populations, with no risk to threatened or endangered bear populations.

However, release programs are not without some controversy within the conservation community. The significance of the controversy ranges from disagreements about what to call attempts to release bears to more important issues regarding the survival probabilities of released animals, the risk of spreading disease and parasites, competition with resident animals and the potential for hybridization within the recipient population.¹⁷

The International Union for the Conservation of Nature and Natural Resources (IUCN) Red List includes four of the six species of bears that currently have active rehabilitation programs in place.¹⁸ The conservation benefits of raising and releasing orphaned bear cubs

back to the wild have not been demonstrated in the field. However, preliminary results suggest it may be feasible to use orphan bear release programs to augment small, isolated populations in areas where human activities have caused bear numbers to decline, or to reintroduce bears into formerly occupied habitats from which they were extirpated.

III. Options for the Placement of Orphaned Bear Cubs

Bear cubs are orphaned due to a variety of causes. Some of the more common reasons include commercial land use activities, regulated and non-regulated hunting, weather events, road/train accidents, abandonment as a result of food shortages, and nuisance situations. Regardless of the reason cubs are orphaned, wildlife officials face difficult decisions in attempting to balance the public's concern for the welfare of these cubs and their obligation as wildlife stewards to protect the well being of native bear populations. The four options wildlife officials most frequently consider are to 1) leave the cubs in the wild to fend for themselves, 2) capture them and place them permanently in a zoo or research facility, 3) capture them and place them temporarily in a rehabilitation facility, or 4) euthanize them.

1) Leaving cubs in the wild

Leaving a cub in the wild is a viable option for many cubs if they are old enough to survive alone and have adequate fat reserves. Although brown bear cubs as young as 6 months old¹⁹ are known to have survived in the wild after being orphaned, and American black bear cubs^{2,20} as young as 5 to 7 months of age have survived, information from studying released bears suggests that survival rates are higher for older, larger cubs.

Bears are inherently shy animals that are solitary for most of the year, except for family groups.²¹ Bear cubs depend primarily on their mothers for protection against predators until they are self-sufficient. The experiences of many rehabilitators suggest that the behaviors and skills cubs need to survive in the wild are instinctive and do not need to be taught to them by their mothers. As a result, the likelihood of cubs surviving without intervention by humans probably increases substantially as they grow older, larger and less vulnerable to predation by adult bears or other carnivores.

The circumstances that led to the orphaning of the cubs also may influence their chances for survival in the wild. Cubs orphaned near human habitation or in habitats influenced by human activities may be at greater risk of becoming habituated or nuisance animals in the future.

The primary advantage of choosing this option is the cubs remain a part of the natural fauna

and live at no cost to management authorities. The main disadvantage is they may be less likely to survive than if they were raised in a rehabilitation facility and released when they were older and larger in size.

2) Placing cubs in captivity

Placing orphaned cubs in permanent captivity is the outcome least desirable to many people interested in the welfare of orphaned cubs. Bears are long-lived animals and require relatively large enclosures. Consequently, the demand for bears as display animals by research facilities or zoological institutions is low, so few opportunities exist for placing them in permanent captivity. While this option, too, involves little cost to wildlife management authorities, the cubs are lost to the wild population.

3) Raising and releasing cubs

Rehabilitation facilities offer another viable option for wildlife managers in areas where they are available. These facilities, when operated by experienced persons, have demonstrated that bears can be excellent candidates for release back to the wild. Survival rates for orphaned cubs do not differ substantially from those of wild cubs, and few animals (less than 2%) become involved in nuisance situations within one year of their release.^{2, 6, 22}

Reproduction has been documented for American black bears released as yearlings in a study of 19 sets of cubs by eight different females—including one set of cubs produced by the offspring of a released orphan bear.²³ Reproduction also has been documented for a released Andean bear in Ecuador.¹² These data suggest that concerns about the survivability of released cubs and their ability to function behaviorally as wild bears are not valid when good rehabilitation techniques are used to raise the cubs.

An obvious advantage of placing an orphaned cub in a rehabilitation facility is that the wildlife manager retains the option of releasing the animal back into the bear population if it is deemed a suitable candidate. Opportunities for raising and releasing common bear species (i.e. American black bear) also allow rehabilitators and wildlife authorities to develop methodologies that may prove useful in the future, if intensive management of threatened or endangered bear populations becomes necessary.

A number of disadvantages are associated with placing cubs in a rehabilitation facility, however. In many cases, the cost of raising and releasing orphaned cubs is substantial, although frequently it is borne by the rehabilitator using funding from private welfare organizations, personal funds and grants. A significant risk to wild bear populations exists if care is not taken to ensure that all bears released are free from disease and parasites. Two important factors should be considered before releasing cubs: The status (age structure) of

the wild bear population in the release area, and assurance that the area does not contain bears of a different, distinct genotype.

4) Euthanizing cubs

Euthanasia is clearly a less costly and safer alternative available to wildlife managers. Euthanizing an orphaned cub eliminates any risks associated with genetic or ecological issues and is, by definition, a humane act. However, many people do not view this option as a positive choice, and it can generate negative publicity for the governmental entity charged with protecting and managing bear populations. Choosing euthanasia as the preferred alternative disregards the ability of wildlife managers and rehabilitators to appropriately address disease, genetic and other ecological issues during the rehabilitation process. An appropriate protocol for raising and releasing bear cubs should take these issues into account and result in minimal or no risk to wild bear populations.

IV. Decisions about the Suitability of Cubs for Rehabilitation Programs

Orphaned cubs are held in captivity for varying lengths of time and under a variety of conditions before they are delivered to a rehabilitation facility. The circumstances range from situations where the cubs are very young and exposed to very little human contact, to cubs held in captivity for several months experiencing daily contact with many different people. In cases where the cubs have had minimal contact with people, the decision to place the cubs in a rehabilitation facility is not difficult for wildlife biologists or for the rehabilitators who will care for them. However, if cubs have had relatively long-term contact with people, decisions can be difficult because of concerns about habituation or the potential for cubs to injure or kill humans after release.

Very young or bottle-fed cubs will become habituated to their caretaker unless the caretaker makes a very disciplined effort to minimize all interactions (including conversation) with the cub. It is unclear, however, whether habituation to only one or two humans results in a lower probability of a successful release, especially when contact is reduced significantly after weaning and the cubs have an opportunity to socialize with other cubs during rehabilitation. Experienced rehabilitators have demonstrated success in releasing cubs that had considerable contact with people prior to weaning at 5 to 6 months old, but had only limited contact with their caretaker during post-weaning captivity. Cubs that enter a rehabilitation facility older than 5 months of age also will readily habituate to their caretaker, but they often remain wary of strangers when approached, even in the presence of their caretaker,

and are good candidates for release. However, bears exposed to many different individuals during rehabilitation, especially after weaning, may be more difficult to release successfully.

Every bear has its own personality, so decisions regarding the suitability of a cub for rehabilitation are probably best delayed until the bear is ready for release.

Reports of bears attacking people are rare for most bear species, but bears nevertheless have a reputation as being dangerous, particularly brown/grizzly, Asiatic black and sloth bears.^{24, 25, 26, 27} As a result, wildlife officials in several countries have expressed concerns about raising and releasing some species of bears. These concerns certainly are valid and must be considered before releasing cubs from a rehabilitation facility. Nevertheless, hundreds of orphaned bear cubs, including more than 130 brown bears in Russia,²⁸ have been released from rehabilitation facilities in the last 30 years, and there are no reports of released bears injuring or killing a person. It is entirely possible that a released bear could become aggressive toward people in a conflict situation, but these data suggest that the risk of injury or death to people from released bears is low.

V. Rehabilitation Facilities

Rehabilitation facilities focused on raising and releasing bears are located in urban, rural and wild environments throughout the world.²² The location of these facilities dictates, in many ways, the type of construction materials that can be used, the size and number of enclosures needed and the appropriate types of escape deterrents.

1) Licensing/Funding

Most wildlife rehabilitation facilities are privately owned and operated, but all are required to be licensed by governmental entities responsible for managing wildlife. Very few (2 out of 23) of the individuals responding to a survey of rehabilitation centers reported receiving funding from governmental sources; the majority received most of their funding from private sources, including animal welfare organizations and the general public.²² The majority of rehabilitation center operators also reported using personal funds to maintain the facility and care for the bears.

2) Number and Size of Enclosures

Bears are brought into rehabilitation facilities during all months of the year. Therefore, a rehabilitation facility that has several enclosures of various sizes available offers considerably more flexibility in the number of bears that can be housed at any given time. Although most

facilities do not separate bears by sex, they do occasionally separate them by size when such differences are deemed important. Injured or sick bears also need to be separated from other bears to facilitate healing and treatment protocols. In cases where some bears are being forced to hibernate, it may be necessary to house underweight or underage bears in a separate enclosure so they can continue to be fed throughout the winter. The National Wildlife Rehabilitators Association (NWRA) recommends the following **minimum enclosure sizes** for members of the Ursid family:²⁹

Table 1. Minimum recommended sizes for Ursid enclosures by age groupings.^{1*}

Age	Infant	Nursing/Pre-weaned W x L x H	Juvenile/Adult (Outside) W x L x H	Injured Adult (Inside) W x L x H
Size				
English^{1*}	20 gallons	3 x 6 x 3	20 x 36 x 16	8 x 12 x 8
Metric	76 litres	0.9 x 1.8 x 0.9	6 x 11 x 5	2.4 x 3.6 x 2.4

Infant cubs (from birth to 8 weeks of age) must be housed separately from older cubs (yearlings), and they require frequent feedings and a warm environment. Infants must be housed in a heated room in a small carrying kennel or box lined with dry towels. Cubs between 8 and 12 weeks of age can be moved to a somewhat larger enclosure to give them more room to move about and interact with other cubs. These cubs still cannot survive exposure to rain and cold temperatures, so the enclosure must offer protection from the elements. Cubs beyond 12 weeks of age can be housed in an outside enclosure that provides sufficient shade during summer months and shelter from extreme weather events. Individuals responding to the WSPA survey reported using enclosures as large as 1.2 to 2.0 ha (3 to 5 acres) for larger cubs/yearlings.²²

Although the NWRA has published minimum standards (Table 1) for bear enclosures, larger enclosures containing natural vegetation and habitat enrichment may decrease the probability that bears will develop stereotypic behaviors and increase their chances of successfully adapting to life in the wild.^{30, 31}

1 * Dimensional measurements are in feet (English) and meters (metric).

3) Construction Materials

The most common materials used to construct enclosures for bears are heavy-gauge woven wire (chain link) or net wire. Enclosures also have been constructed from brick, concrete or other solid, durable materials, including heavy-gauge metal tubing and metal sheeting. Many facilities use a combination of these materials for their enclosures. The primary factor affecting the suitability of an enclosure for bear cubs is durability. Bears are inquisitive animals, and they can be very destructive as they explore and test the limitations of their enclosure. The flooring for all enclosures should be a natural material, such as grass or dirt.²⁹

4) Escape Deterrents

Facilities located in bear habitat and far from human neighbors may not be concerned about accidental releases (escapes), while those in urban areas need to take special precautions to avoid accidentally releasing bears from the facility. Small enclosures typically are covered with chain link or net wire to prevent bears from escaping. Larger enclosures usually have electric fencing along their vertical walls approximately one meter above the ground, plus several strands located along the top of the enclosure.

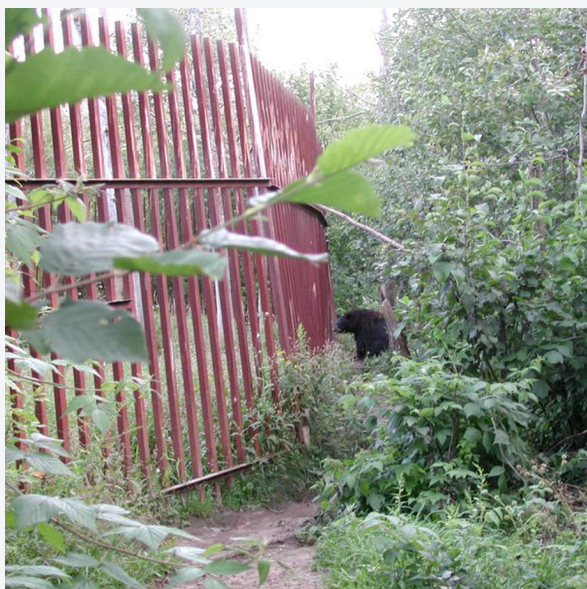


Figure 2. Heavy gauge vertical metal bars.



Figure 3. Net wire with electric fencing around perimeter.



Figure 4. Heavy gauge metal sheeting mounted above chainlink.



Figure 5. Fully enclosed and covered chainlink enclosure.

All facilities use buried wire (woven or net wire) or buried concrete along the inside perimeter of the enclosure to prevent bears from digging holes under the perimeter fencing. A few facilities employ a double-entry door system to reduce the risk of animals escaping via an entrance. All entrances should be secured with combination or keyed locks to prevent the bears from opening the doors and to prevent unauthorized human entry into the enclosure.

5) Visual Barriers

Most facilities use natural or artificial materials to screen enclosures. This prevents bears from seeing human activity adjacent to the enclosure or seeing their caretakers during feeding.



Figure 6. Opaque plastic sheeting used as a visual barrier.

Minimizing visual contact between bears and their caretakers by using artificial barriers has some appeal to wildlife managers and rehabilitators. However, because bears depend primarily on their senses of smell and hearing to avoid predators and other dangerous situations, it is unlikely that simple visual barriers are effective in preventing

the bears from recognizing that people are close by or are involved in feeding them. Visual barriers and small, dark structures (shelters) within the enclosure do serve the security needs of shy bears and bears new to the enclosure, however, and barriers may provide some level of stress relief for those individuals.

No differences between success rates for releases have been reported for facilities using artificial visual barriers and those that simply restrict the number of individuals involved in caring for the bears and limit their interactions with the bears.

Minimizing the number of caretakers and their interactions with bears while they feed and care for them appears to be very important in creating and maintaining the bears' avoidance behavior toward people other than caretakers.

6) Habitat Enrichment

Many wild animals are prone to developing stereotypic behaviors (pacing or bawling) when in captivity, and bears are no exception.^{31, 32, 33, 34} In an effort to minimize the opportunity for these types of behaviors to develop, rehabilitation facilities typically place objects meant to stimulate the cubs (habitat enrichment) in the enclosures. In many cases, these items simulate natural objects found in bear habitat. Several rehabilitation facilities also provide human-made objects for the bears to amuse themselves with during captivity. Objects commonly placed in bear enclosures to provide enrichment include water features (streams, pools or large tubs), climbing structures, trees, logs, stumps and toys (balls, boxes, etc.).



Figure 7. Climbing structures.



Figure 8. Water Feature

7) Denning/Shade Structures

In temperate climates, it occasionally becomes necessary to over-winter bear cubs in a rehabilitation facility in preparation for a late winter or spring release. Placing small, well-insulated structures (boxes or dens) in the enclosure provides the bears with a secure environment for hibernating and resting. Most dens used by wild bears are just large enough to hold an adult male bear or an adult female accompanied by young. However, in rehabilitation facilities, only the size of the den limits the number of cubs that will use it:



Figure 9. Artificial den structure being used for shade.

Larger structures that can accommodate more cubs are as readily used as smaller structures. Structures placed in the enclosure for denning purposes can be partially or completely buried or filled with straw to increase their insulation. Buried structures also can be used during the summer to moderate high temperatures in an enclosure where ambient temperatures exceed 30°C (86 F) for extended periods of time.

Bears that will be released into winter dens should be provided with denning structures in the enclosure that permit easy access by the release team, so the animals can be tranquilized with minimal disturbance before being transported to the release site.

VI. Characteristics of Orphaned Bear Cubs

Orphaned bear cubs are brought into rehabilitation facilities throughout the year. Each bear may require slightly different handling, depending on its stage of development, habituation history and individual personality; type of enclosure available; time of year; and presence of other cubs in the facility. Imprinting on human caretakers is often cited as a major concern for rehabilitated bears, particularly animals that enter rehabilitation facilities when they are very young. However, the experience of many rehabilitators suggests that imprinting is not a factor in raising bears. Very early in their life cycle bears, will imprint on movement or respond to specific sounds, but they are not a gregarious species, so imprinting is not as developed as it is in many more social species. As a result, imprinting is a less serious consideration to rehabilitators than habituation.

Bears quickly habituate to their humans and often display behavior demonstrating a close relationship with their caretaker. Normally, this behavior evolves as the cubs become older. With time, they begin showing more independence, especially if other cubs are in the enclosure. Young bears are very playful animals and will readily mingle with other cubs in the enclosure, giving them an opportunity to develop appropriate social skills for interactions with other bears after they have been released. Occasionally, single cubs readily interact with their caretaker through their first year, but that behavior usually diminishes after they have hibernated. In situations where only one cub is present in the rehabilitation facility, it may be necessary to hold it in captivity for a longer period of time before release, to allow the natural separation between the caretaker and the cub to develop.



Figure 10. American black bear and a brown bear housed in the same enclosure.

Bears are genetically predisposed to leave their natal home range (emigrate) within a year of family break-up; they do not maintain a long-term relationship with their mother or siblings.

Observations of cubs' behavior toward their caretakers suggest that their genetic predisposition to emigrate and lead a relatively solitary life likely limits the effects of habituation to humans during the rehabilitation process.

Regardless of their age when they arrive at a rehabilitation facility, cubs demonstrate different personalities. Many are very shy and always avoid contact with caretakers; others are not shy and actively interact with their caretaker. In some facilities, caretakers directly discourage any interaction from the time the cub enters the facility until it is released; others do not. One individual uses a small stick to discourage cubs from approaching their caretaker during feeding by tapping the cub's feet. Another person uses behavioral dominance techniques to discourage interactions by the cubs with their caretaker.³⁵

Although cubs show less interest in their caretakers and avoid interactions to some extent as they age, a conservative approach that discourages interactions with the caretaker may increase the probability of successfully releasing most bears to the wild. Cubs that enter the rehabilitation facility when they are more than 6 months of age will habituate to their caretaker and demonstrate no evidence of excessive stress while the caretaker is present in the enclosure. However, they rarely tolerate being approached by the caretaker and will move away if given the opportunity.

Occasionally cubs enter a rehabilitation facility after their mother has been killed in a nuisance situation. In these cases, it is not unusual for wildlife authorities to express concerns about the level of human habituation the cubs have been exposed to before arriving at the rehabilitation facility. However, if the rehabilitation facility uses proven methods to raise the cub, the level of human habituation of an orphan cub's mother is not a good predictor of how that cub will respond to humans when it is released back into the wild.

VII. Handling Methods

1) Contact with Caretakers

Rehabilitation facilities surveyed in 2005 used similar methods for handling bottle-fed cubs; however, when the cubs were older (feeding from a bowl) some differences were noted in the amount of human contact with the cubs. For brown bears, caretakers in one facility attempted to eliminate all conversation by using hand signals to communicate. They wore cotton gloves while feeding very young cubs to prevent the cubs from becoming accustomed to human voices and presence. At other facilities, conversation (sometimes with the bear cubs) was not uncommon. Although it is difficult to argue against taking a very conservative approach with regard to the potential negative effects of human conversation on cub development, it is not clear how important that approach is to minimizing the attachment between the caretakers and the cubs.

Taking steps to minimize conversation in the presence of cubs is a more conservative approach and worth serious consideration.

The most difficult situation for caretakers involved raising a single cub. Much of the difficulty resulted from the inability of a single cub to socialize with other conspecifics, leading the cub to place more focus on the caretaker than desirable. One facility allowed single cubs to interact with a dog to divert the cub's attention from the caretaker²². It reported that the behavioral development of cubs exposed to the dog evolved in much the same manner as the behavior of cubs that only interacted with other cubs in the rehabilitation process. Very young cubs raised in the absence of other cubs tend to show longer-term interest in interacting with caretakers. However, these cubs will develop more independence as they near the time for normal family break-up in a wild bear population.

For the most part, minor differences in the way cubs are handled seem to make little difference in the ability of cubs to adapt to their wild surroundings after release. All facilities contacted in WSPA's survey of rehabilitation centers restricted public access to the facility and to the cubs in the facility²². Most respondents also reported that they minimized the number of caretakers involved in handling the cubs in an effort to reduce the potential for cubs to become habituated to the presence of humans. However, the effort required to feed cubs and clean their enclosures daily results in frequent cub/human contact.

Minimizing the number of individuals the cubs are exposed to during captivity and reducing interactions between caretakers and cubs during feeding and enclosure cleaning may reduce the level of habituation that occurs.

Bottle-feeding very young cubs requires frequent, daily cub/human contact, suggesting that these animals may become very dependent on human caretakers and therefore poor candidates for release. Such cubs do show considerable dependence on their caretakers while being bottle-fed and for a period of time after weaning. However, as they grow older they appear to become more independent and show less interest in their caretakers, especially if they have other cubs to interact with in the facility. After weaning, cubs prefer to interact with other cubs and often will ignore a familiar caretaker in the enclosure. Allowing contact between cubs and large numbers of humans did appear to be a common factor associated with unsuccessful release attempts for brown bears, however.^{14, 36}

Minimizing post-weaning contact between the cub and caretakers appears to be an important consideration when raising single cubs.

2) Health Issues

Orphan bears often enter rehabilitation facilities suffering from mild malnutrition or starvation, superficial wounds, parasitic infections, internal injuries or disease. However, bears are particularly resilient animals and will recover from many of these ailments with appropriate treatment protocols.

The potential for spreading disease or parasites should be a major concern for individuals engaged in bear rehabilitation programs. Bears are known to show exposure to a variety of disease pathogens. Although active cases of disease are rare in the wild,³⁷ the potential exists for released cubs to infect wild bears with disease pathogens or parasites they have been exposed to prior to or during the rehabilitation process. Many individuals responding to WSPA's survey reported that health issues were not important in the rehabilitation process because they took appropriate action to ensure that all cubs released were healthy. Only four individuals responding to the WSPA survey did not require a veterinarian to examine cubs prior to release; 13 did require a veterinarian's examination; and six reported they personally tested all cubs for disease before release.²² Without thorough pre-release testing, it is impossible to ensure that released animals are healthy and free of disease.

Parasitic infestations are not uncommon in rehabilitation facilities. Many orphan cubs are brought into the facility in poor physical condition as a result of inadequate care in captivity, or as a result of dehydration or malnutrition.

These cubs are very susceptible to internal and external parasitic infestations. Internal parasites that may be found in orphaned bear cubs include round, tape and trichinella worms. Orphan bear cubs in poor condition also can be vulnerable to external parasites such as ticks, lice and *Ursicoptic* mites, both in the wild and in captivity. Periodic and routine treatment with Ivermectin, either orally or by injection, is an effective means of controlling many ecto-parasites found on cubs in captivity.



Figure 11. *Ursicoptic* mite infestation on an American black bear.

Maintaining clean and dry enclosures contributes significantly to keeping bears healthy and controlling the presence of disease and parasites in the facility. To minimize the time caretakers are in direct contact with cubs in the enclosure, it may be helpful to coordinate feeding and cleaning activities. The size and number of cubs in each enclosure will dictate the frequency and length of cleaning time. Other measures that may be required to prevent the spread of disease or parasites within the rehabilitation center include quarantining sick or newly arrived bears before integrating them into the main enclosure, taking sanitary precautions preparing the cubs' food, and occasionally disinfecting items in the enclosure, especially in small enclosures with non-porous flooring.

3) Feeding

a. Infants (Birth to 8 weeks)

In temperate regions of the world, bear cubs usually are born in January or February while the mother bear is hibernating. The cubs are quite small (0.2 - 0.5 kg; 0.5 - 1.0 lb.) and helpless when they are born. They are very dependent on their mothers to provide adequate nutrition for growth before leaving the den in the spring. Mother bears nurse their cubs for 9 to 28 months, depending on species. Bear milk has a very high caloric value, and the cubs grow very fast for the first few months.³⁸ By the time bear cubs leave their natal dens in April or May, their eyes have opened, they are somewhat mobile, and their fur coat has developed to the point that they have some protection from inclement weather.



Figure 12. Bottle-feeding European brown bear cubs in Turkey.

Bear cubs that require bottle-feeding have special needs in the rehabilitation process. In many respects, they are very similar to what a human baby requires: security, sleep and food. The youngest cubs need small amounts of formula (15% to 25% of their body weight)

every two to three hours around the clock. By 30 days of age, cubs need only five to seven feedings per day. After 90 days, the daily quantity of food can be tapered off to 10% to 20% of body weight.³⁹

At an early age, cubs will benefit from order and routine in the feeding process. They may show preferences for certain nipple types, the color of the bottle cap or the position in which they are held while feeding. A variety of human infant bottles and nipples have been used to hand-raise polar bear cubs in zoos.³⁹ Developing a routine for handling and feeding the cubs provides them with the sense of security they need, and will contribute to their development as wild bears. Very young cubs that have received inadequate attention often tend to show more dependence on their caretakers, and they have a more difficult time with separation, as they get older.

In early attempts to raise orphaned cubs, people used evaporated milk and light cream diluted with water for bottle-feeding small cubs,⁴⁰ or simply used various dilutions of evaporated milk and water.⁴¹ Occasionally, egg yolks were added to fortify the formula. When researchers experimented with various formulas while raising brown bear cubs from three separate litters, they concluded that a formula composed of 24% fat, 12% protein and very few carbohydrates simulated the caloric quality of bear milk. It resulted in faster cub growth rates than artificial diets high in carbohydrates.¹⁵ They also reported that cubs raised in captivity consumed almost twice the amount of food (as a percent of total body weight) as wild cubs and were 1.3 to 2.7 times as large as wild cubs of an equivalent age, at most stages of growth.⁴²

Most rehabilitation facilities use a commercial formula to feed nursing cubs, but some have developed their own custom recipe. One common powdered commercial formula is a combination of Esbilac and Multi-Milk in the following mixture: ⁴³

Commercial Formula: **75% Multi-Milk^{2*}**
 25% Esbilac
 Mix one part powder with two parts water

One Canadian rehabilitator uses a slightly different formula consisting of: ⁸

Powdered puppy formula mixed with warm water
1 table spoon of plain Yogurt
1 tea spoon Multi-vitamins
1 tea spoon of vegetable oil

2 * Available from: UPCO P.O. Box 969, St. Joseph, MO 64502 U.S.A. www.upco.com

The San Francisco zoo successfully raised a polar bear cub from the age of one day by starting the cub on a diluted formula of Esbilac and boiled water (1:3 ratio) for the first 5 days, then gradually increasing the amount of Esbilac to a 1:1 ratio with water by the time the cub was 30 days old. They also added pediatric vitamins (0.5 ml/100gms) and Karo syrup (4 ml/100 gms) to the formula.³⁹

To make basic formula more palatable to cubs and reduce the number of feedings each day, ingredients such as Karo syrup, honey, Gerber's strained fruit, baby cereal or Gerber's baby rice cereal commonly are added. Techniques for encouraging young cubs to feed from a bottle are described in the Idaho Black Bear Rehabilitation Handbook.⁴³ When a nutritionally complete milk replacer is used, it might not be necessary to add pediatric vitamins to the formula.³⁹ Plain yogurt has been used to address problems with upset stomachs and diarrhea in small cubs ⁸.

In western Russia, the Pazhetnovs bottle-feed orphan brown bear cubs a slightly different combination of ingredients.⁴⁴

Custom formula:	3 liters fresh milk	2 large spoons of dried milk
	1 liter water	2 tablespoons of sugar
	200 ml semolina (similac)	dash salt

As the cubs get older and are ready to eat from a bowl, the Pazhetnovs add a cooked barley mixture (1 part barley to 5 parts water) to their diet. Once the cubs begin taking their food from a bowl, the Pazhetnovs give them formula at the morning feeding plus the following twice during the day; in the morning and again in the afternoon.

Afternoon Feeding:	Liquid formula listed above	7 tablespoons vegetable oil
	7 eggs	Cooked barley
	2 teaspoons multi-vitamins	

Some cubs will begin taking formula offered in a bowl at an early age (70+ days).^{15, 42}

Two important facts are associated with weaning very young cubs from a bottle. First, hungry cubs tend to become frantic or excited at feeding time and will turn the feeding bowl over, wasting food, unless it is securely anchored in place. Also, sucking behavior is genetically driven. When cubs are not allowed to suckle, they often attempt to nurse on their footpads or the ears of other cubs (or their caretaker). Bottle-fed cubs often express this alternative suckling behavior, particularly if the hole in the bottle nipple is large and formula flows out of the bottle very quickly. Although the cub has a full stomach, it still needs to

suckle for a period of time to satisfy the natural urge to suckle. To prevent cubs from attempting to suckle their footpads or the ears of other cubs, the caretaker may need to use a nipple with a smaller hole or allow the cub to suckle on his/her arm after feeding. Using a nipple with a small hole also reduces the risk of the cub aspirating formula because it is flowing too fast.

b. Pre-weaned cubs (9 to 20 weeks)

Although bear cubs nurse for more than nine months in the wild, they begin feeding on small amounts of solid foods soon after they leave the den in the spring. The age that nursing shifts from a nutritional function to one of social bonding with the mother bear is not clear. In captivity, cubs may continue taking formula from a bottle or bowl until they are several months old, but they can be introduced to solid foods (canned fruit, oatmeal or dry cereal soaked in formula) at about 9 weeks of age. Cubs generally wean themselves from the bottle at 5 to 6 months of age, but they can be forcibly weaned at a much earlier age.



Figure 13. Trough used to stabilize feeding bowls.

At weaning, their diet consists primarily of fruits, dry dog food (for nutritional balance), nuts (acorns), some vegetables, and occasionally fish or the carcasses of ungulates donated by local hunters. Individual bears will show preferences for certain foods and refuse to eat other foods that are readily accepted by other bears. Solid foods can be presented to bears in a variety of ways (scattered, hidden, chunks, etc.) to increase behavioral enrichment in the enclosure and encourage the bears to search for their food as they do in the wild. Supplemental foods (i.e. grapes, raisins, peanut butter and honey) can be provided to the bears, but should be varied and should not exceed 3%, by weight, of the total diet provided each day.³⁹

4) Socializing cubs

Orphan cubs raised as single cubs tend to remain attached to their caretakers for longer periods than cubs that have an opportunity to socialize with other cubs. When human contact with the cubs is severely restricted after weaning, cubs will show less interest in interactions with their caretakers, regardless of whether they are raised as singles or in the presence of other cubs. The tendency for all cubs to become less dependent on their



Figure 14. Allowing cubs to socialize with other cubs is important to their development.

human caretakers as they approach dispersal age may be related to genetic predisposition to emigrate from their natal range shortly after family breakup. All but one of the individuals responding to WSPA's survey indicated that they allowed cubs to socialize with one another in the rehabilitation center²². However, several individuals also reported separating cubs by size and/or age when they believed those differences were important to the safety of the smaller cubs.

Allowing cubs raised in captivity to socialize with other cubs may be the single most important factor in reducing the degree of their habituation.

5) Hibernation

In temperate climates, two of the more common release strategies are to place orphaned cubs into natural or artificial dens in winter, or to release them in the spring when green vegetation is readily available to them. Both require holding the cubs in captivity for part or all of the winter denning period when wild bears normally would be hibernating.

One to three cubs in a rehabilitation facility will use almost any small, dark shelter for hibernating. In situations with four or more cubs, cubs often den together in a relatively large hibernaculum (den). Most facilities provide grass, hay or straw for insulation within the den and let the cubs arrange it as they choose.

Cubs' physical condition and health status should be evaluated prior to forcing them into hibernation. When cubs have sufficient fat reserves and are healthy, their food supply can be reduced gradually for a couple of weeks and then completely withdrawn. Typically, cubs will begin to show lethargic behavior in the late fall (mid- to late October) and will naturally reduce their food intake; however, they will continue to feed and resist hibernating as long as food is available.



Figure 15. Brown bear cub emerging from a natural den dug in the enclosure.

In moderate climates, bears generally den for shorter periods of time in the winter, so rehabilitators must use their judgment or consult with local wildlife biologists to determine the appropriate time to begin withdrawing food from the cubs. Local weather conditions play an important role in the hibernation process: Mild conditions delay the onset of hibernation, while severe cold may cause the bears to den earlier.

Regardless of weather conditions, it is important to recognize that bears enter and emerge from a dormant state gradually. It is not uncommon for orphan cubs to remain active for several weeks after their food has been completely withdrawn or to occasionally emerge from their den for short periods of time when weather conditions moderate for a few days.

During the hibernation period, it is important to minimize disturbance around the bear's enclosure.

VIII. Release Site Considerations

Rehabilitation facilities often have little control or input into decisions about where to release bears; typically, that is the province of the governmental wildlife authority responsible for managing wild bear populations. Release site decisions can influence the success of rehabilitation efforts, however, making it imperative that bear rehabilitators establish a solid working relationship with wildlife biologists to ensure that conditions in the proposed release area are favorable for a release. Several factors should be considered when choosing a release site.

1) Release Site Approvals

Many potential release sites are located on public land or land administered by governmental authorities, and their permission must be obtained before captive animals can be released back to the wild. In some cases, local laws may prohibit individuals from releasing captive animals to the wild, regardless of land ownership. All of the rehabilitators responding to WSPA's survey indicated they either worked closely with governmental wildlife personnel in their release efforts, or the appropriate wildlife authorities took full responsibility for choosing release times and locations and carried out the releases.²²

2) Habitat Assessment

The first considerations in choosing a release site are whether the potential site is within the historic range of the species, is currently good bear habitat and is large enough to support a bear population. Depending on the type of release (re-introduction, supplementation, etc.), determining the suitability of an area for supporting a viable bear population can be as simple as documenting the presence of bears in a prescribed geographical location, or as difficult as conducting habitat suitability studies in the area.⁴⁵

At this point in time, with the exception of attempted releases of Asiatic black bears in South Korea, all releases of orphan bears from rehabilitation centers are best described as supplemental or augmentation releases (see Appendix A, IUCN definitions).⁴⁶ However, as rehabilitation and release methodologies are perfected, more bear releases may occur with the intent of re-establishing populations in unoccupied, but suitable, habitat, or of augmenting the genetic variability in small, isolated populations. In the meantime, it may be advisable for release personnel to establish that a given area has the habitat characteristics necessary to support released bears.

At a minimum, release areas should have adequate food and water resources for the bears to use during their active season, potential den sites (in temperate climates), relatively low human densities, and enough size to support a viable bear population. Other land use issues to be considered in choosing a release site include distance to nearest human settlements, history of human/bear interactions in the area, presence and timing of hunting seasons for bears and other animals, presence and type of livestock using the area, predominant land use activity (agriculture, forestry, Wilderness, etc.), and public attitudes toward bears in the area.

3) Land Use Issues

In most rehabilitation facilities, it is almost impossible to prevent bear cubs from becoming somewhat habituated to their caretakers, especially cubs that come into the facility at a very young age and are bottle-fed for some period of time. Although bear cubs gradually become more independent of their caretakers during the rehabilitation process, they may continue to demonstrate some level of habituation until the day they are released. However, experience suggests that, in most cases, bear cubs become very wary of humans, including individuals who were responsible for caring for them, within a short time (10 to 14 days) after they are released.

These observations suggest that bears should be released in areas (and at times of the year) where they are unlikely to encounter people during the first two weeks after their release.

In situations where it might be very difficult to find a remote release location, the timing of the release may become the more important consideration in choosing the site. Biologists in temperate climate areas have released bears successfully by placing them in natural or artificial dens in winter, rather than release them at other times of the year when people are using forested areas for food gathering and recreation. Winter releases also avoid problems when areas have a documented history of human-bear conflicts related to the availability of anthropogenic (human food) foods.

Poaching and legal hunting activities are additional considerations that may influence the success of bear releases. Although very little information exists regarding the effects of poaching on released bears, they occasionally are shot during legal bear hunting seasons, usually during the first year of their release. It is not clear whether released cubs are more vulnerable to hunters as a result of the rehabilitation process or are simply vulnerable because they are traveling widely in search of a permanent home range, as is the case

with wild subadult bears. Regardless, the existence of hunting and poaching in a potential release area should be considered in choosing an appropriate release site.

It is advisable to avoid releasing orphaned bears during active hunting seasons for bears or other large mammals.

Human/bear conflicts associated with livestock and apiaries are common in many parts of the world. Any bear can become involved in a conflict situation when habitat conditions become less than optimal due to drought, wildfires, loss of key habitat or other environmental factors. That is especially true for bears released in areas with inadequate natural food resources, whether due to environmental conditions or simply poor-quality habitat.

A lack of familiarity with the location of high-quality food resources in the release area also contributes to the vulnerability of young bears. In such situations, these bears (as well as dispersing wild, subadult bears) may be tempted to take advantage of unfamiliar but readily available food items, resulting in high mortality rates from conflicts with humans. As a result, it is imperative that bear releases occur where natural food resources are adequate and that the release team is aware of potential attractants in the area that could result in high mortality rates from human-bear conflicts.

Steps should be taken to avoid releasing bears where the probability is high that they will become involved in conflict situations.

Other release site characteristics that might play an important role in determining the success of releases include topographic features, status of the resident bear population, presence of potential competitors or predators, and any other factors that could act to limit the bear population.

4) Topographic Considerations

Released bears are known to disperse from the release site for several hundred kilometers. Orphan bears released in Ontario dispersed an average of 34 km (21 mi) from the release site, and the maximum dispersal distance observed was over 400 km (248 mi).⁶ Bears released in relatively flat terrain or in broadly distributed mountain habitat may show no pattern in their dispersal direction from the release site. Moreover, in linear-shaped mountain ranges or in areas with geographical barriers such as very large bodies of water or large

agricultural areas bordering the release area, bears often will disperse along the axis of the mountain range or along the border of an area they are reluctant to cross. Released bears also are known to travel down drainages.²³ These dispersal patterns may result in bears encountering human settlements shortly after they are released.

5) Predation

The status of the resident bear population in a release area also can influence the success of release efforts. Many rehabilitators prefer to release bears in protected areas to reduce the likelihood that bears will be shot by hunters. On the surface, this approach sounds reasonable, but when considered in the context of the social structure of wild bear populations, it may not be as effective as releasing bears in areas where the social structure of the wild bear population is in flux (disrupted by hunting or other factors, resulting in high mortality rates in the population). Wild bear populations that are not hunted or are only lightly hunted tend to reflect an old-aged population structure dominated by large males and containing few young bears.⁴⁷ Hunted populations are dominated by younger bears, including many dispersing subadult males.⁴⁸ Large adult male bears have been implicated in the killing (infanticide) of young bears,⁴⁹ suggesting that orphan bears released in protected areas dominated by older-aged bears may experience higher mortality rates due to predation by adult male bears.

In many areas of the world, bears co-exist with other large carnivores such as tigers, leopards and other bear species, and in these places predation may be a factor limiting the survival rates of young bears. Although no rehabilitation facilities have reported cub mortalities as a result of predation by tigers or leopards, it is a factor that should be taken into consideration when choosing a release site where bears co-exist with other large carnivores.

6) Competition

Critics of supplementation/augmentation and re-introduction programs have expressed concerns that released bears may experience (or cause resident bears to experience) high mortality rates as a result of direct competition for critical resources such as food, space or mates. The social structure of bears involves a dominance hierarchy system whereby the more dominant individuals have greater access to food and mates. The physical condition of all released bears recaptured or killed by hunters within a year of their release indicates they had no difficulty obtaining adequate natural food resources. This information suggests that direct competition is not a significant threat to the survival of released orphan bears or their wild counterparts in areas with adequate natural food resources available.¹⁵

7) Genetics

Genetic considerations frequently are cited as a major concern regarding the release of orphaned or captive-bred bears. The primary concern involves the loss of genetic integrity in the recipient bear population as a result of hybridization. Concerns also have been expressed about the inability of released animals to survive without an opportunity to learn critical survival skills from their mother.

The level of genetic diversity among conspecific bear populations varies considerably and is a reasonable indicator of geographic separation over time. Bear populations that have been isolated for centuries from other populations of that species are known to possess detectable differences in genetic make-up, generally resulting in a loss of genetic diversity within the population.^{50, 51} Some bear populations do have unique genetic signatures. Those populations are not suitable recipients for releases without thorough testing of orphaned cubs to ensure genetic compatibility.

Examining the issue from another perspective, there may be some potential benefit from releasing orphaned bear cubs into small, isolated bear populations as an intrusive management option designed to prevent the loss of genetic variability in “at risk” bear populations. The genetic and biological implications of the relationship between the level of genetic diversity and the “health” of wild bear populations are complex and not clearly understood. However, the issue of genetic “pollution” is not a relevant concern in situations where the provenance (capture location) of the orphaned cub is known and the proposed release location is within the same geographical range of the species. In situations where the provenance of the cub is unknown, genetic testing of the cub and the recipient bear population is the only safe, ethical approach for releasing the cub.

Concerns related to the capability of orphan cubs to survive in the wild without the benefit of learning certain behaviors from the mother do not appear to be valid. The results of hundreds of releases of orphaned cubs, including cubs taken into captivity before their eyes were open, confirm the fact that all the skills bears need to survive in the wild are innate, not learned. The primary benefit cubs receive from their prolonged association with their mothers appears to be protection from potential predators. There is no question that cubs learn certain behaviors while under their mother’s care, and they certainly benefit from that learning opportunity. Observations of cubs that enter the rehabilitation process late in their first year indicate they readily habituate to their human caretakers, but they are generally more wary of humans, and may be less likely to become nuisance animals within a year of their release than cubs taken in shortly after they were born.

The fact that cubs do not need to learn survival skills from their mother (or their human caretakers) reinforces the suggestion that the cubs be exposed to minimal contact with humans during the rehabilitation process.

8) Disease/Parasites

The potential for introducing disease or parasites into a wild bear population is a significant concern that must be addressed in any release protocol. Disease and parasitic infestations are not uncommon in wild bear populations.³⁷ However, it is rare to find active cases of disease in wild or captive bears, even if positive titers to a variety of disease pathogens in their blood samples indicate they have been exposed to disease pathogens. If bears in captivity have external parasites (ticks, lice or occasionally fleas), a veterinarian can easily treat them, as well as internal parasites like round and tape worms.

The risk of introducing either disease or parasites into wild bear populations is unacceptable. Therefore, a licensed veterinarian must thoroughly examine all bears prior to release and test them for disease exposure and parasitic infestation.

9) Ecological Issues

Although bear cubs are known to survive in the wild after being orphaned at 5 to 7 months of age,^{2, 19, 20} survival of released bears appears to be higher for cubs that are older and heavier. Bears also tend to become more independent of their caretakers as they get older, especially if they have an opportunity to socialize with other cubs in the rehabilitation process.

Some rehabilitation facilities advocate releasing cubs as soon as possible. They typically release cubs in late summer or early fall, when high-quality bear foods are abundant in the forest.²² People associated with other facilities suggest that the optimum time for release should coincide with the time of natural family break-up in the wild. They typically overwinter cubs before releasing them the following spring, to maximize cub survival rates.

Releasing bears near the time of natural family break-up may be the more conservative approach to maximize cub survival.

Body weight may influence survival and whether or not a released bear will be involved in a nuisance situation in the short-term following release. Captive-reared cubs consume almost twice as much food each day as wild cubs.¹⁵ Therefore, cubs raised in a rehabilitation facility often weigh considerably more than their wild counterparts at a comparable age. It is likely that the released cubs' additional body mass somewhat buffers the impact of entering an unfamiliar environment. It may enhance their initial prospects for survival in the wild and reduce the likelihood that they will be involved in nuisance situations. The relationship between body weight and survival or nuisance activity certainly is influenced by the availability of natural foods in the release area, suggesting that timing releases with the production of high-quality natural foods also may increase the probability of successful releases.

IX. Release Considerations

1) Public Relations

Public involvement is an integral part of bear rehabilitation programs. It provides wildlife authorities, rehabilitators and the public an opportunity to resolve orphan cub issues in a positive light, to educate the public about bear ecology, and to involve the public in wildlife programs. The public generally has a positive attitude toward wildlife and the governmental authorities charged with managing wildlife. In fact, the majority of funding for rehabilitation programs comes from private donations, indicating that the public is very supportive of these programs.²²

Wildlife professionals are trained to manage at the population level, and except in the case of endangered species, the fate of individual animals rarely affects the status of wild populations. However, it is important for wildlife authorities to recognize that the fate of individual animals is important to many members of the public. This difference in perspective has resulted and continues to result in unnecessary conflict between the general public, animal welfare organizations and wildlife authorities about the disposition of injured or orphaned wildlife.

Bears, and many other species, occasionally are involved in nuisance situations that require biologists to take unpopular actions to remove (euthanize) adult females accompanied by young of the year. Because bears are particularly good candidates for rehabilitation programs, raising orphan cubs for release back to the wild provides a reasonable alternative to euthanizing entire family groups in nuisance situations. Placing in a rehabilitation facility the cubs orphaned as a result of management actions provides wildlife authorities with an opportunity to demonstrate to the public that the fate of individual animals is important and

that decisions to kill nuisance bears are not taken lightly by agency personnel. It also gives governmental authorities, rehabilitators and animal welfare groups an opportunity to educate the general public about their role in creating nuisance situations in their community, near their homes and where they recreate in bear habitat.

The release of orphan cubs also provides an excellent opportunity to involve school-age children in wildlife programs, which can result in changing the public's attitude about controversial species and management programs. For example, in the late 1980s the Idaho Department of Fish and Game re-introduced endangered woodland caribou into northern Idaho. The re-introduction was very controversial because of the perceived economic threats these animals represented to local communities.

Part of the public relations effort for that project included providing selected classrooms in the local school district with caribou radio collars for the children to decorate and allowing students to name the individual animals that would receive the collars when captured and released. The classrooms involved in decorating the collars and naming the caribou were provided weekly updates on the movements and survival of "their" caribou. This program, called Adopt-a-Caribou, was a huge success in terms of educating school children about the ecology of woodland caribou. The children's enthusiasm and support for the project also appeared to result in reduced public animosity for the re-introduction. Involving local government and residents in bear rehabilitation programs offers similar opportunities for gaining public support for wildlife programs.

The general public rarely gets an opportunity to view bears in the wild; people commonly rely on second-person accounts for much of what they know about bears and their habits. Bears are shy, secretive animals, often difficult to observe in the wild. However, bears in general (and some species in particular) can be aggressive and cause injury or death to humans. They also are capable of causing severe economic damages to farmers and ranchers when they depredate on domestic livestock, agricultural crops or apiaries.

Releasing orphaned bears back to the wild has the potential to create a great deal of controversy in nearby communities unless public relations efforts are planned and carried out before the release.

Public relations plans need to clearly identify the steps the release team has taken to prepare the bears for living in the wild. They also must outline the monitoring protocol that will be followed to ensure that the bears can be recaptured or removed from the area if they become involved in nuisance situations or demonstrate aggressive behavior toward humans.

Providing reassurance to the public by listening to their concerns and taking actions to alleviate them may result in greater public acceptance and support for bear releases.

2) Ascertaining the Suitability of a Bear for Release

Prior to release, both the physical and behavioral characteristics of a bear should be evaluated to determine if it is a suitable candidate for release. Evaluating the physical characteristics is relatively straightforward. It involves assessing body and pelage condition and examining the bear for external parasites or injuries that could create problems for the bear after it is released. Bears can be checked for internal parasites by collecting a stool (fecal) sample prior to the release date and having it examined microscopically by a veterinarian. Good pelage condition is particularly important for bears that will be released during the late fall or winter, and fat reserves should be adequate for the date of the release. General body condition can be assessed using the guidelines presented in Table 2. The bears should score ≥ 3 .

Table 2. A visual method for estimating the body condition of bears prior to their release to the wild.

1	2	3	4	5
Pelvic and shoulder bones protruding; ribs very prominent with a deep sunken area between the rump and the last rib; no obvious fat under the skin.	Easy to feel the pelvis and ribs; some muscle tissue covering the ribs; the sunken area between the ribs and rump remains obvious, but softer.	Body appears to be fully fleshed out. Obvious layer of fat covering the pelvis and shoulder region; sunken area between the ribs and the rump is absent.	Bear has a blocky appearance; very full-bodied over all bony areas; obvious fat over the rump and shoulders.	Legs appear short for the size of the body; rolls of fat on the neck, shoulders and abdominal area.

Adapted from Standard Field Scoring Table for polar bears.³⁹

Assessing bears' suitability for release from a behavioral perspective is far more difficult because some individuals may have greater difficulty adapting to a natural environment than others that display similar behaviors in the rehabilitation facility. Most captive bears demonstrate some level of habituation to their caretaker. Habituation can range from tolerating the presence of the caretaker in the enclosure to seeking out and attempting to interact with the caretaker during feeding and cleaning activities. No clear correlation appears to exist between release success rates for bears showing minimal habituation and those demonstrating significant levels of habituation to one or two caretakers, at least in situations where the cubs were allowed to socialize with other cubs in the enclosure. Habituation of single cubs

presents a more difficult situation for rehabilitators. In such cases, to increase the probability of a successful release, steps should be taken to actively discourage interactions between single cubs and their caretakers.

Stereotypic behaviors (pacing, bawling or other behavioral ticks) are not uncommon in captive animals, particularly in mammals that maintain large home ranges in the wild.^{52,53} Bears are no exception. The majority of individuals responding to a survey of rehabilitation facilities reported they added habitat enrichment features to bear enclosures to minimize the incidence of stereotypic behaviors.²² Researchers involved in one study of captive bears reported that the frequency of stereotypic behaviors and their behavioral persistence tended to increase with time spent in captivity, which may affect the ability of bears to adapt behaviorally to the wild after release.³⁰

Other researchers have questioned these results, suggesting that studies of caged animals do not provide a complete picture of how captivity affects the brain and the onset of stereotypic behaviors.³¹ They concluded that animals may adapt their behavior to different environments, and found insufficient evidence to conclude that stereotypy may affect the survival rates of released bears.³¹ They also pointed out that further research on habitat enrichment programs might show that captive bears in a rehabilitation facility are more likely to demonstrate increased levels of stereotypic behaviors in small cages than they would in an enclosure with more favorable environmental conditions (larger enclosures containing natural vegetation). These results suggest that even the presence of stereotypic behaviors in orphaned cubs in a rehabilitation facility may not be a good predictor of their ability to adapt to the wild.

3) Release Type

Rehabilitators reported that wildlife authorities used a variety of release methods for releasing orphaned cubs back to the wild.²² The most common method was “hard release:” simply transporting the bear to the release site and releasing it from the transport container directly into the forest. This is the least costly approach. “Soft release,” the second alternative, involved holding the bear in an enclosure at the release location for a period of time to allow the bear to acclimate to its new surroundings before being released. Opening the door to the enclosure and allowing the bear to leave on its own, with no prompting by the release team, accomplished the actual release.

Two individuals reported that they took the bears for daily walks in the forest and put them back in the enclosure at the end of the day.⁵⁴ After a variable length of time, the enclosure

door was left open and the bears were free to come and go as they chose. The release team continued providing food to the cubs as long as they returned to the enclosure. At one of the two soft-release sites, in a very remote area, the bears had little opportunity to come into contact with people after they permanently left the enclosure, and no significant bear/human problems were reported. The other soft release, in a rural area, was largely successful but the results were mixed.



Figure 16. Author releasing a yearling American black bear in the spring.

Bears, particularly males, are genetically programmed to emigrate from their natal area shortly after family break-up. As a result, it is not uncommon for released bears to travel long distances from their original release site. Movements in excess of 200 km (125 mi) from the release site have been reported for hard-released bears.^{6,55} It is unclear at this time whether soft-released bears may be more inclined to remain in the immediate vicinity of the release site.

4) Timing of the Release

A number of factors determine the best timing for releases in a specific area, including the age and weight of the bear, the presence of human activity, snow depths (in temperate climates) and the availability of natural foods. All of these factors are controllable by the release team and potentially could influence significantly the probability of a successful release. Individuals responding to a survey of rehabilitation methods reported releasing bears successfully during the late summer/early fall of the cubs' first year; during winter in temperate climates where the bears could be placed in artificial or natural dens; and in late spring of the cubs' second year.²²

Typically, late summer/fall releases occur when high-quality foods are available in the release area, and this approach therefore may influence the bears' post-release movements. Releases at this time of year also are advantageous because the bears are kept in captivity less time, thereby reducing their exposure to humans and the cost of raising them for the rehabilitator. However, summer/fall releases occur at a time very close to the minimum age cubs are known to survive in the wild without their mother, and thus may result in survival rates lower than those of bears released in winter or during the following spring when they are yearlings.



Figure 17. Feeding on berries in the fall.

Winter releases are more difficult logistically than other releases, but they offer a number of advantages that may positively affect success rates. The major advantage is that cubs placed in winter dens hibernate throughout the winter, with very little opportunity for contact with humans. The cubs usually emerge from their dens very early in the spring when human use of the forest remains low, allowing the cubs additional time to adjust to their new environment. Cubs that do not have contact with humans for 10 to 14 days after their release appear to be more successful in making the transition back to the wild than cubs that encounter people shortly after their release.⁵⁵

Tranquilized, orphaned bears have been placed successfully in both natural and artificial winter dens. Occasionally, bears will abandon their dens and move short distances before building another den; however, snow depths of > 30cm (12 in) tend to discourage den abandonment. The ability to construct or use natural cavities for denning appears to be an innate behavior common to bears regardless of the age they arrive in a rehabilitation facility. This suggests that providing them with natural or artificial dens may be unnecessary unless the ground is frozen at the time of release.

Orphan cubs also have been observed building elaborate above-ground denning structures for use during winter. A major disadvantage of winter releases, in addition to the logistical challenges, involves the necessity of tranquilizing the cubs prior to transport (in some facilities), and then again at the release site prior to putting them into the den.

Tranquilizing any wild animal involves some risk and can be particularly challenging when one or more cubs are housed in small transport cages.

Individuals who believe survival rates are higher for bears released during the time frame when family break-up normally occurs in the wild favor spring releases. Although very little data exists to support this belief, spring releases should be given serious consideration for several reasons. The primary advantage is that the cubs (now yearlings) are larger and potentially less vulnerable to predation by large adult male bears or other predators (this is one reason cubs remain with their mothers for 1.5 to 2.5 years). Also, logistical considerations are not an important consideration in spring. The major disadvantages of spring releases are the costs associated with maintaining cubs in captivity for a longer period, additional contact with humans after emerging from hibernation, and possible lack of enclosure space during early spring, when new cubs often show up at rehabilitation facilities.

Release timing unquestionably is an important component of the rehabilitation process. To date, most bear releases have occurred with species that maintain the mother-cub family bond for approximately 1.5 years, including brown bear releases in Europe.²⁷ In North America, however, brown bear cubs normally remain at their mother's side for approximately 2.5 years. This raises the question of whether such cubs, when orphaned, should be released as yearlings (to minimize human contact during captivity) or as 2.5-year-olds (to potentially increase survival rates). The few release attempts made with North American brown bear cubs have occurred when the cubs were yearlings, and most were unsuccessful, suggesting it might be more effective to hold these cubs until they are 2- or 2.5-year-olds before releasing them to the wild.¹⁴

5) Tranquilizing Bears

In many instances, it will be necessary to tranquilize cubs to perform routine health examinations, treat injuries or place them in a transport box for relocation to another enclosure or a release site. The caretaker's ability to approach cubs in the enclosure will dictate the most appropriate method of administering the drugs.

a. Jab Stick - If bear cubs will allow a human to approach within 2 m (6 ft.), a jab stick is the ideal equipment to administer drugs, because it does not "force" drugs into muscle tissue under high pressure and results in less tissue damage. Jab sticks can be purchased commercially or be hand-made from easily obtained materials. Some commercial jab sticks can be extended from 1 m (3 ft.) to 3+ m (10 ft.), while others are fixed in length. Jab sticks have a small (12 cc) syringe mounted on the tip that holds the drugs. They are

injected into the muscle tissue through an 18-16 ga needle as pressure is applied to the stick against a large muscle mass in the cub.



b. Blowpipe - Blowpipes also are effective in situations where the cubs can be approached closely. Blowpipes are typically about 1 m (3 ft.) in length and can be used accurately at distances of 3-4 m (10-12 ft.). Drugs are injected into a large muscle mass by a compressed air dart (identical to those used in capture guns) blown by mouth from the pipe. Tubes suitable for blowpipes should be slightly larger in diameter than the darts. They can be handmade or purchased commercially.

c. Capture Gun - When cubs will not allow humans to approach them closely, a dart fired from a capture gun (or pistol) is effective. A powder charge or compressed air fires the dart. The latter often is preferable because it is easy to adjust the pressure to compensate for changing conditions in the enclosure as the targeted bear cub is approached. Many capture guns are fitted with telescopic sights to facilitate accuracy. Capture guns (and pistols) fire compressed-air darts that expel the drugs into a large muscle mass when they strike the bear. If large drug volumes (> 2cc) are administered, some muscle bruising is to be expected from the impact of the dart and the injection of the drugs into the muscle tissue. This usually is not a major problem, but may result in a serious situation if the dart penetrates the skin and cuts a major blood vessel, or enters the abdominal cavity. It is advisable to use well trained, experienced people to remotely administer drugs using all types of capture equipment.

d. Drugs - The two drugs commonly used to immobilize bears in order to perform health examinations or transport them to release sites are Ketamine and Telazol. Both are “dissociative” anesthetics that chemically separate consciousness from the sensory and motor control

mechanisms of the brain. These drugs produce rapid analgesia, anesthesia and a trance-like state. Both Ketamine and Telazol work very well on bears and have wide margins of safety.

i. Ketamine/Rompun - Ketamine causes muscle rigidity and is best used in combination with Rompun, a sedative, which causes depression of the nervous system. Combining Ketamine and Rompun also has a synergistic effect that reduces the volume of Ketamine necessary to achieve complete immobilization. Administering Yohimbine to a recovering bear reverses the effects of Rompun and results in the bear returning more quickly to physiological normalcy. Dosage rates for these drugs are presented in Table 3.

The primary advantages of using a mixture of Ketamine and Rompun are that these two drugs are inexpensive, they have a wide margin of safety and they act quickly. The induction period for black and brown bears is approximately 3-5 minutes or 8-10 minutes, respectively, during the active season. The reduced metabolism of hibernating bears causes induction times to increase to approximately 25-30 minutes in the winter. Care must be used with this drug mixture during extremes in ambient air temperature because it interferes with the animal's ability to regulate its body temperature. Bears drugged with Ketamine and Rompun are capable of recovering very quickly, so they must be monitored continuously for early signs of arousal (head movements, lip and nose twitching, increased respiration or reaction to sound). Occasionally, bears will recover quickly from this drug combination without showing many of these early signs of recovery. Ketamine can be used to maintain anesthesia; multiple doses of Rompun should not be used to maintain anesthesia.

ii. Telazol – This drug has been used for years to immobilize bears and it, too, has a wide margin of safety. Telazol contains a tranquilizer, Zolazepam, to help relax the animal. Bears immobilized with Telazol recover more slowly than bears drugged with a Ketamine/Rompun mixture. That can be a major advantage when handling times are long. Induction times for Telazol are short (approximately 3-8 minutes) and bears often remain immobilized up to 3 hours. The antagonist, Flumazenil, reverses the effects of the Zolazepam component of Telazol, but is very expensive and not often used by biologists in the field. The early signs of recovery for Telazol are similar to those described for Ketamine/Rompun. Recovery generally occurs 20-30 minutes after the bear is able to raise its head. Ketamine is the drug of choice when it is necessary to maintain anesthesia in a bear immobilized with Telazol.

iii. Diazepam (Valium) – It is not uncommon for immobilized bears to have seizures if they are overdosed or are particularly sensitive to the immobilizing drugs being used. If seizure activity occurs, administering Diazepam will control it. A low initial I.V. dose of Diazepam (0.25 mg) is recommended, followed by an additional dose after 5 minutes if the seizure activity continues.

Table 3. Recommended dosage rates for black and brown bears.⁵⁶

Drug	Black Bear	Brown Bear
Ketamine/Rompun (100mg/ml)	Ketamine - 2.0mg/lb. I.M. Rompun – 1.0mg/lb. I.M.	Ketamine – 3.6mg/lb. I.M. Rompun – 1.8mg/lb. I.M.
Yohimbine (5mg/ml)	0.05mg/1mg Rompun I.V. or I.M.	0.09mg/1mg Rompun I.V. or I.M.
Telazol (100mg/ml)	2.0 – 3.0 mg/lb. I.M.	2.0 – 3.0 mg/lb. I.M.
Diazepam (5mg/ml)	0.25 – 5.0mg/100 lb. I.V. (given slowly over 5-10 sec.)	0.25 – 5.0mg/100 lb. I.V. (given slowly over 5-10 sec.)



6) Marking

Applying a semi-permanent or permanent mark to individual bears before releasing them back to the wild is an essential element of any monitoring effort designed to provide information about movements and survival rates. The type of mark used to identify individual bears varies with the objectives of the monitoring plan. Marks that provide opportunistic data (ear-tags, PIT tags and tattooing) are the least costly, but they result in sporadic data collection. Returns from bears marked thusly depend largely on the bears being recaptured by wildlife authorities in research or nuisance situations, or killed and reported to authorities as a result of legal hunting seasons, road accidents or depredation kill permits.

Marking bears with radio collars (or radio implants) is far more costly but produces better quality information about the fate of released bears. Standard Very High Frequency (VHF) radio collars, including implants, are less expensive to purchase than GPS collars, but require more human effort to monitor on a daily or weekly basis. The cost to obtain a VHF radiolocation varies considerably, depending on manpower and vehicle costs, road access in the release area and the availability of small aircraft to locate “missing” collars. The cost of monitoring VHF collars on orphaned bears can be reduced by releasing bears in an area where other wildlife research or monitoring is occurring. Releasing orphaned bear cubs where other animals are

being monitored does not reduce the hard costs associated with drugging and radio-collaring the cubs, but may substantially reduce monitoring costs.

In many parts of the world, large expanses of bear habitat exist where the lack of road access and small aircraft availability limit the utility of VHF radio collars. In these areas, the best option—possibly the only option—for monitoring released bears' movements and survival may be GPS or GPS-Satellite radio collars. Although GPS collars are more expensive to purchase than VHF collars, the cost per location often is much less. Also, they can provide information on survival and movements in places where VHF collars are not practical to use. In some areas of Europe, GPS-GSM (GPS collar-cell phone communication) technology may be available, but it is somewhat experimental, and additional research is needed to validate its usefulness for tracking bears.

Orphaned bears were released on-site (soft release) at two rehabilitation facilities surveyed in 2005.²² The remaining facilities transported cubs to distant release sites and were required to address potential problems associated with moving bears under environmental conditions that varied from relatively hot ($> 30^{\circ}\text{C}$; $> 85^{\circ}\text{F}$) to very cold ($< -10^{\circ}\text{C}$; $< 12^{\circ}\text{F}$) ambient temperatures.

After cubs are tranquilized, they should be monitored to be sure they have a clear airway, or the team should wait until the cubs can control their head movements before transporting them.

7) Transporting cubs

Transport cages may be constructed from wood or metal in various sizes, large enough to hold a single cub or several. When cubs will be released directly from their transport cage, its size may not be critical if all the cubs are to be released in the same location. However, a cage must be large enough to hold cubs comfortably, especially if they are tranquilized when placed in the cage. It is often more convenient and safer to place no more than two cubs in a transport cage if the cubs will be tranquilized before being released from it (i.e. winter denning situations).

Transporting cubs relatively long distances during warm weather may necessitate providing them with water. In these situations, block ice is an excellent option for keeping water in front of the cubs for extended periods of time. Wrapping transport cages in canvas or plastic tarps protects cubs from cold temperatures during winter releases. Tarps are not recommended for use during warm weather, however, when adequate air circulation is important

to help keep the cubs cool. Extremely hot weather may require spraying the cubs down with water during transport to assist them in maintaining cool body temperature, or even necessitate delaying the release until temperatures moderate.



Figure 20. Metal transport cage with double locks on door.

8) Monitoring

Monitoring released bears requires a significant investment in both time and money. This influences decisions about whether or not to monitor bears, as well as how often and how long to monitor them. Because many wildlife rehabilitators depend on donations from animal welfare groups, the public and often their personal financial resources, they often rely on governmental wildlife personnel to conduct monitoring. In the past, throughout much of North America, wildlife authorities were not actively involved in rehabilitation programs for bears, resulting in sporadic monitoring efforts on released bears and limited information regarding the success or failure of rehabilitation programs.

This lack of active participation by many wildlife authorities has led to monitoring criteria that often represent the minimum effort required to evaluate the effectiveness of rehabilitation efforts. Simply putting ear-tags on bears or tattooing them does, over time, yield information on minimum survival rates. However, because bears are long-lived animals (they suffer low mortality rates), these data do not provide the timely information rehabilitators need to adjust their programs for increased release success. Recently, wildlife authorities have become more involved and are providing radio-collars and personnel to monitor released bears. This cooperative approach has resulted in better quality information that can be used to evaluate methods for releasing bears.

Two major myths expressed by bear rehabilitation critics are that orphaned cubs need to be taught survival skills by their mothers and that these bears will not be assimilated into

wild populations because of behavioral deficiencies. It has been difficult to address these concerns using information from individual rehabilitation facilities because they lacked intensive monitoring data. As a result, much of the information available on the survival and productivity of released bears is anecdotal. However, it is accumulating, and it suggests promising results for many bear rehabilitation programs. Individuals responding to a 2005 survey of bear rehabilitators reported that at least seven American black bears were known to have survived for > 7 years, at least five brown bears have survived > 4 years, and one Andean bear survived > 10 years in the wild. They also reported that fewer than 2% of 576 released bears from eight facilities were known to be involved in nuisance situations within a year of their release.²²



Figure 21. Idaho Fish and Game biologist Jeff Rohlman radio tracking a released cub.

Although these results are encouraging, the lack of large data sets illustrates the need for better monitoring of released bears. Several monitoring efforts have been conducted over short time frames with small sample sizes by either relying on capture and kill information from tagged animals or by following radio-collared bears (primarily American black bears and European brown bears) for a few months after their release. Recently, a major step was taken in gathering survival and movement data by monitoring the fates of 60 orphaned cubs from three facilities in Ontario.⁶ To date, that research project represents the largest single effort to directly examine, over a two-year period, the survival and movements of released orphan bears. The data showed survival rates for the 60 orphaned bears to be comparable to survival rates published for wild bears of similar ages.⁶

Concerns expressed about behavioral deficiencies in rehabilitated bears are more difficult to address because bears are difficult to observe after they are released back to the wild. Gathering these data is also complicated by the length of time bears must be monitored to

obtain information about their reproductive status. Although concern has been expressed about the effect of stereotypic behaviors on survival,³⁰ most of the focus appears to be on whether rehabilitated bears successfully integrate into the wild population and become active breeders. Because female bears do not reproduce until they are at least 3 or 4 years old, it is often impractical to monitor productivity in orphan bears except in a research environment. Despite this limitation, four individuals opportunistically documented reproduction by released American black bears, including 17 sets of cubs by seven different females, and one set of cubs by the offspring of a released bear. Another individual has documented reproduction (two litters) by a released Andean bear in Ecuador.¹²

Beyond financial considerations, in many parts of the world those monitoring the survival and movements of released bears face obstacles such as insufficient road access into remote areas, few small aircraft available to locate “missing” bears, and the lack of trained personnel to radio-track the bears. In addition, bear populations in many countries are not hunted because they are threatened or endangered, making the use of radio telemetry essential for obtaining information on survival and movements. Relatively new technologies (GPS and GPS/Satellite collars) are now available to overcome these obstacles, but in many rehabilitation projects, the price of these collars (several thousand dollars each) discourages their use.

9) Interventions

In various parts of the world, the potential for bear attacks on people living, working and recreating in bear habitat has generated concerns about releasing some species of bears. Often, these fears are exacerbated by the knowledge that bears from rehabilitation programs are habituated to humans at some level and that habituation may increase the likelihood of a released bear attacking a person. Although no reports are available of rehabilitated bears attacking people after their release, intensive monitoring of released bears is appropriate because it allows the release team to intervene in a timely manner if a released bear enters an area occupied by people or demonstrates aggressive behavior toward humans.

Although few released bears become involved in nuisance situations after release, some risk is always associated with releasing bears that have habituated to their caretakers during the rehabilitation process. Most reports of released bears becoming nuisance animals involve bears that, shortly after they are released, do not shy away from people or move toward people when they encounter them. In many cases these bears encountered people in the forest, but occasionally conflicts occurred at nearby home sites or in villages.^{12, 15}

For many species of bears, such encounters do not represent a threat of injury or death to the people involved. However, some species of bears are known to be aggressive toward people, especially when they are surprised in the forest or are protecting their young or a

food resource. As a result, it is advisable to develop an intervention plan before releasing bears from a rehabilitation facility. It should address any conflicts that may develop if a released bear becomes involved in a nuisance situation or acts aggressively toward people. In some countries, local laws may prohibit residents from killing nuisance bears that are damaging private property or threatening human life. In these areas, an intervention plan can be a positive public relations tool, providing reassurance to residents that the release team is prepared to respond to their concerns about a nuisance bear in a timely manner. The intervention plan should include information that clearly states the following:

- a. Criteria for compensating for actual damages, in areas where compensation programs exist.
- b. Who is responsible for monitoring the movements and activity of released bears, including the frequency and duration of monitoring efforts.
- c. Criteria for deciding how to respond to an actual or perceived conflict situation and determining which situations warrant a response.
- d. Options for resolving the conflict, including decision criteria for euthanizing the bear or relocating it, and potential relocation areas.

10) Evaluation

Periodic evaluation of release protocols is a necessary step to ensure that rehabilitators are using proven methods to raise and release bear cubs. A survey of rehabilitation facilities indicated that while many of the facilities used very similar approaches to raising and releasing orphaned bears, some methods differed.²² Despite this, most facilities reported that many of their releases were successful. As a result, ascertaining the critical factors that determine the success or failure of individual releases is often difficult. Bears apparently are genetically equipped to survive in the wild without the benefit of learning essential survival skills from their mothers, but other factors may play an important role in determining the success or failure of any given release.

Bears readily habituate to people. Therefore, rehabilitators need to take careful steps to minimize contact between captive bears and people.

Biologists and rehabilitators also recognize that many habitat variables can influence release outcomes. Individuals reporting release failures have suggested that exposing bears to large numbers of people, raising cubs in isolation (with no opportunity to socialize with other cubs), and individual bear personalities may have contributed to those failures. Increased cooperation among rehabilitators to document methods for raising and releasing bears, in

addition to monitoring bears' fates after release, is needed to better understand the dynamics between successful and failed release efforts. Evaluating short- and long-term success indicators for all aspects of the rehabilitation process would be helpful in revising release protocols to increase the potential success of future releases.

X. Key Elements Associated with Successful Releases

Rehabilitators use a variety of methods to raise orphan bear cubs for release back to the wild. In many cases the differences are relatively minor, but sometimes they are major. For example, at least one rehabilitation facility completely screened the bear enclosure to prevent the bears from seeing their caretakers during feeding or other activities occurring in the general area of the enclosure, while other facilities took no steps to prevent bears from seeing their caretakers during feeding. Yet a review of the fates of released bears found no detectable difference in success rates for facilities taking these two disparate approaches.

The same was true for facilities that actively discouraged human contact with very young cubs and those that did not discourage contact until after weaning. This information suggests that bears are very flexible in their ability to adapt to captivity for short periods of time and still remain good candidates for release. Despite such differences, many rehabilitators agreed some factors are important to successfully releasing bears.



Figure 22. Radio collared orphan bear walking through the forest in Idaho.

Key elements associated with successful releases include:

- 1) Minimizing the frequency of contact and number of caretakers, particularly after weaning.**
- 2) Providing an opportunity for cubs to socialize with other bears while in captivity.**
- 3) Releasing bears close to the age when family break-up occurs in the wild and with sufficient fat reserves to sustain them during their initial adjustment period.**
- 4) Releasing bears in good quality bear habitat.**
- 5) Timing releases to coincide with the availability and abundance of natural foods.**
- 6) Releasing bears when the probability of encountering people in the forest shortly after their release is low.**

APPENDIX A.

DEFINITIONS USED IN THE TEXT:

IUCN Definitions: ⁴⁶

Re-introduction	An attempt to establish a species in an area that was once part of its historical range, but from which it has been extirpated or become extinct.
Re-establishment	A successful re-introduction of a species.
Translocation	The deliberate and meditated movement of wild individuals to an existing population of conspecifics.
Re-enforcement or of Supplement	The addition of individuals to an existing population conspecifics.
Conservation or Benign Introduction	An attempt to establish a species, for the purposes of conservation, outside its recorded distribution area but within an appropriate habitat or eco-geographical area.

Definitions of Additional Terms:

Wildlife Rehabilitation	Treatment and temporary care of injured, diseased and/or displaced indigenous animals, and the subsequent release of healthy animals to appropriate habitats in the wild.
Euthanasia	To take away life for a humane purpose; the induction of death with minimal pain, stress or anxiety.
Hard Release	A release method whereby animals are released directly to the wild without benefit of acclimatization to the release area.

Soft Release	A release method whereby animals are confined in the release area for a period of time before release into the wild.
Imprinting	A learning process that takes place early in the life of social animals, establishing a behavior pattern such as recognition of or attraction of conspecifics or a substitute.
Conspecific	Of the same species.
Hibernate	To pass the winter in an inactive or dormant state.
Hibernaculum	A shelter occupied during the winter by a dormant animal.
Anthropogenic	Relating to, or resulting from, the influence of humans on nature.
Stereotypic Behaviors	Behaviors that are repetitive, invariant and without obvious function.
Analgesia	Insensibility to pain without loss of consciousness
Anesthesia	Absence of normal sensation, especially sensitivity to pain, induced by drugs.

APPENDIX B

SCIENTIFIC NAMES OF REFERENCED SPECIES

1. Panda Bear	<i>Ailuropoda melanoleuca</i>
2. American Black Bear	<i>Ursus americanus</i>
3. North American Brown Bear	<i>Ursus arctos horribilis</i>
4. European Brown Bear	<i>Ursus arctos arctos</i>
5. Asiatic Black Bear	<i>Ursus thibetanus</i>
6. Sun Bear	<i>Helarctos malayanus</i>
7. Andean Bear	<i>Tremarctos ornatus</i>
8. Sloth Bear	<i>Melursus ursinus</i>
9. Tiger	<i>Panthera tigris</i>
10. Leopard	<i>Panthera pardus</i>
11. Woodland Caribou	<i>Rangifer tarandus caribou</i>

REFERENCES

1. Clark, S.H., J. O'Pezio, and C. Hackford. 1980. Fostering black bear cubs in the wild. Intern. Conf. Bear Res. And Manage. 4:163-166.
2. Alt, G.L. and J.J. Beecham. 1984. Reintroduction of orphaned black bear cubs into the wild. Wildl. Soc. Bull. 12:169-174.
3. Carney, D.W. and M.R. Vaughan. 1987. Survival of introduced black bear cubs in Shenandoah National Park, Virginia. Intern. Conf. Bear Res. And Manage. 7:83-85.
4. Clark, J.E. 1999. Survival of orphaned black bears released in the Smoky Mountains. M.S. Thesis, University of Tennessee, Knoxville.
5. Clark, J.E., M.R. Pelton, B.J. Wear, and D.R. Ratajczak. 2000. Survival of orphaned black bears released in the Smoky Mountains. *Ursus*
6. Binks, M. *In Prep.* Survival and behaviour of orphaned and rehabilitated black bears in central Ontario. M.S. Thesis. Cambrian College, Sudbury, ON.
7. Jonkel, C.J., P. Husby, R. Russell, and J. Beecham. 1980. The reintroduction of orphaned grizzly bear cubs in the wild. Intern. Conf. Bear Res. And Manage. 4:369-372.
8. Leona Green, Hillspring Wildlife Rehabilitation Center, Canada, personal comm. October 2006
9. Valentine Pazhetnov, IFAW, Russia, personal comm., September 2005
10. John Goodrich, WCS, Russia, personal comm., February 2005
11. Gabriella Fredrickson, Univ. of Amsterdam, Netherlands, personal comm., January 2006
12. Armando Castellanos, Espiritu del Bosque, Ecuador, personal comm., August 2005
13. Leonardo Bereczky, Vier Pfoeten, Romania, personal comm., October 2005
14. Tim Manley, MDFWP, USA, personal comm., December 2005
15. Huber, D., I. Kulier, A. Poljak, and B. Devjic-Kuhar. 1993. Food intake and mass gain of hand-reared brown bear cubs. *Zoo Biology* 12:525-533.
16. Servheen, C. 1990. The status and conservation of the bears of the world. Int. Conf. Bear Res. and Manage. Monogr. Series No. 2. 32pp.
17. IUCN. 2002. IUCN Guidelines for the placement of confiscated animals. Prepared by

the IUCN/SSC Re-introduction Specialist Group. IUCN, Gland, Switzerland and ER-WDA, Abu Dhabi, UAE. 24 pp.

18. IUCN. 2004. 2004 IUCN red list of threatened species. World Conservation Union, Gland, Switzerland.
19. Palomero, Guillermo, J.C. Blanco, , P. Garcia, and Gonzalo Palomero. 1997. Ecology and behavior of 3 wild orphaned brown bear cubs in Spain. *Int. Conf. Bear Res. and Manage.* 9(2):85-90.
20. Erickson, A.W. 1959. The age of self-sufficiency in the black bear. *J. Wildl. Manage.* 23:401-405.
21. Beecham, J.J. and J. Rohlman. 1994. *A shadow in the forest: Idaho's black bear*. The University of Idaho Press, Moscow. 245pp.
22. Beecham, J.J. and V. Watkins. 2005. Rehabilitation and release of orphaned bear cubs. Poster, 16th International Conference on Bear Research and Management, Riva del Garda, Italy. October 2005.
23. Ben Kilham, USA, personal comm., September 2005
24. Herrero, S. 1985. Bear attacks: their causes and avoidance. Winchester Press, Piscataway, N.J. 287 pp.
25. Chauhan, N.P.S. 2003. Human casualties and livestock depredation by black and brown bears in the Indian Himalaya. *Ursus* 14(1):84-87.
26. Akhtar, N., H.S. Bargali, and N.P.S. Chauhan. 2004. Sloth bear habitat use in disturbed and unprotected areas of Madhya Pradesh, India. *Ursus* 15(2):203-211.
27. Can, O.E. and I. Togan. 2004. Status and management of brown bears in Turkey. *Ursus* 15(1):48-53.
28. Sergey Pazhetnov, IFAW, Russia, personal comm., April 2003
29. Miller, E.A. 2000. Minimum standards for Wildlife Rehabilitation. 3rd edition. National Wildlife Rehabilitation Association. St. Cloud, MN. 77 pp.
30. Vickery, S. and G. Mason. 2003. Behavioral persistence in captive bears: implications for reintroduction. *Ursus* 14:35-43.
31. Criswell, A.R. and G.J. Galbreath. 2005. Behavioral persistence in captive bears: a critique. *Ursus* 16(2):268-273.
32. Carlstead, K. and J. Seidensticker. 1991. Seasonal variation in stereotypic pacing in an American black bear, *Ursus americanus*. *Behavioural Processes* 25:155-161.

33. Kolter, L. and R. Zander. 1997. Potential and limitations of environmental enrichment in managing behavioural problems of polar bears. Pages 131-141 in B. Holst, ed. Proceedings of the Second International Conference on Environmental Enrichment. Copenhagen Zoo, Copenhagen, Denmark.
34. Langenhorst, T. 1998. Effects of a behavioral enrichment program on the stereotypic behavior of brown bears (*Ursus arctos*). Der Zoologische Garten 68:341-354. (In German).
35. Hunt, C.L., F. Hammond and C. Peterson. 1988. Behavioral responses of Yellowstone ecosystem grizzly bears to aversive conditioning techniques. Wyoming Game and Fish Department, Progress Report, Cody, Wyoming. April 1988. 68 pp.
36. Djuro Huber, Univ. of Zagreb, Croatia, personal comm., December 2005
37. Binniger, C.E., J.J. Beecham, L.A. Thomas and L.D. Winward. 1980. A serologic survey for selected infectious diseases of black bears in Idaho. J. Wildl. Dis. 16(3):423-430.
38. Jenness, R., A.W. Erickson and J.J. Craighead. 1972. Some comparative aspects of milk from four species of bears. J. Mamm. 53:34-47.
39. Lintzenich, B.A., A.M. Ward, M.S. Edwards, M.E. Griffin, and C.T. Robbins. 2006. Polar bear nutrition guidelines. Published by Polar Bears International. Pp.1-65 www.polarbearsinternational.org
40. Butterworth B.B. 1969. Postnatal growth and development of *Ursus americanus*. J. Mamm. 50:615-616.
41. Hulley, J.T. 1976. Hand-rearing American black bear cubs *Ursus americanus* at Toronto Zoo. International Zoo Yearbook 16:202-205
42. Oftedal, O.T. and J.L. Gittleman. 1989. Patterns of energy output during reproduction in carnivores. Pages 355-378 in Carnivore behavior, ecology and evolution. J.L. Gittleman, ed. Chapman and Hall, London.
43. Maughan, S. 2005. Black bear rehabilitation handbook. Unpublished. Idaho Black Bear Rehabilitation, Inc. Garden City, ID.
44. Svetlana Pazhetnov, IFAW, Russia, personal comm., April 2003
45. Van Manen, F.T. and M.R. Pelton. 1997. Procedures to enhance the success of a black bear reintroduction program. Int. Conf. Bear Res. And Manage. 9(2):67-78.
46. IUCN. 1998. IUCN Guidelines for re-introductions. Prepared by the IUCN/SSC Re-introduction Specialist Group. IUCN, Gland, Switzerland and Cambridge, UK. 10 pp.
47. Beecham, J.J. 1980. Population characteristics, denning, and growth pat-

terns of black bears in Idaho. Ph.D. Dissertation, Univ. of Montana, Missoula. 101pp.

48. Beecham, J.J. 1983. Population characteristics of black bears in west central Idaho. *J. Wildl. Manage.* 47(2):402-412.
49. Swenson, J.E., F. Sandegren, S. Brunberg, and P. Segerstrom. 2001. Factors associated with loss of brown bear cubs in Sweden. *Ursus* 12:69-80.
50. Waits, L.P. 1996. A comprehensive molecular study of the evolution and genetic variation of bears. Ph.D. Dissertation, Univ. of Utah, Salt Lake City. 334 pp.
51. Waits, L., D. Paetkau, C. Strobeck, and R.H. Ward. 1998. A comparison of genetic diversity in North American brown bears. *Ursus* 10:307-314.
52. Ormrod, S.A. 1992. A review of captive polar bears in Great Britain and Ireland. Report commissioned by the Born Free Foundation, Horsham, West Sussex, UK.
53. Clubb, R. and G.J. Mason. 2001. Are some carnivore species predisposed to develop stereotypy because of their foraging strategy in the wild? Pages 139-141 *in* V.J. Hare, K.E. Worley, and K. Myers, eds. *Proceedings of the Fourth International Conference on Environmental Enrichment. The Shape of Enrichment*, San Diego, USA.
54. Kilham, B. and E. Gray. 2002. Among the bears: raising orphan bear cubs in the wild. Henry Holt and Co., LLC. New York, NY. 289 pp.
55. Beecham, J.J. Unpublished data
56. Quigley, K. 2000. Immobilization and biological sampling protocols. Horner Wildlife Institute, Bozeman, MT. 31 pp.

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