From the Field: Brown bear habituation to people—safety, risks, and benefits

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Abstract Recently, brown bear (*Ursus arctos*) viewing has increased in coastal Alaska and British Columbia, as well as in interior areas such as Yellowstone National Park. Viewing is most often being done under conditions that offer acceptable safety to both people and bears. We analyze and comment on the underlying processes that lead brown bears to tolerate people at close range. Although habituation is an important process influencing the distance at which bears tolerate people, other variables also modify levels of bear-to-human tolerance. Because bears may react internally with energetic costs before showing an overt reaction to humans, we propose a new term, the Overt Reaction Distance, to emphasize that what we observe is the external reaction of a bear. In this paper we conceptually analyze bear viewing in terms of benefits and risks to people and bears. We conclude that managers and policy-makers must develop site-specific plans that identify the extent to which bear-to-human habituation and tolerance will be permitted. The proposed management needs scientific underpinning. It is our belief that bear viewing, where appropriate, may promote conservation of bear populations, habitats, and ecosystems as it instills respect and concern in those who participate.

Key words bear–human interactions, bear management, bear viewing, brown bears, habituation, individual distance, overt reaction distance, personal space, *Ursus arctos*

Brown bears (*Ursus arctos*) are managed for their intrinsic and ecosystem values and to provide a variety of benefits to people, while trying to minimize bear–human conflict. The fundamental causes of bear–human conflict, such as people's food, garbage, and other attractants, have become a major focus of modern management because they have been associated with property damage, human injury, and bear removal (Herrero 1985, Gunther 1994, Gniadek and Kendall 1998, Herrero and Higgins 2003). Managers increasingly are challenged to maintain bear populations in the face of conflicts that develop with expanding human development and land use. Within the past few decades, new challenges and opportunities for managers of bears and their habitat have developed. People love and fear bears. Some people seek opportunities to view, understand, and appreciate bears. Managers of bear populations intended primarily for viewing need to help foster positive, reasonably safe experiences with bears, while helping people better understand their fear and replace it with respect for bears and understanding of bear behavior and ecology. We discuss benefits and risks (costs) to brown bears that accept people at close distances and the underlying processes, especially

habituation, that influence bear tolerance of people.

In this paper we use the term "brown bears" to refer to all North American bears of the classification *Ursus arctos,* although bears in interior parts of North America traditionally have been referred to as grizzly bears and those on the coast, in salmon-rich areas, as brown bears. The densest populations of brown bears occur in coastal areas that have high nutrient density (Miller 1993, Miller et al. 1997). Brown bears in dense populations tolerate other bears and often people at closer distances than do bears from lower-density populations such as are typical in interior areas without salmon (Smith et al. 2005). For this reason it is important to distinguish between brown bears found in different areas and at different densities.

In the past some biologists have warned that brown bears are inherently too dangerous for coexistence with people in unhunted areas such as national parks (Moment 1968, 1969). However, research has shown that many safety concerns related to bear populations during the 1960s–1980s have been all but eliminated by not allowing bears access to people's food or garbage. Preventing access to anthropogenic foods keeps bears from being positively rewarded for close association with people. A few brown bears that were rewarded for aggressive, food-seeking behavior around people treated humans as prey, or otherwise caused human injury because of their altered behavior and increased proximity to people (Herrero 1985, 1989; Gunther 1994; Gniadek and Kendall 1998). Incidents where brown bears treated people as prey by attacking them at night in camp have been significantly reduced throughout North America except where human food and garbage attractants still exist (Gunther 1994, Gniadek and Kendall 1998, Herrero 2002, Herrero and Higgins 2003). Today most brown bear attacks are associated with defensive behavior or incidents involving protection of a food cache such as an ungulate carcass (Herrero 1985, Herrero and Higgins 1999, 2003). Historical records strongly suggest that brown bears have not been important predators on people, although rarely predation may have occurred, as it still does today (Herrero 1985, 1989).

Habituation

Habituation is a behavioral response observed in a wide variety of animals, including bears (Thorpe 1956, Herrero 1985, Aumiller and Matt 1994, Whittaker and Knight 1998). When bears repeatedly are exposed to a neutral situation, such as a person observing them from a close distance, they conserve energy by muting their reaction. Consequently, habituation often is assumed to have occurred when bears tolerate people at close distances. Hence, such bears are often described as human-habituated. However, few researchers have studied habituation in bears. Such study requires repeated observations over time of response by individual bears to specific situations. One important dataset comes from the long-term observations of individual bears by Larry Aumiller, who for the past 28 years has managed the McNeil River State Game Sanctuary in Alaska (Aumiller and Matt 1994; L. Aumiller, Alaska Department of Fish and Game [ADFG], personal communication). Habituation is not an all-or-none response and may vary widely among individual bears. Habituation of bears to other bears and to people will occur to the extent that the benefits of not reacting outweigh the perceived risks (costs). If the bear is wrong in its assessment, it may be injured or pay with its life.

Habituation differs from negative conditioning, in which painful stimuli such as rubber bullets may be used to discourage the use of a site or situation. It also differs from positive conditioning, in which food rewards may encourage undesirable behaviors such as exploring campgrounds. Bears are thought to habituate to a variety of cues directly associated with people such as our smell, visual image, and sounds such as our voices. Some bears habituate to certain human artifacts such as roads and other structures (Follman and Hechtel 1990). We know of no experimental work conducted to elucidate the nature of habituation in bears. However, understanding habituation is central to making informed bear and people management decisions, yet in the past the term often has been casually applied or misused (Whittaker and Knight 1998, Smith et al. 2005).

Multivariate influences on overt reaction distance (ORD)

Various terms have been used to describe the distance at which a bear overtly reacts to a person. The most common ones are individual distance, personal space, and critical distance. We propose adopting a new term, overt reaction distance (ORD), since it describes behavior that can be

observed, yet does not deny that important, unobserved internal reactions may occur without overt response. Observed behaviors when a brown bear's ORD has been entered are often stress-related and may include actions such as change in body position, yawning, salivating, bear staring at a person, huffing, lip-popping, loud vocalizations (just prior to or during attack), and moving away (fleeing) or toward (charging), with the extreme being rare instances of attack. An animal may not react overtly to a stimulus but may react internally. This has been demonstrated using heart-rate telemetry in bighorn sheep (*Ovis canadensis*) and studying their heart rate change in response to potential stressors such as dogs and helicopters (McArthur et al. 1982). Energetically costly increases in heart rate often occurred before any overt reaction from the bighorns. Hence, we surmise that bears may be stressed without overt response to a person. This implies a conservative approach distance to bears and stopping before overt reaction would be anticipated.

When a bear does not overtly react to a person nearby, it is often assumed to be human-habituated. While this probably is often true, this simple conceptual model does not appropriately consider possible internal reactions that lack an outward manifestation. Nor does it consider other variables that might influence a bear's ORD. There is a need to develop richer, more complex models to understand animals' responses to humans (Whittaker and Knight 1998, Smith et al. 2005). Labeling a bear "habituated" because it does not overtly respond to nearby people likely identifies one of the most important processes contributing to ORD, but it ignores many others. We group variables that likely influence a bear's ORD into 3 categories: those associated with 1) an individual bear, 2) the bear's environment, and 3) humans (Figure 1). Our purpose is not to explore the relative contribution of these variables but to suggest that behavior some people have assumed to be exclusively due to habituation is influenced by many other factors as well. We do not deny the importance of habituation as a major variable often influencing ORD. Habituation may be the variable most amenable to study and most malleable to manage. We urge development of richer models and experimental, multivariate studies that should lead to broader understanding and application.

A dilemma arises if one accepts that there are multivariate influences on a bear's ORD: do we continue to refer to bears that do not overtly respond to people nearby as habituated, as is conventionally done, or, in addition to ORD, do we create other new terms? Given the difficulty in altering terminology, we have chosen to continue to use the term "habituated" to refer to bears that do not show overt reaction when people are nearby. We do this because we assume the process of habituation is one of the most important influences on a bear's ORD. In this sense "habituated" is correct but incomplete because it does not suggest other variables that might influence ORD. We urge readers to understand that habituation is only one process influencing a bear's ORD.

The distance at which a bear reacts to people appears to be strongly influenced by a bear's expe-

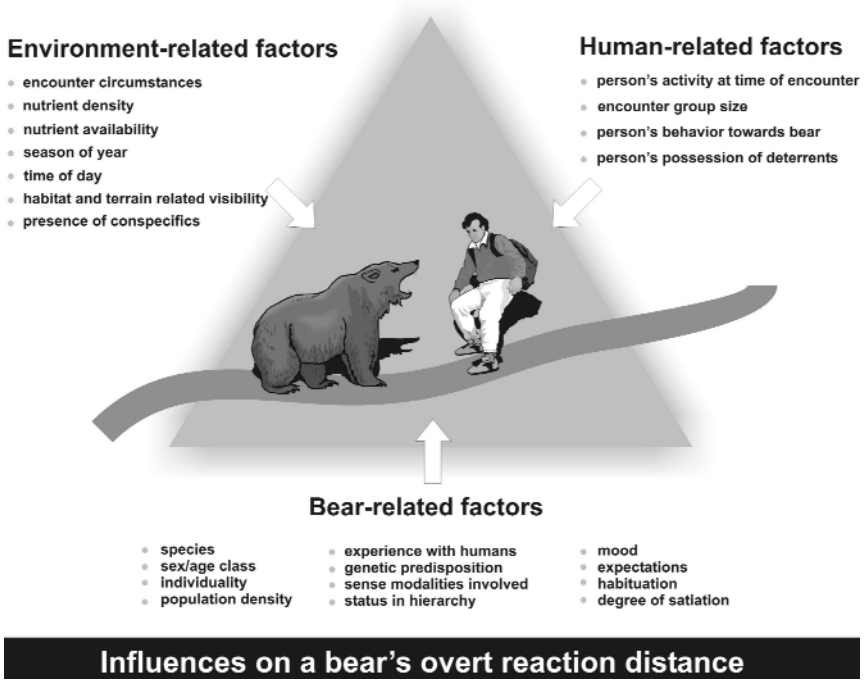

Figure 1. Influences on a bear's overt reaction distance.

rience with other bears, what Smith et al. (2005) referred to as bear-to-bear habituation. The distance at which one bear overtly reacts to another probably also is influenced by multiple variables. Bear-to-bear habituation occurs most frequently in high-density brown bear populations where clumped resources, such as salmon (*Oncorhynchus* sp.) during runs or in coastal sedge meadows, whose availability is prolonged over time, attract seasonal aggregations of bears. Brown bears learn to accept potential danger of other bears at close range in order to gain the benefits of eating calorically dense foods (Egbert 1978, Jope 1983, Craighead et al. 1995). This bear-to-bear habituation process appears to set the stage for bears' accepting people at close range without overt reaction (Smith et al. 2005). After repeated exposure to humans, bear-to-human habituation occurs and may then act to further reduce the ORD between bears and humans. Bears tolerating people in close proximity has encouraged development of coastal brown bear viewing operations such as occur at McNeil River Falls, Brooks Camp, Pack Creek, and Anan Creek, Alaska, and at the Khutzeymateen River and Knight Inlet, British Columbia, and other sites.

We believe that a different set of circumstances recently has led to some brown bears in Yellowstone National Park not overtly reacting to people at distances as close as 20–50 m. The presence of such brown bears in Yellowstone each year attracts tens of thousands of people interested in viewing and photographing them. Current park policy is to manage human behavior when "bear jams" develop and not to aversively condition the bears to avoid roadsides (Gunther and Biel 1999). A bear jam occurs when the parked vehicles of people watching bears obstruct traffic (C. Daigle-Berg, Yellowstone National Park, personal communication). In Yellowstone brown bear density is estimated at 11–17/1,000 km^2 (Ruth et al. 2003). This is magnitudes lower than brown bear density estimates reported for salmon-rich coastal areas such as Katmai National Park (551/1,000 km^2) and Admiralty Island (440/1,000 km^2) (Miller et al. 1997).

How then do habituation and tolerance for humans develop in Yellowstone with its lower brown bear density and reduced opportunity for bear-to-bear habituation to set the stage for bear-to-human habituation? We hypothesize that ORD may be small at roadsides in Yellowstone because the park averages approximately 3 million visitors/year. Habituation may be caused by the high likelihood of human contact due to the sheer numbers of visitors, especially near areas of attractive habitat. Yellowstone has an extensive road network, and in some places productive brown bear habitat occurs adjacent to roadways. Visitors may legally exit their vehicles for bear viewing or photography but may not harass bears (Gunther and Biel 1999, Gunther et al. 2002). During 2002 Yellowstone National Park had 692 bear jams, 279 involving brown bears. Since 1990 there have been over 3,000 documented bear jams in Yellowstone, over 1,000 involving brown bears.

We believe brown bears have learned that large numbers of humans near roads are relatively benign. Management removals of brown bears for the entire park now average only 0.2/year. Vehicle-strike mortality accounts for only 0.4 road-killed brown bears/year. In Yellowstone some brown bears have learned to tolerate people at roadsides because of a lack of adverse outcomes for bears and because by tolerating people they gain access to resources that might not be available otherwise. Roadside locations also may give some bears security from other bears (Mattson 1990).

We hypothesize that different circumstances in coastal areas versus Yellowstone have led to somewhat similar ends. In both cases brown bears have come to tolerate people at relatively close distances. At coastal bear-viewing areas, some bears' ORD may shrink to a few meters. In Yellowstone distances are greater, yet still short enough to support bear viewing. For coastal bear-viewing areas, we believe that bear-to-bear habituation that occurs from frequent contact with conspecifics predisposes bears to habituate to people. In interior Yellowstone there is less contact between individual brown bears because population density is lower and resources are not as clumped and are not available for prolonged time periods. However, in Yellowstone the high visitation rate leads to some bears being exposed to large numbers of people and developing the relatively short ORDs that support bear viewing. We see these as 2 somewhat different pathways by which brown bears have come to tolerate humans at close range without overt reaction.

Habituation: potential benefits and risks

We have described several contexts in North America where mostly unhunted brown bears for-

age, or otherwise co-exist, in close proximity to people. We assume without experimental evidence that in most close-proximity situations the brown bears involved are somewhat habituated. In some coastal areas, a burgeoning bear-viewing industry has grown where people may with acceptable safety, great delight, and often considerable expense be within meters of brown bears. Although the highest-density brown bear populations in North America only occur in some coastal areas of Alaska and British Columbia, we have discussed other circumstances, such as in Yellowstone National Park, that foster bear-to-human tolerance and bear viewing. We identify (Table 1) and then discuss the benefits and risks for both people and bears in bear-viewing areas where some bears are habituated and tolerate people at relatively close distances.

Bear-to-human habituation: potential benefits primarily to humans

1) Seasonal aggregations of brown bears in productive coastal habitats provide rich opportunity to people for acceptably safe bear viewing, appreciation, and photography and film making (Aumiller and Matt 1994, Smith et al. 2005). There is mutual safety for both people and bears (Aumiller and Matt 1994). As noted, bear viewing in a few interior areas such as Yellowstone National Park also is accepted by park management and is popular with visitors (Gunther and Biel 1999). Habituated and otherwise tolerant individual bears are seen closest to people and are of particular viewing interest (Bright 1998, Matt and Aumiller 2002). Seeing bears nearby and in their natural habitat can be a positive "life changing" experience for people visiting bear-viewing areas (L. Aumiller, ADFG, personal communication). Such observations support a positive image of bears and may promote their conservation and ultimately ecosystem maintenance, as people having had these powerful experiences become ambassadors of good will for bears.

2) Bear viewing is the basis for a growing industry in coastal Alaska, British Columbia, and Yellowstone National Park. A recent survey revealed that tourists were willing to pay more to view bears than any other Alaskan wildlife species (Miller et al. 1998). This offers economic benefits to a variety of persons commercially involved. With

Table 1. The potential benefits and risks (costs) of bear-to-human habituation.

Benefits primarily to humans	Costs (risks) primarily to humans
1. Provides highly sought-after opportunities for acceptably safe bear-viewing, photography, film-making.	1. Not appropriate in all contexts; may conflict with sport-fishing and hunting.
2. Bear-viewing is a growing industry in North America offering economic benefits to many.	2. Close proximity of habituated bears may encourage ignorant, even illegal acts.
3. Evidence that habituated brown bears are less likely to threaten or attack hikers or bear viewers.	3. More interactions with habituated bears may increase cumulative odds of injury.
4. Habituation and use of roadside habitat could, in theory, increase carrying capacity of protected areas for brown bears.	4. Habituated brown bears, especially sub-adults, have a greater tendency to approach people and people may respond inappropriately and dangerously.
	5. Habituated bears in roaded areas may encourage traffic jams and serious collisions.
	6. It costs money to manage habituated bears, especially if they become food-conditioned.
Benefits primarily to bears	**Costs (risks) primarily to bears**
1. Habituated bears are better able to access natural foods and other resources that exist near centers of human activity.	1. Habituated bears near roadsides or railways are more likely to be injured or killed.
2. Some bears may use presence of humans to avoid encounters with other bears (mothers caching cubs near observation stations).	2. Habituated bears are more likely to be killed if outside of protected areas.
3. Habituated bears promote bear-viewing which, in turn, may promote bear conservation.	3. Habituated bears near roads are more likely to be fed by people or get people's food and become food-conditioned.
	4. Despite regulations, habituated bears are more likely to be approached by people for better photographs or viewing,resulting in greater risk of human injury and bear harassment or removal.

respect to Yellowstone National Park, motels, restaurants, and other gateway-community businesses benefit from bear and wildlife viewing.

3) There is evidence that habituated brown bears are less likely to threaten or attack hikers or bear viewers on a per-encounter basis (Jope 1983, Nadeau 1987, Aumiller and Matt 1994, Smith et al. 2005). In Yellowstone no roadside bear viewers have been injured by a brown bear. At McNeil River Falls State Game Sanctuary, in over 28 years and roughly 60,000 encounters between brown bears and people, a bear has never injured a person, nor has a bear had to be removed or killed. At McNeil there have been 13 documented charges by brown bears toward people. However, none of these has been by a fully habituated bear (Aumiller 2003). An important, recent research finding in this regard is that brown bears in very low-density populations appear to have the highest rate of attacks during encounters with people (Smith et al. 2005). This is consistent with bears in higher-density populations being more tolerant of each other and of people because of greater bear-to-bear interaction rates and the advantage of conserving energy in such contexts.

4) Habituation and use of roadside habitat could, in theory, increase the carrying capacity of protected areas for brown bears. This might allow for more human-caused mortality and fewer human-use restrictions in nearby nonprotected areas while still maintaining a viable bear population. An increase in carrying capacity assumes that brown bear mortality rates do not increase with habituation.

Bear-to-human habituation: potential risks (costs) primarily to humans

1) Management of bears for viewing is not appropriate in all contexts. For example, sport fishing on Alaska's Kenai Peninsula is well established. During peak usage hundreds of people line the banks of the Kenai and Russian Rivers to catch migrating sockeye salmon (*Oncorhynchus nerka*). Brown bears also frequent the river, foraging on spawning fish and offal discarded by successful anglers. Although the habituation of these bears to people could provide increased viewing activities, it also would increase undesirable conflict and costs as bears learn to obtain fish from people.

2) The proximity of habituated brown bears may encourage ignorant, if not illegal, acts. Such acts include feeding, thus food-conditioning bears, or approaching so close that defensive attacks could result. The potential dangers of food-conditioned brown bears are well known (Herrero 1970, 1985, 1989; Gunther 1994; Herrero and Higgins 2003). In extremely rare instances, food-conditioned bears have preyed upon people (Herrero 1985, 1989). Habituated bears are more visible and tolerant of people at close range, which emboldens some people to approach yet closer. However, every animal has an ORD, and once this has been breached, aggressive behavior may result. A fatal attack by a brown bear in Yellowstone National Park in 1986 resulted from a photographer intentionally approaching too close to a food-conditioned female bear with young that was used to people being nearby at roadsides.

Bear walking by McNeil River Falls pad, Alaska.

3) Since habituated bears come to accept people at closer distances, this tolerance makes interactions more probable. In some contexts this may increase the cumulative odds of injury. Since 1994 most brown bear-inflicted injuries in Glacier National Park, Montana, have occurred on trails in high-use areas where many brown bears are thought to be habituated (J. Waller, Glacier National Park, Montana, personal communication). In this context an individual encounter is less likely to lead to human injury, but the increase in encounter rate may result in more aggressive interactions overall. The amount of vegetative cover in Glacier National Park may create opportunity for surprise encounters and related, defensive brown bear attacks (Nadeau 1987). This topic needs quantitative research. At McNeil River Falls and Brooks Camp, cumulatively large numbers of encounters have not led to brown bear-inflicted injuries to humans.

4) Curious brown bears, particularly subadults,

have a tendency to approach people. In response, people should not run as this sometimes encourages chase and possible attack (Egbert 1978; Herrero 1985; Aumiller and Matt 1994). People who encounter curious, approaching brown bears and are not knowledgeable about bear behavior may be unnerved by the experience and react inappropriately by running away or shooting the bear. In one rare instance, persistent approach by a subadult brown bear, coupled with a poorly informed response by the 2 people involved, led to a fatal attack in Kluane National Park in 1996 (S. Herrero, University of Calgary, unpublished data). In this incident, the brown bear was not known to be habituated.

5) Habituated brown bears in roaded areas may encourage traffic jams as previously noted, and in the worst cases this has led to serious collision injuries.

6) Most, if not all, of these potential risks can be managed by direct visitor contact and public education. This costs money, often more than is available to manage habituated bears, especially if they become food-conditioned and have to be de-conditioned.

Bears behind McNeil River Falls pad, Alaska.

Bear-to-human habituation: potential benefits primarily to bears

1) As mentioned, habituated bears are better able to access natural foods and other resources that exist near centers of human activity. Habituated brown bears in protected areas may forage near roads or salmon streams while people are present. Whether this has long-term benefits to individual bears or to the population depends upon mortality probabilities for habituated bears and the relationship of the population to carrying capacity. In theory, habituated bears could benefit as they are able to access habitat that would otherwise be unavailable.

2) Some bears may habituate to people and use their presence to avoid encounters with other bears that may be threatening or dangerous to them. For example, brown bear family groups may forage closer to roads or other developments to avoid encounters with adult males (Mattson 1990, Nevin and Gilbert 2005). Similarly, females have been observed to "cache" their cubs near people at bear-viewing sites such as Brooks Camp and McNeil River in Alaska while they fish. These females may have learned that some other bears, which may be a threat to their cubs' survival, avoid close proximity to people (Peirce and DeBruyn 1999, Nevin and Gilbert 2005).

3) Due to their small ORDs, habituated bears provide bear viewing that, in turn, promotes bear conservation in 2 different ways. For one, people who thrill at the sight of bears in the wild may be more likely to be sympathetic to and involved in bear conservation issues. Second, concentrations of habituated bears generate bear-viewing constituencies that in turn may demand hunting closure in those areas. Although controversial, hunting closures for bears clearly add protection to individual bears and perhaps to subpopulations of bears.

Bear-to-human habituation: potential risks (costs) primarily to bears

1) Habituated bears near roadsides or railways with high-speed traffic are more likely to be injured or killed by motor vehicles or trains (Benn and Herrero 2002). Such losses may constitute unacceptable mortality to certain bear populations. Because habituation of brown bears increased

transportation-related mortalities in Banff National Park (Mueller et al. 2004), it is actively discouraged by the park (H. Morrison, Parks Canada, personal communication). However, we have noted that in Yellowstone National Park, where roads are narrower and traffic speeds slower, only 0.4 brown bears are killed by vehicles/year. This is 1 vehicle-caused mortality per 9.7 million visitors.

2) Habituated bears, especially those found near roads, are more likely to be killed by poachers. An ongoing radiotelemetry study of brown bears in eastern Jasper National Park and nearby Alberta Provincial Lands identified significant poaching of bears near roads (Stenhouse et al. 2003). Habituation was assumed to have been a contributing factor in some cases for bears that had a known history of feeding on natural food near roadsides.

3) Habituated bears near roads are more likely to encounter food associated with people and become human-food-conditioned. Because of the potential danger from such bears, they must either be deconditioned using aversive agents such as rubber bullets, cracker shells, or bear dogs, or removed from the population through relocation or elimination. During the 1970s and 1980s in Yellowstone National Park, brown bears that were both human-habituated and food-conditioned were killed 3.1 times more often than nonhabituated, nonfood-conditioned bears (Mattson et al. 1992).

4) Despite regulations to the contrary, habituated brown bears are more likely to be approached by people for photographs or better viewing. This typically causes brown bears to flee. Approach into a brown bear's ORD also creates a risk of bear-inflicted injury and removal of the bear.

Managing people's behavior and risk of injury around habituated bears

What degree of control over people's behavior is necessary to provide for acceptable risk around habituated bears? How important is predictability of human behavior? Brown bears are known to flee or approach when another bear, animal, or person appears suddenly. By making people's activities as predictable as possible, we minimize surprise encounters and the chance of defensive attacks and simultaneously encourage habituation (Aumiller and Matt 1994). At McNeil River Falls, the number of visitors is limited to 10 at a time, plus at least 1–2 guides; therefore, people's behavior is quite predictable. However, at another nearby bear–salmon concentration area, Brooks Camp in Katmai National Park, Alaska, there are up to 300 visitors/day at peak times. Their actions, while broadly predictable (visitors are found within certain areas), are only loosely managed within the area where bear–human interactions frequently occur. Neither McNeil River Falls nor Brooks Camp has had a serious bear-inflicted human injury in the past 35 years. This may be because high levels of bear-to-bear tolerance associated with dense bear populations that aggregate on salmon streams promote bears tolerating people in a variety of contexts (Smith et al. 2005). Despite the impressive safety record at Brooks Camp, more predictable human behavior would further encourage habituation and help minimize stress on bears and lessen even further the chance of a person being injured.

Yellowstone National Park bear jam.

In interior locations, such as Yellowstone National Park where large numbers of unsupervised visitors travel over an extensive road system, it is much harder to monitor and control people's behavior around habituated bears. Under such conditions, it is paramount to properly educate visitors so that they know how to behave in a manner that does not put themselves or habituated bears at risk during unsupervised bear-viewing opportunities.

There is no simple formula for determining how close people should be allowed to approach apparently habituated bears. However, a good barometer is to not cause the bear to overtly react in any way (ADFG and United States National Park Service 2003). We suggest that a distance greater than where the bear overtly reacts is even better, since internal reaction that costs a bear energy may occur before external reaction. Some people at coastal viewing areas take advantage of this toler-

ance and either approach or allow bears to approach them (a safer, more respectful situation) within a few meters. At McNeil River the group of bear viewers stands near sites where bears typically feed. Each bear, according to its own comfort level, passes or feeds near the people. There likely are some wary bears whose ORD is so large as to keep them from even coming near the viewing site. Feeding bears is almost never an issue in this context, but unless people's food and garbage are under strict control, bears willing to be so close to people may find these food sources and become food-conditioned. In Alaska bear managers have developed recommended standards for bear viewing that respect needs of bears and desires of people for bear viewing (ADFG and United States National Park Service 2003).

To some extent acceptable standards for human conduct around habituated bears, and the associated risk of injury, will have to advance by adaptive management. This was the case at Brooks Camp, where for years human injuries have been expected due to high bear–human encounter rates coupled with somewhat unpredictable human behavior (Servheen and Schoen 1998). However, anticipated bear-inflicted injuries have not occurred. This suggests that their probability is low and probably acceptable.

Habituation management for bear managers and policy-makers

Seasonal aggregations of bears, or bears feeding on natural foods near roads, present opportunities for bear viewing, appreciation, and photography and filmmaking. These opportunities can be developed and enhanced by encouraging bear-to-human habituation. However, such opportunities need to be weighed against the risks and costs to both people and bears in each specific context. We have pointed out that multiple recreational and other resource uses may be possible in an area where habituation could encourage bear viewing. In some situations, bear-to-people habituation and bear viewing may conflict with recreational fishing or other uses. Habituation and viewing also may create unacceptable mortality risk for bears in certain contexts. In each specific situation the risks (costs) and benefits we have identified should be considered. Bear habituation and viewing can offer major benefits with acceptable risks but only in certain contexts and if thoughtfully planned and executed (Fulton et al. 2002).

Tourists stop for close-up view of bear at Yellowstone National Park.

Habituation of bears to people in areas closed to bear hunting is a management challenge and opportunity requiring policy decisions related to the extent to which it will be tolerated, discouraged, or encouraged. The issue of habituation is even more controversial in areas that allow bear hunting. Issues of "fair chase" can be hotly debated. The affected public has been successfully involved in decisions related to management options for some habituated brown bear populations (ADFG 2000, 2002). Policy-makers and managers need to develop a clear mission and goals related to bear viewing. These should be reflected in operational plans. Measurable objectives such as viewing benefits, low human-caused bear mortality rates, and acceptable financial costs are fundamental. A general principle is that if people and the environment are well managed, bear management will occur with minimal handling or removal of bears.

Interior bears may be expected to habituate to humans more slowly and seek more separation distance than do brown bears living in food-rich coastal areas. In contrast to brown bears living in dense, coastal populations, those living in lower-density interior populations do not regularly interact with conspecifics, except within family groups (Smith et al. 2005). The distances at which interior brown bears react to one another typically are greater than for coastal bears (Smith et al. 2005). Thus bear-to-bear habituation likely develops more slowly and less completely among bear populations at lower densities. Given this experience, ORDs to humans usually do not become as small for bears in low-density populations as for bears living in dense, coastal populations.

The human-influenced environments in interior

areas usually are more complex due to more people and more extensive developments. Cost–benefit analyses related to bear viewing may be more complex as a result. What bears can expect from humans becomes increasingly less predictable, thus retarding habituation. Even if we could strictly control all human activity, the lack of extensive bear-to-bear interactions in the interior suggests slower habituation to humans. This said, we have identified that habituation sufficient to support brown bear viewing is occurring in Yellowstone National Park. Distances at which Yellowstone brown bears are viewed are greater than at coastal bear-viewing areas.

Conclusions

People can, need to, and are co-existing in close proximity with certain populations of brown bears. This occurs at a variety of places with acceptable safety for both people and bears. Maintaining safe environments for bears and people at viewing locations requires active management, primarily of people and more rarely of bears. This requires planning and financial resources. Managers and policy-makers need to develop plans that specify the extent to which bear-to-people habituation will be discouraged or encouraged. These management plans need solid scientific underpinnings and a broad understanding of habituation and other processes that may lead bears to accept people at close distances. In threatened or endangered bear populations, where habituation may increase mortality risk, such as along high-speed roads, habituation should be discouraged unless the mortality risk can be managed. In other contexts, tolerance of bears to people creates considerable benefits with manageable risks. Habituated bears can create outstanding opportunities for people to observe brown bears in their natural environment. This may inspire caring for bears and conservation of their populations, habitats, and ecosystems.

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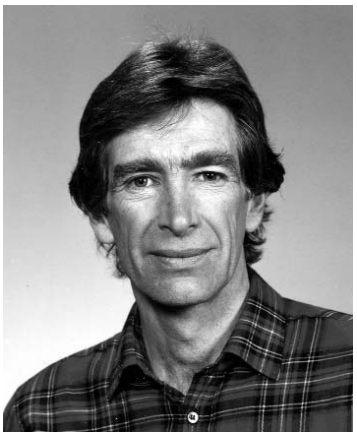

Stephen Herrero (right) completed his Ph.D. in animal behavior at the University of California, Berkeley, in 1967. This was the year that 2 young women were killed by different grizzly bears in Glacier National Park, Montana. Steve began research, which still continues, on bear behavior, ecology, and bear–human interactions, to try to understand and work toward minimizing such incidents and conserving bears and people. Much of what he and his colleagues have learned is discussed in his book *Bear Attacks: Their Causes and Avoidance*, the Lyons Press, Guilford, Connecticut, USA, 1985 (revised 2002). The book was nominated for, but did not win, the best book or monograph award of The Wildlife Society. Steve has been a professor at the University of Calgary since 1970 and now has emeritus status. ***Tom Smith*** (below) is a

research wildlife ecologist for the U.S. Geological Survey's Alaska Science Center in Anchorage. Tom received his B.S. in zoology from Brigham Young University, an M.S. in natural resources management at the University of Alaska - Fairbanks, and a Ph.D. from Brigham Young University in wildlife ecology. Since 1992 Tom's work has focused on brown, black, and polar bear research projects with an emphasis on bear–human interactions. ***Terry D. DeBruyn*** (above) is the regional wildlife biologist for the National Park Service's Alaska Region. He received a B.S. in environmental science from Grand Valley University (1976), and both an M.S. in biology from Northern Michigan University (1992) and a Ph.D. from Michigan Technological University (1997) studying black bears in Michigan's Upper Peninsula. Among his other experiences with bears are Section Leader, Bear Research and Management, Florida Conservation Commission, and Bear Biologist, Katmai National Park and Preserve, Alaska. Terry is primarily interested in field research of bear habitat use, movement, and behavior. ***Kerry Gunther*** (above, right) is the bear management biologist for Yellowstone National Park and a member of the Interagency Grizzly Bear Study Team for the Greater Yellowstone Ecosystem. He has worked in Yellowstone National Park as a bear management technician and biologist for 21 years. Prior to that, he worked in bear research and management for the U.S. Forest Service's Superior National Forest and the U.S. Fish and Wildlife Service. Kerry received his B.S in biology and earth science from Northland College and his M.S. in fish and wildlife management from Montana State University. His interests include the conservation of bears and finding practical solutions for reducing bear–human conflicts. ***Colleen Matt*** (below) is the lands and

public services coordinator for Alaska Department of Fish and Game. She has conducted a variety of public and interagency projects dealing with brown bear viewing and bear–human conflicts, including the development of "Best practices for bear viewing on the west side of Cook Inlet and the Katmai coast."