

MANAGEMENT OF MCNEIL RIVER STATE GAME SANCTUARY FOR VIEWING OF BROWN BEARS

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Abstract: Since a management plan was developed in 1973, the McNeil River State Game Sanctuary has become internationally famous as a spectacular wildlife viewing opportunity. A restricted number of human visitors interact in proximity with wild brown bears (*Ursus arctos*) that congregate at the McNeil River Falls to fish for chum salmon (*Oncorhynchus keta*). Brown bear habituation is defined and described. In the 21 years since the management plan has been in effect bear use has doubled, no bear has had to be destroyed or removed from the sanctuary, and no human has been injured. This program illustrates that humans and brown bears can co-exist peacefully particularly when humans behave in appropriate ways.

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Wildlife watching as a recreational pastime was formalized on this continent with the creation of the first national park at Yellowstone. Today people are watching wildlife in larger numbers than ever before (Vickerman 1991). Nationwide surveys in 1980 and 1985 showed a 43% increase in Americans participating in wildlife viewing, feeding, or photography as a primary or secondary recreational activity (Vickerman and Hudson 1991). North American wildlife watchers were most interested in viewing large mammals, and of the large mammals, watching bears was of highest interest (U.S. Dept. of the Interior 1989). This growing national interest in bear viewing is reflected in the increasing number of applicants and the increasing number of visitor days at McNeil River State Game Sanctuary (MRS GS) (Table 1).

The unique convergence of humans and large numbers of brown bears in a relatively safe, stress-free environment forms the basis of a 21-year-old bear-viewing program at McNeil River. The population of bears has increased dramatically since 1982. This increase is due to bear hunting closures in nearby areas outside the sanctuary (Sellers and Aumiller 1994), and a stable visitor management program.

Some authors suggest that humans and bears cannot peacefully co-exist when bears lose their wariness of humans (Moment 1968, McCullough 1982, Bromley 1985). We describe what we learned at MRS GS about the nature of bear-human interactions where most bears were very habituated to humans. We also discuss how this knowledge may be applied in other areas where bears and humans come into proximity.

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Table 1. Visitor use of McNeil River State Game Sanctuary (MRS GS).

Year	Number of applicants	Number ^a of visitors	Visitor ^a days at campground	Total ^b permit days for Jul-Aug	Season length
1973		48	183	152	7/1 - 8/15
1974		72	204	173	7/2 - 8/10
1975		85	385	245	7/1 - 8/15
1976		76	256	232	6/28 - 8/19
1977		122	365	311	6/29 - 8/14
1978		143	390	345	6/28 - 8/25
1979	669	75	185	91	6/28 - 8/25
1980	532	116	520	356	6/13 - 8/25
1981	397	133	519	434	6/17 - 8/27
1982	485	132	556	420	6/24 - 8/23
1983	625	178	738	454	6/11 - 8/25
1984	992	159	574	377	6/5 - 8/27
1985	832	216	816	449	6/10 - 8/25
1986	806	255	967	430	6/9 - 8/25
1987	1,757	252	1,054	473	6/8 - 8/23
1988	1,094	304	1,328	498	6/1 - 8/29
1989	1,306	264	1,183	488	5/22 - 8/26
1990	1,481	299	1,435	524	6/8 - 8/25
1991	1,818	249	1,415	526	6/1 - 8/27
1992	1,672	245	1,210	478	6/1 - 8/25
1993	2,150	225	1,113	516	6/7 - 8/25

^a Includes June visitation.

^b 560 maximum possible (56 days × 10).

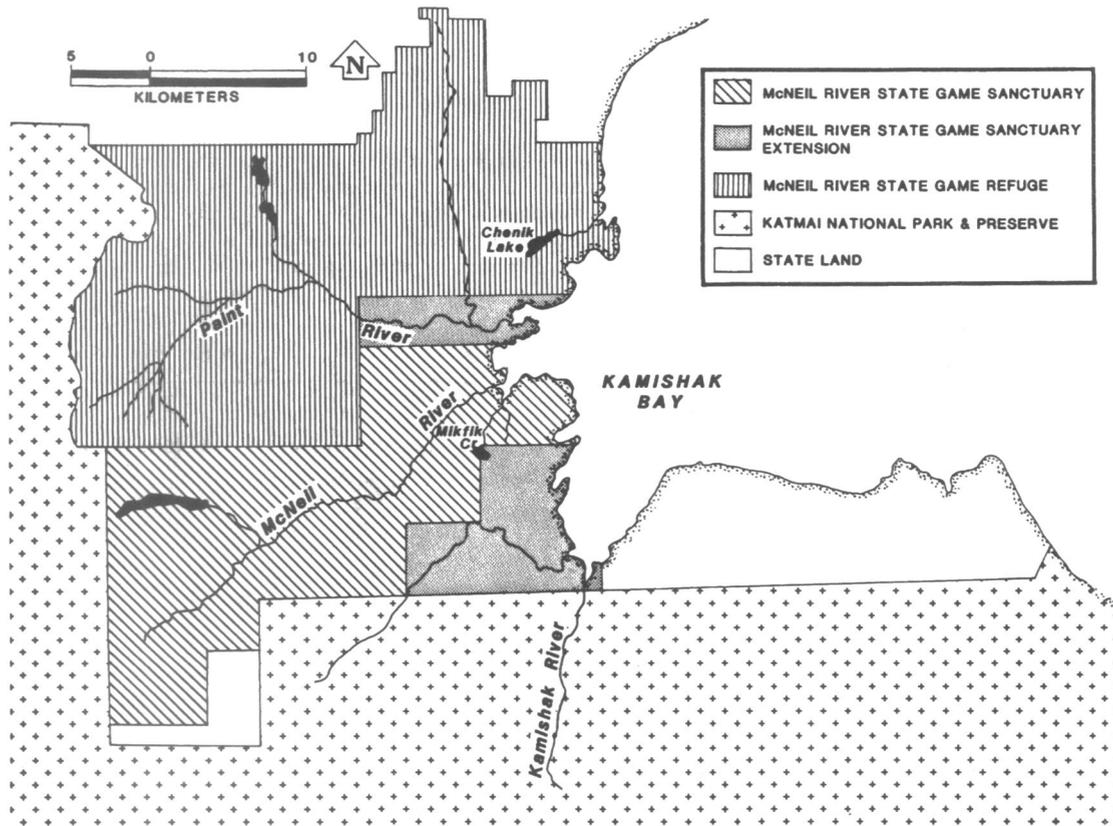


Fig. 1. McNeil River State Game Sanctuary and surrounding area.

SITE DESCRIPTION

The McNeil River State Game Sanctuary encompasses both the McNeil River and Mikfik Creek drainages (Fig. 1). The sanctuary is managed by the ADF&G and is located on the Alaska Peninsula approximately 340 km southwest of Anchorage and has been described in detail (Faro and Eide 1974, Glenn et al 1976, Egbert 1978, Bledsoe 1987, Walker 1993). McNeil River supports primarily chum salmon (*Oncorhynchus keta*) with incidental numbers of king salmon (*O. tshawytscha*), pink salmon (*O. gorbuscha*) and silver salmon (*O. kisutch*). Red salmon spawn (*O. nerka*) in Mikfik Creek.

Virtually all human and most bear use occurred in or near McNeil Cove on the lower 1 km of McNeil River and Mikfik Creek (Fig. 2). Bears were more numerous in areas where salmon were most efficiently caught, especially the long low cascade that forms the well-known McNeil River Falls. In most years, the falls effectively stopped the upstream migration of chum salmon (T.R. Schroeder, Alas. Dep. Fish and Game, pers. commun.). Schools of salmon waited in pools below the cascades while resting between attempts to

jump the falls. These resting fish were vulnerable to bears who positioned themselves on ledges and within pools of the falls. McNeil River bears preyed primarily upon salmon before they spawned. Partially eaten, injured, and post-spawning salmon were scavenged by less dominant bears downstream of the falls and throughout McNeil cove, especially in areas where the current was slow and the stream depth was shallow. Preferred fishing sites on Mikfik Creek included the upper falls, the lower falls, and the "riffles," where tidal influence ends.

The original 1967 boundaries of MRSGS encompassed 340 km². In spring 1991, the Alaska State Legislature passed a bill to expand the MRSGS by 123 km². The same bill created McNeil River State Game Refuge (536 km²) around the Paint River and Chenik drainages north of the current sanctuary (Fig. 1). The combined sanctuary and new refuge protects 999 km² of brown bear habitat (with the exception of some existing mining claims in the new refuge). Expansion of the sanctuary and creation of the refuge were stimulated by construction of a fish ladder on the adjacent Paint River.

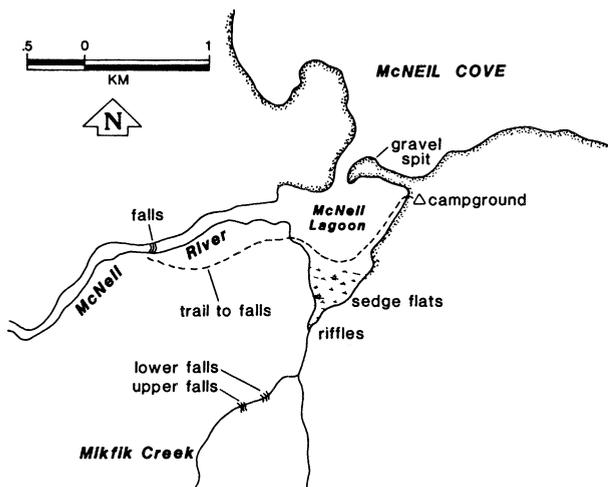


Fig. 2. McNeil River Cove and Lagoon.

The MRS GS permit system limited the number of people that visited the area inland of the campground, including McNeil River Falls, to 10 per day. Each group of visitors to the permit area was accompanied by an ADF&G staff member to ensure that the group behaved consistently during bear-human interactions. We encouraged consistent and predictable human behavior and we interacted with bears in a nonthreatening manner.

METHODS

Most of the data and observations presented in this paper were compiled from experiences gained during program development. Because of our noninvasive approach to bear management, opportunities for controlled experiments were very limited. Our conclusions and recommendations have evolved through adaptive management over the 21 years the site has been managed. The senior author has spent 18 seasons at MRS GS.

More than 5,000 hours of direct observation at McNeil River Falls and more than 2,000 hours elsewhere in the sanctuary have allowed the staff to recognize individual bears and differentiate between subtle behaviors. Individual bears were identified by differences in size, sex, age, color, scars, and behavior. Less important or more temporary identifiers were bears' association with siblings or offspring, or other physical characteristics such as claw color, shed patterns, limps, wounds, or stage of estrus. Consistent and idiosyncratic patterns of behavior were observed for

individuals.

Bears that were only seen briefly at a long distance, or were less than 5.5 years old were difficult to distinguish from other bears. These bears were not tallied as individuals.

Recognition of bears enabled us to monitor specific individuals over many years. In many individual bears, we noted an evolution from wariness to a high degree of habituation through countless interactions with humans. We also noted which of our own behaviors contributed to habituation and which behaviors deterred bears away from us.

HABITUATION AND SAFETY

The success of the McNeil River bear-viewing program was largely due to the habituation of bears to people. We concur with Rogers and Wilker (1990:322) that "as trust develops, threats all but disappear." Habituation is defined as the reduction in the frequency or strength of response following repeated exposure to an inconsequential stimulus (Jope 1985, Gilbert 1989). The stimulus in the context of MRS GS was proximity to people in a nonthreatening interaction. Bears habituated to other bears as well as to humans (Stonorov and Stokes 1972).

The distinction between habituation and human food conditioning is critical. Conditioning to human food occurs when 2 circumstances exist: (1) bears have fed on human food or garbage, and (2) bears learn to associate humans and/or human development as potential sources of food (Gilbert 1989). Habituation, on the other hand, occurs with or without human food conditioning (Jope 1983, Aumiller 1984, Jope and Shelby 1984, Warner 1987).

At McNeil River we avoided food conditioning yet strove for habituation. We found that, in the absence of a food reward, habituated bears were safer than wary bears. This follows logically from the premise that habituation is the reduction in the frequency of responses, and aggression is among those responses that are reduced. Therefore, in some situations habituation can contribute to safer interactions between bears and humans (Jope 1983, Jope and Shelby 1984, Herrero and Fleck 1990, Olson and Gilbert 1990).

A bear's reaction to people, aggressive or otherwise, is related to the perception of threat (Bromley 1985). Highly habituated bears at McNeil River perceived humans as neutral and not threatening and, therefore, less dangerous. As in other areas, habituated bears come closer to humans and exhibit fewer signs of stress than do nonhabituated bears (Herrero 1989). Highly

habituated bears at McNeil River routinely approached humans to within 5-8 m before showing avoidance behavior. We think that encouraging habituation encourages use by bears and may, in part, account for the increase in bear numbers. In the last 18 years, highly habituated bears never showed aggressive or threatening behavior toward humans.

Degrees of Habituation

Not all MRS GS bears habituated to the same degree or at the same rate. We categorized bears into 3 groups based on their responses to humans and human development. These groups follow Haroldson and Mattson (1985, cited in LaFranc et al. 1987), but are renamed to accurately reflect our situation.

Wary.—This group included bears that were not habituated to people. They characteristically fled from human encounters and avoided human developments.

Neutrally Habituated.—This group included bears that were indifferent to the presence of humans or human development and did not actively seek human food.

1. Partially habituated: This group include bears whose level of wariness increased when they encountered humans in unfamiliar settings, or when humans exhibited unfamiliar behavior. For example, some bears at McNeil River Falls fished on the opposite bank from our viewing site. These bears often avoided humans in settings other than at McNeil River Falls. Unfamiliar human behavior at the falls such as a direct approach caused these bears to retreat.

2. Highly habituated: At McNeil River there was a fairly defined cadre of bears that tolerated humans at very close distances in a variety of settings and situations including areas outside the sanctuary. For example, this group included females that nursed cubs-of-the-year within 5 m, adult males that slept within 5 m, and mating pairs that consorted within 10 m of humans.

Habituated and Human Food Conditioned.—This group included bears that did not normally fear human proximity and sought human food and garbage. There have been only a few bears that received humans' food or fish at MRS GS and exhibited food-conditioned behavior. There are currently no bears conditioned to human food at MRS GS.

Younger bears tended to habituate quicker than older bears. The cohort of older males (>12 yr) seemed slowest to habituate. Even within the group that we call "neutrally habituated," the transition between partially habituated to highly habituated often took

several years in adult bears. Further, bears that were neutrally habituated did not change their level of habituation whether they were hungry, accompanied by cubs, in estrus, or consorting prior to mating. This was true for both partially and highly habituated bears though it was more easily observed in the highly habituated group (Bledsoe 1987).

Processes of Habituation

The most common process of habituation occurred when bears had to be near humans in order to gain access to a food source. This habituation method has been observed in black bears at garbage dumps (Herrero 1983). At McNeil River the food source was salmon, and bears were attracted to specific sites where salmon were more easily caught. If humans were near these sites, bears tended to overcome their wariness in order to gain access to the fish. We speculate that the earliest form of habituation at McNeil River occurred when bears tolerated humans in order to gain access to fish at McNeil River Falls. By the first year of the permit system in 1973, some bears were already habituated to people (Stonorov and Stokes 1972).

Another habituation process occurred when cubs were brought close to people by their habituated mothers. Cubs tended to display stressed behavior in proportion to their mother's behavior. Cubs-of-the-year that exhibited wariness and fear at their first sight of humans learned to accept nearby humans within a few days if their mother was calm and unstressed. On one occasion, a litter of 3 curious cubs-of-the-year approached a group of visitors to within 3 m while their highly habituated mother grazed 10 m away. It was the cubs' third known exposure to humans.

A third process of habituation occurred when highly habituated bears drew less habituated bears near humans. There were 2 circumstances for this type of habituation: (1) highly habituated females in estrus were accompanied by less habituated males, and (2) highly habituated adolescents were accompanied by less habituated adolescents. In both of these situations, the habituated partner drew the less tolerant bear closer to humans than the latter bear normally tolerated. Presumably, the less habituated bear's desire to be with its partner overcame its wariness of humans. Repeated instances of benign contact with humans reinforced habituation.

No matter what habituation process was operant, appropriate human behaviors accelerated and reinforced the process. We viewed each interaction with individual bears as a learning experience for the bear and adjusted our behavior accordingly. There were

several specific behaviors that seemed to work well: (1) we strove to be predictable by being consistent in our behavior, and (2) we were benign in our interactions with bears (with 2 exceptions, defense of camp and personal boundaries).

BEAR MANAGEMENT

The Alaska State Legislature's objective in creating MRS GS was "to provide for the permanent protection of brown bear and other wildlife populations and their vital habitat in the area of McNeil River so that these resources may be preserved for scientific, esthetic, and educational purposes." (Alaska State Legislative House Bill #156-1967). The ADF&G interpreted this mandate to mean that a minimum number of observable bears should be maintained at the sanctuary. This objective is the cornerstone of our current management plan. A secondary management objective is to "provide a quality wilderness setting for viewing brown bears." (Ala. Dep. Fish and Game 1981). Clearly, it is also the department's intent to make this viewing experience as safe as possible.

At McNeil River we found that the objectives of bear protection, quality viewing, and safety were compatible. Managing for the maximum number of bears required limiting the number of visitors and their activities in the sanctuary. Limited visitation required less development and crowding and thus enhanced the visitors' wilderness experience. Most of the actions we took to encourage more bear use also encouraged habituation. The following section outlines human behaviors that promoted the above objectives.

Actions That Encouraged Habituation and Safety

Methods which contribute to habituation in other animals include the following: (1) consistent context (repeated stimulus in similar circumstances), (2) frequent, irregularly spaced encounters, (3) easily recognized stimulus, and (4) innocuous human behavior (Kimmel 1973, Thompson et al. 1973). At MRS GS our methods were similar:

Predictable and Consistent Interactions.—Our actions were as predictable and consistent as possible. The main camp location remained stable over 21 years and camping was not allowed elsewhere in the sanctuary. Each day we followed the same trails, used the same viewing sites, and generally limited viewing hours to between 1000 and 2000 hours. Our camp, trails, and viewing areas were detectable by both scent and sight. Hence, bears made the choice about their proximity to

humans; wary bears avoided areas frequented by humans and their avoidance was proportional to their level of wariness. As a result, people were most likely to interact with bears that were most comfortable with humans.

The staff managed each group of visitors so that bears perceived little variation in human behavior. During interactions with bears, humans had 3 general behavior patterns to choose from: aggression, retreat, and no response. If we quickly and directly approached a bear it often perceived our actions as aggressive and would, in future encounters, avoid us. Retreat from nearby bears could, depending on the age and curiosity of the bear, induce mild pursuit. No response from humans toward bears usually resulted in neither approach nor retreat by nearby bears. For example, when a curious adolescent bear approached the group of humans, we held our position (i.e., gave no response) until the young bear swerved to avoid us. If we arbitrarily retreated from a curious bear one day and approached it on another day, we missed an opportunity to reinforce the appropriate behavior in that bear. We found that inconsistent behavior in interactions caused bears to avoid humans, whereas as consistently neutral behavior reinforced habituation. As with any other behavior modification scenario, it is important to give consistent responses in order to facilitate learning of the desired behavior (Kimmel 1973, Thompson et al. 1973).

Nonapproach.—In all areas of the sanctuary, with the exception of camp and personal boundaries, we tried not to violate bears' comfort zones. More specifically, we allowed bears to choose their proximity to humans. When bears made the choice to come near to humans they generally showed little or no signs of stress. However, when humans made that choice for bears, (i.e., we approached them), we could induce high stress levels.

Proximity to Food Source.—The process of habituation was hastened when bears had to be near humans in order to gain access to food. However, for safety's sake it was equally important that humans did not block access to or put themselves directly in the midst of the desired food source. The viewing pad at MRS GS was an example of this principle. The viewing site was near the river yet it did not impede bears' approach to or use of the falls since there were alternate routes.

Calm Demeanor.—We avoided loud noises and fast or exaggerated body movements when bears were close to people. Bears reacted to human gestures at distances that varied from 7 to 70 m, depending on the wariness

of the particular bear and other distractions (such as other nearby bears). We found that slow movement and low-level talking caused less stress in nearby bears than loud noises and quick, jerky movements. A highly habituated bear might pass a group of visitors within 8 m if that group was relatively calm and quiet. However, that same bear might be alarmed by a visitor's loud cry and wild gesticulation and swerve to avoid the group.

Adaptation to Bears' Stress Level.—In all interactions with bears, we tailored our responses to the level of stress that we observed. For example, during our daily trek through the sanctuary we occasionally approached bears in order to pass them to get to our viewing sites. In making our approach we watched each bear closely for signs of stress or an escalating pattern of stressed behavior. Brown bear stress signals tended to follow a loose pattern starting with yawning, staring, moving away (or rarely, toward us), woofing, lip-popping, or, in extreme and rare cases, a charge. If any stress was apparent we stopped or changed our course to avoid the bear.

Actions That Encouraged Safe Interactions

At McNeil River, we were comfortable with bears at close distances, but we enforced a limit to that closeness. These limits were established both for "personal space" and the campground. We defined personal space as the area around us (as individuals or as a group) in which we would not tolerate the presence of a bear. This area varied depending upon our familiarity with a bear and/or its demeanor. Generally, if a bear exhibited stress we discouraged close approach. Conversely, if a bear was calm and paying attention to something other than us (e.g., grazing or fishing), we might allow it to approach as close as 3 m.

Bears also exhibited defense of personal space when approached by other bears or humans. Responses varied along a continuum from avoidance to aggression (Stonorov and Stokes 1972, Luque and Stokes 1976, Bledsoe 1987). Our own response to violation of personal space ranged from avoidance to aggression.

Curiosity was by far the most common motivation for approaching humans at MRS GS. This behavior was most prevalent among cubs and adolescents. A second motivation, also common among young bears, was a "testing" challenge. Testing included following people, persistent crowding of humans, or "hop charges," (Egbert and Stokes 1976). A third motivation was stress leading to aggressive behavior directed at humans. The latter behavior was rare and occasionally included an intense charge.

Bears attempting to escape other bears also approached humans inadvertently. Due to the high concentration of bears at McNeil River, there were many aggressive interactions between bears. Occasionally, bears chased other bears toward a group of humans. Fleeing bears were so intent on escape from pursuers that they often seemed unaware of the humans in their path. In these situations, sanctuary staff intervened to warn away the approaching bear.

Highly habituated bears often walked by humans at very close distances and gave no apparent response to human presence. We did not consider such behavior an "approach"; sometimes the presence of humans simply had no observable impact on the behavior of highly habituated bears.

If a bear approached for any reason other than aggression, we responded with the lowest level of appropriate aversive reaction. Responding at the mildest level was important because we were simultaneously reinforcing habituation in the bear. Our goal was to protect our personal space and yet encourage the bear to be comfortable outside of that space. Neutral human behavior (e.g., not moving) was the appropriate response in the previously mentioned curious approaching bear scenario, based on our goals for making bears comfortable with the nearness of humans and still maintain our own comfort zone. If a bear purposefully approached humans for any reason, we did not retreat. We have learned from observing bears interacting with other bears that retreat encourages pursuit.

The following are aversive actions that we used in nonaggressive situations. The list begins with the most innocuous actions and ends with the most extreme responses.

- * Hold your ground; do not move away from the bear.
- * Change body orientation to face the bear.
- * Raise your arms, wave slowly.
- * Speak firmly without yelling.
- * Take one or two steps toward the bear.
- * Clap your hands softly and slowly.
- * Clap your hands harder and rapidly.
- * Yell or make noise (e.g., bang metal).
- * Stand on a higher object if available (e.g., log or rock)
- * Wave arms or coat vigorously.
- * Throw objects such as rocks or sticks at the bear.
- * Chamber a shotgun round for the mechanical noise effect.
- * Fire a shot into the air (sometimes this elicits no response).

- * Fire a shell cracker onto the ground between you and the bear.
- * Fire a rubber slug or rubber shot at the bear's rump.¹
- * Fire #9 birdshot at the bear's rump.¹

Many of these responses elicited a stronger response if several people responded. These actions were also combined or repeated until the desired response was achieved.

Both the number of incidents and the difficulty in moving bears out of camp were reduced in the last few years. Usually these bears were highly habituated juveniles or curious 2-year-old cubs followed by their mothers. When bears were seen in the camp area they were immediately expelled by sanctuary staff. We used low impact aversive actions such as walking toward the bear and clapping our hands or beating a pan for the noise effect. A bear rarely came back a second or third time, and our responses escalated on each occasion. In cases where food conditioning occurred, our response was quick and forceful. We considered the use of rubber shot an extreme response and have used them only once in the last 5 years.

In aggressive interactions stronger and simpler actions worked best because it was difficult to get the attention of a stressed bear and situations unfolded quickly. Again, these actions are listed here in order of forcefulness:

- * Hold your ground.
- * Raise your arms, gun in hand.
- * Yell loudly.
- * Chamber a round.
- * Fire shell into the air if time permits.
- * Shoot to kill the bear.²

By holding our ground, we communicated to approaching bears that their continued approach may result in combat. When adult bears were charged by other bears, they typically held their ground. Charging bears in these situations commonly broke off their charges before making contact with other bears.

In the last 21 years sanctuary staff have experienced 8 intense charges (Table 2). Four were by wary bears and 4 were by partially habituated bears. None

Table 2. Intense charges by brown bears at MRS GS, 1976-93.

Date	Status of bear	Area	Level of habituation
7/8/77	Adult male	McNeil River Falls	Wary
7/15/79	Female with 2 2-1/2 year olds ^a	McNeil River Falls	Wary
7/16/79	Female with 2 2-1/2 year olds ^a	McNeil River Falls	Wary
7/16/81	Adult male	McNeil River Falls	Partially habituated
7/29/82	Adult female with 2 yearlings	McNeil River Falls	Wary
7/7/87	Adult female with 1 spring cub	McNeil Cove	Partially habituated
7/10/87	Adult male	McNeil River Falls	Partially habituated
6/30/93	Adult female with 3 yearlings	McNeil Cove	Partially habituated

^a = same bear.

involved highly habituated bears. In all cases the person held their ground and prepared to discharge a firearm. However, firearms were not used and each bear veered away or stopped, turned, and fled.

VISITOR MANAGEMENT

Habituation of bears without food conditioning was the crux of the success of MRS GS. A crucial component of habituation was visitor management. The lottery system at MRS GS contributed to habituation by limiting the number and activities of visitors. Visitors entered a lottery and drew permits in order to watch bears at MRS GS between 7 June and 25 August. Permits were limited to 10 per day at bear-viewing areas. The campground had a maximum occupancy of 15. People typically arrived by commercial float plane service from Homer, Alaska.

Each day 1-2 sanctuary staff took a group of 10 visitors to watch bears. Daily trips generally lasted 5-9 hours and the groups usually spent the viewing period at a single site. In June, viewing sites included several points along Mikfik Creek and the intertidal area where bears fished for sockeye salmon or grazed on sedges. The McNeil River chum salmon run began in early July and both the bears and the visitors shifted their attention to McNeil River. By late August, the chum salmon run was depleted and the bear population dispersed.

¹ For the bear's safety these methods should be employed no closer than 36 m, and then only when the bear is faced away (Bromley 1985).

² Use shotgun slugs at distances less than 30 m (Thelanius and Meehan 1983). We recommend waiting until the bear is 10 m away before shooting to give the bear the opportunity to stop its charge.

The campground was located away from high bear use areas or major access trails to those areas. The camp was accessible to float planes and had nearby fresh water, dry tent sites, and protection from the prevailing winds. Visitors were required to camp in the campground. The camp had 3 wooden structures: 1 cabin for the permanent ADF&G staff housing; 1 cabin for storage, emergency use, and temporary ADF&G staff housing; and a third cabin where visitors stored food, cooked, and escaped inclement weather.

Visitors to MRSGS were not always supervised in their movements and actions; however, they were educated upon arrival at the sanctuary about proper behavior near bears and consequently, they tended to behave in ways that contributed to bear habituation even when unaccompanied by sanctuary staff. There were 2 major topics of the orientation: (1) appropriate behavior around bears, and (2) rules concerning garbage and food. Visitors were allowed but not encouraged to bring firearms. Less than 5% of MRSGS visitors brought firearms and even fewer carried them away from the campsite.

Visitors were not allowed inland of the campground unless they were accompanied by sanctuary staff. However, visitors were free to walk seaward of camp along the sand spit and sea cliffs. If unguided visitors encountered bears during their hikes they were instructed to do the following:

1. If you see a bear walking toward you, but it is still quite far away (> 150 m), slowly move out of the bear's path if possible.
2. If the bear continues to approach, make sure that it sees you. Stand still, wave your arms calmly and talk loudly. These actions give audio and visual cues to the bear about your identity and will reduce the chance that you will surprise the bear.
3. The bear may stop to look at you and then change its path to avoid you. However, many of the bears you will encounter are so highly habituated that they will make no indication that they see you and will continue toward you and pass by fairly closely (sometimes within 20 m). In this case remain standing still, continue to talk loudly in order to make sure that the bear is aware of you. The bear will, in all likelihood, pass by you.
4. Occasionally, a curious adolescent bear will approach you. Under no circumstances should you run or walk away because this will entice the bear to follow. Remain standing and, if possible, elevate your position by standing on a log or a rock. Wave your arms and yell more vigorously. You may have to do this for a few minutes before the young bear

loses interest and walks away.

5. Never run from a bear. Running invites pursuit.

6. In the unlikely event you are charged by a bear, stand your ground and remain upright.

Visitors cooked and stored food in the cook shack and disposed of their trash and garbage in a receptacle in the same building. Visitors were encouraged to save food scraps and take them back to Homer for disposal because of the difficulty of burning food adequately without a high heat incinerator. Prior to 1985, garbage was burned once a day with kerosene in a burn barrel located 35 m from camp. Burned remains were buried nearby. Bears frequently dug up the buried remains of burned cans and bottles. Beginning in 1985, all burned garbage was sacked in plastic bags, stored until the next flight, and then flown to Homer by one of the air taxis. This new system reduced the number of bear visits at the burn barrel to fewer than 4 or 5 during the 3-month season. Typically these bears didn't stay long and seldom returned a second time.

The importance of keeping human food from bears cannot be overemphasized. Early in 1977, a 3-year-old bear discovered an underground cool storage area adjacent to an ADF&G cabin where it consumed 4 kg of cheese and several packages of lunch meat. This young bear returned several times over the course of the next few days. Each time it was met with an escalated response and encouraged to leave. After 5 such interactions, the "cheese thief" finally left camp and did not return. This bear had one known event of food conditioning that required much perseverance on our part to de-condition.

GUIDELINES FOR ESTABLISHMENT OF BEAR-VIEWING AREAS

Several elements must be considered when evaluating an area for a possible bear-viewing program.

Viewability of Bears.—Choice of an area with a good population of bears is critical. Bears that concentrate around a naturally occurring food resource provide an ideal situation. The food source should be as predictable and continuous as possible.

Stable Land Status.—This could include private land but is more likely to include state/provincial or federal land with active management. The ability to regulate other human uses is important.

Buffer Zones.—As much as is possible, bear-viewing areas should encompass the home ranges of most of the bears using the site. The area should be managed by a single agency or by cooperating agencies (e.g., Stan Price State Wildlife Sanctuary Cooperative Management

Area). Humans that interact with habituated bears should behave consistently. This is rarely possible except in largely unsettled and unvisited areas. In lieu of jurisdictional control, homogeneous management of areas around the viewing site encourages consistent human behavior.

Funding.—Stable funding to maintain programs should be established in the early stages. The public demand for viewing areas is increasing significantly. Bear-viewing sites will probably draw visitors even if managers cannot afford to supervise them. Inconsistent funding could allow unsupervised visitation to overwhelm a viewing site.

Establishment of a Management Plan.—Goals and objectives should be clearly identified at the onset of a viewing program. With these guidelines in place daily management decisions become simpler. Guidelines should include the following elements:

1. Set priority of objectives. There will be conflicts, for example, if the management plan calls for maximum number of bears, maximum visitation, and/or maximum habituation.
2. Set the level of visitor management, education, and supervision. Steps include: (a) determine maximum number of visitors, (b) establish method of visitor limitation, (c) develop education program for bear-human interactions, (d) devise visitor supervision plan, (e) develop food-garbage management plan including camps, and backcountry, and (f) design locations of camps, trails, roads, and visitor facilities for minimum displacement of bears.
3. Establish a monitoring system to measure the effects and results of the program.
4. Develop a strategy for compatible and noncompatible uses.

MANAGEMENT IMPLICATIONS

The future of threatened bear populations in North America is influenced by the public image of bears. Bear-viewing areas like McNeil River, Brooks Camp in Katmai National Park, and Stan Price State Wildlife Sanctuary on Admiralty Island allow people to view free-ranging bears, learn about bear biology and behavior, and co-exist with bears in settings that are nonthreatening for either species. The success of long-term bear-viewing areas like MRS GS confirm that bears and humans *can* interact safely. Both visitors and the media help to build a support group for the conservation of bears and their habitat in other areas. McNeil River Falls with its prodigious population of habituated bears in a scenic wilderness setting is

unique. However, many of the MRS GS management tools are applicable at other bear-viewing sites.

Single Priority Management.—The MRS GS management plan clearly states that maintenance of the bear concentration is the highest priority. This single priority simplifies most other management decisions. For example, if overwhelming visitation displaces bears, then visitation must be reduced.

Eliminate Food Conditioning.—It is well documented that food conditioning in bears can increase negative bear-human interactions. At MRS GS we have gone to extremes to decrease the likelihood of food conditioning. This includes human food, garbage, or sport caught fish. Management programs at other bear-viewing areas that follow this example will have fewer food conditioning difficulties.

Knowledge of Bear Behavior.—Recognition of individual bears and their behavioral differences also can be important. This requires well-trained and experienced staff. At MRS GS we learned that bear behavior is predictable. However, in order to take advantage of this predictability the management staff must be able to interpret behavioral signals and respond appropriately.

Neutral Habituation.—The McNeil River experience demonstrates that neutral habituation is possible and that bear behavior, in the absence of a food reward, is easy to modify. Some managers of other bear-viewing areas may view neutral habituation as a undesirable element. We believe that our experience at MRS GS will show managers that neutral habituation in bears is not a safety problem in all circumstances.

Visitor Management and Neutral Habituation.—Neutral habituation and closely supervised visitor management are key components of the viewing program at McNeil River. Neutral habituation is possible without close visitor supervision, as can be seen at other bear-viewing sites such as Katmai National Park and Denali National Park. However, the high degree of habituation of bears at McNeil River is attributable to our close visitor supervision. Managers of other bear-viewing areas may not want to achieve the same degree of habituation because their circumstances do not allow for close visitor supervision, visitor education, and low levels of visitation.

Strategic Aversive Conditioning.—Aversive reactions must be designed for the level of habituation desired at a particular viewing area. In keeping with our goal of neutral habituation, we respond to bears with the lowest necessary level of aversive reaction. Maximum responses such as firing shotgun projectiles may have

the unwanted result of keeping bears away from humans under all circumstances.

Ethical Considerations of Habituation.—McNeil River management works well largely because sanctuary personnel are virtually the only humans interacting with these bears over the entire breadth of their home ranges. Habituated bears may maintain their lack of concern about humans when they are away from MRS GS. There is the concomitant ethical consideration that managers must address. What are the ramifications of habituating bears that will later come in contact with bear hunters and other less benevolent humans? The ethics of shooting habituated bears are questionable to both consumptive and nonconsumptive wildlife users.

Consideration of Economic Uses.—Economic evaluation gives managers a tool for assessing and prioritizing the highest use of potential wildlife viewing sites. The value of wildlife watching can go far beyond onsite direct use. In most existing and potential bear-viewing areas, including MRS GS, multiple uses such as tourism and fisheries compete with high quality wildlife watching. Economic evaluation of wildlife watching may be necessary in order to justify management for viewing as the highest and best use of an area. The methods used by Swanson et al. (1992) should be applied to evaluate and mitigate various conflicting uses.

Acceptance of Risk.—Given all of the management tools at our disposal, we can shift the odds of safe interactions in our favor. However, we cannot eliminate risk of injury entirely. Humans must accept some risk in trade for all of the positive aspects of bear viewing.

It is to be hoped that many more diverse areas will be developed in the coming years for all 3 North American species. Support from all user groups is one of the best ways to ensure that bears and their habitat will persist for both hunters and wildlife watchers.

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