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Front Cover: A brown bear family group takes a break from fishing near the Brooks River floating bridge, Katmai National Park, Alaska. Photo by Howard Maltby, NPS.
BEAR MANAGEMENT at BROOKS RIVER, KATMAI NATIONAL PARK, 2003–2006

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Abstract

Between 2003 and 2006, 1,725 records of bear-human interactions and other bear management events of concern were documented at Brooks River, Katmai National Park, Alaska. Most records (71%) were for events that occurred during July and September. There were 49 records of bears directly or aggressively approaching people in non-management response situations. Forty-five percent of these records (n = 22) involved anglers, including 16 in which anglers had fish on their lines. Eight records documented separate incidents in which bears obtained fish from anglers, predominantly during June and July (n = 7). Yet, a multi-year comparison suggested that the regulation limiting fish retention at Brooks River to downstream of the floating bridge may have contributed to a reduction in "fish stealing" incidents. Although there were 44 records of improperly stored food or garbage left potentially available to bears, there were only 7 records of bears obtaining minimal amounts of human food or garbage, and those appeared to be isolated incidents in which no repeated food-related events were documented. There were 1,033 records of bears trespassing or attempting to trespass in Brooks Camp. Of the 730 detailed records of trespass-related events, 607 documented National Park Service (NPS) hazing responses to these trespasses. Forty-nine records also documented NPS personnel hazing resting bears outside of the Brooks Camp Residence Area to facilitate human traffic movements along trails/roads or to access parked aircraft. Most of these records (n = 43) were for actions taken along the main trail between the floating bridge and Brooks Camp. We offer several recommendations regarding structural and operational changes that could help to reduce bear-human conflicts at Brooks River.

Key Words

Alaska, Brooks River, bear-human interactions, brown bear, Oncorhyncus nerka, salmon, Ursus arctos

Brooks River, a significant salmon stream for brown bears (Ursus arctos) in Katmai National Park and Preserve (KATM), has averaged >9,500 visitor days of use per year over the past decade (B. Brock, KATM, unpublished data). Bear viewing is currently the predominant visitor activity at Brooks River; however, sport fishing is also popular. Because human-bear conflicts can ultimately result in bears being removed from the population or in human injury or death, preventing undesirable interactions is of concern to park managers. Consistent with the KATM’s General Management Plan (National Park Service [NPS] 1986), a bear-human conflict management plan (BMP) has been updated and revised (NPS 2006a) with an emphasis on preventative management primarily through education and proper storage and handling of food and garbage. The BMP also provides guidance on responsive management, including use of hazing equipment to prevent or eliminate undesirable bear behavior. To evaluate the effectiveness of the bear management program, as well as to collect data on human-bear interactions that may be useful for park planning, the BMP tasked resource management with documenting bear-human interactions at Brooks River using Bear Management Report Forms (BMRFs) and Short Trespass Forms (STFs). This report summarizes Brooks River BMRF and STF data collected during the 2003–2006 field seasons.

STUDY AREA

Brooks River is located approximately 53 km east of King Salmon, Alaska. The river is 2.5 km in
length, flowing from Brooks Lake into Naknek Lake, with a 2-m high falls midway (Fig. 1). Sockeye salmon (*Oncorhynchus nerka*) migrate up the Brooks River during late June through July and spawn in the river during late August through October (Merrill 1964). A small run of coho salmon (*Oncorhynchus kisutch*) also occurs in the river in early September. The seasonal pattern of brown bear activity at Brooks River follows the pattern of salmon activity. During July, bear activity is focused at Brooks Falls, where migrating salmon are particularly vulnerable to bear predation. During the fall, bear activity is more focused in the Lower River and along the Naknek Lake beach north of the river mouth, where spawned-out salmon carcasses tend to accumulate.

Brooks Camp, which is located just north of the mouth of Brooks River along the Naknek Lake shoreline, provided services for visitors to the area, including a concession run 60-person lodge, a visitor center, and employee housing and support facilities (Fig. 2). A 60-person campground is located about 200 m north of Brooks Camp along the shoreline. All access to Brooks River is by floatplane or boat. Sport-fishing for salmon, rainbow trout (*Oncorhynchus mykiss*), arctic grayling (*Thymallus arcticus*), and other species and wildlife photography are the principal visitor recreations. Brooks Camp also serves as a gateway to more remote parts of the park such as the Valley of Ten Thousand Smokes and the Savonoski Loop.

Within the last 30 years, bear use of Brooks River, particularly July use of Brooks Falls, has increased markedly (Olson 2007). Since 1988, the number of individually identified bears seen during observational monitoring sessions has more than doubled during autumn and tripled during late June through July. Increased bear activity at Brooks River is most likely due to a combination of factors including Alaska Peninsula bear population trends (i.e., recovery from previously high harvest [Butler 2005]), mild winters, strong salmon runs, and increased emphasis at Brooks River on minimizing bear-human conflicts.

**Elements of the Bear-Human Conflict Management Program**

**Wildlife Viewing Structures.**—There were 3 viewing platforms available on the south side of Brooks River for visitor use during the 2003–2006 field seasons (Fig. 1). To reach the bear viewing platforms from Brooks Camp, visitors traveled along a hardened path that led to the mouth of the river then paralleled the river about 100 m. A floating bridge allowed visitors to cross the river by foot. The floating bridge was generally removed from the river in early October. The Lower River Platform was located adjacent to the bridge on the south side of the river. To reach the Riffles and Falls platforms, visitors continued along a gravel road to the Brooks Falls trailhead, and then proceeded through the woods along a hardened trail that connected to an elevated walkway. The elevated walkway led to an elevated covered intersection, where separate walkways connected to the Riffles Platform and to the Falls Platform. The Riffles Platform and the elevated walkways were constructed during the summer and fall of 2000.

**Visitor Access.**—Although the established trails and viewing structures were recommended routes and destinations for bear viewers, Brooks River visitors were permitted relatively unrestricted access throughout the area. However, several restrictions applied. Visitors were required to: 1) comply with the wildlife distance requirements detailed below; 2) camp only in the electric-fence-enclosed campground or at least 2.41 km (1.5 mi) beyond Brooks Camp (distance changed from prior 8.05 km [5 mi] limit in 2003); 3) upon arrival at Brooks Camp, receive an approved bear orientation from an NPS ranger (or in some cases by a sport fishing guide approved through the Brooks River Guide Program to provide that orientation); and 4) leave no gear unattended (36 C.F.R. Sect. 13.66 [2006]; NPS 2003, 2004, 2005, 2006b ). In addition, the Falls
Figure 1. Brooks River vicinity, Katmai National Park, Alaska.
and Riffles viewing platforms, walkways, and surrounding areas were closed between 2200 and 0700 hours 15 June – 15 August (36 C.F.R. Sect. 13.66[c][2] [2006]), the Falls Platform was actively managed for use by a maximum of 40 people (NPS 2000), and the boardwalks were managed as travel routes only (loitering along the way was discouraged). State of Alaska regulation prohibited fishing within 100 m of the Brooks Falls fish ladder (5 Alaska Admin.Code Sect. 75.050 [2006]). Anglers avoiding this stretch of the river were asked to use the boardwalk-platform complex to travel through the area. Lodge facilities and the Brooks Campground were open through 18 September (last overnight visitor stays occurred 17 Sep).

Wildlife Distance Requirements.—During 2001–2002, people were generally required to maintain ≥50 m from single large mammals and 100 m from large mammal family groups (see NPS 2001, 2002). In 2003, the specific family group distance requirement was removed. Also beginning in 2003, the distance requirements were changed to prohibit people from approaching within 50 m of large mammals, and to generally prohibit occupying a position within 50 m of a bear utilizing a concentrated food source (see NPS 2003). These distance requirements were promulgated under Title 36 of the Code of Federal Regulations in 2005 (see 36 C.F.R. Sect. 13.66[d] [2006]). Beginning in 2005, anglers were also specifically prohibited from fishing within 50 m of bears (NPS 2005, 2006b).

Food and Garbage Storage and Handling.—Storage of food, garbage, and harvested fish was only permitted in an approved bear resistant food container, a designated food cache, a hard-sided building, or within a secured section of an aircraft or boat (NPS 2001, 2002, 2003, 2004, 2005, 2006). Because of past problems with bears breaking into bear-resistant garbage containers, garbage receptacles have been kept inside hard-walled structures since mid-season, 1998 (Carden and McFarland 1998). Picnicking was restricted to the Brooks Campground, the food cache near the Visitor Center, and the Brooks Lake shelter (36 C.F.R. Sect. 13.66[c][9] [2006]). Due to its deteriorating condition, in 2002 the historic elevated food cache in the Brooks Camp Visitor Center picnic area was replaced with a ground-level hard-walled shed. In addition, because the gear and food caches in the Brooks Campground were within the campground's electric perimeter fence, in 2002 the smaller electric fence surrounding these structures was removed. State of Alaska regulation permitted retention of human-caught fish on Brooks River only below the floating bridge (regulation promulgated 1998), and the bag limit was one fish per day (36 C.F.R. Sect. 13.66[a][3] [2006]). Anglers were required to immediately bag and take any fish caught to the Fish Freezing Building in Brooks Camp (36 C.F.R. Sect. 13.66[c][4] [2006]).

Bear Management Actions.—The BMP provided detailed guidance on use of various hazing techniques to deter undesirable bear behavior (e.g., trespassing within residence areas, obtaining food or fish from people, damaging property, directly approaching and following people; NPS 2006a). Hazing techniques used at Brooks River included yelling and clapping, air horns, percussive instruments, bird scare devices (bangers and screamers) fired from a 15-mm pistol-like launcher, and 12-gauge deterrent rounds (cracker shells, beanbags, and rubber bullets). Only NPS staff that had received requisite training used deterrent rounds.

The area within the immediate vicinity of buildings in the main Brooks Camp and contiguous areas of altered vegetation therewith is referred to in this report as the Brooks Camp residence area. Whenever possible, NPS personnel encouraged bears that trespassed within the residence area to leave. In particular due to the level of unpredictable human traffic within the residence area, lower level hazing that resulted in relatively slow withdrawal of bears from camp
was sometimes favored over more aggressive tactics that could result in bears retreating rapidly and along unpredictable routes. NPS personnel also attempted to discourage bears from entering camp by monitoring bear movements along the beach and inland perimeter of camp (presence of people was often enough to discourage trespasses), and when necessary by hazing bears as they attempted to enter camp.

NPS Staffing.—Three seasonal resource management personnel were stationed at Brooks River during the 2003–2006 fields seasons: 2 bear management technicians and 1 bear monitoring technician. In addition, KATM’s wildlife biologist assisted with bear monitoring at Brooks River, supervised bear management technicians, and assisted with bear management response activities when available. Bear management technicians maintained the BMRF database, investigated bear management problems, patrolled the Brooks River area to identify and address potential bear management concerns, and conducted bear management activities. Other available NPS personnel assisted with accomplishing these tasks. In particular, law enforcement staff often assisted with responsive management actions and with managing human traffic around bears on the beach in front of Brooks River and in the lower river. In 2003, NPS interpreters staffed the Lower River and Falls platforms from 1200–1800 hours with law enforcement and bear management staff providing on-call assistance between the hours of 0800–1200 and 1800–2230. During the 2004–2006 field seasons, interpreters primarily staffed the platforms and corner area (see Figs. 1 and 2) during most peak visitor hours during July and during morning and afternoon hours through the middle of September. Scheduled staffing in the lower river was in part intended to manage human traffic such that impacts to bears were minimized.

METHODS

We collected data from mid May to early October 2003–2006. Resource management staff completed most BMRFs; however, other NPS staff sometimes filled out forms as well. Bear monitoring personnel maintained bear identification records for independent bears observed during observational monitoring sessions conducted along the river from Brooks Falls to Naknek Lake (Olson 2007). When possible, the identification numbers for any bears involved were noted on the BMRFs based on these records.

All known serious or unusual bear-human interactions were documented on BMRFs (NPS 2006a; Appendix A), including any events in which bears: 1) obtained food, garbage, or fish from humans or their facilities; 2) were hazed using deterrent rounds or capsaicin spray; 3) caused property damage; 4) exhibited overtly aggressive or dominant behavior toward humans; 5) injured/killed a human; 6) were killed in defense of life or property; or 7) were harassed by people. We also recorded any observations of gear or food stored inconsistent with park regulations and any close-range (<50 m) human-bear interactions of particular note (e.g., fishing <50 m from a bear, interacting with a bear <<50 m).

People were sometimes observed in brief surprise interactions with bears at distances of <50 m; these encounters were generally not recorded unless the interaction was unusually close or was otherwise atypical. Also recorded were any interactions of bears with motorized vehicles, including float planes. Bear trespasses into residence areas or onto viewing structures were also recorded when possible, particularly if staff challenged the trespass. However, because trespasses were at times frequent and other tasks could distract staff from completing a BMRF, trespasses sometimes went unrecorded. To facilitate documentation of bear trespasses, we continued to use the short trespass form (STF; Appendix B) developed in 2001 (Olson et al. 2002). The STF was primarily intended to capture information on unchallenged bear trespasses in Brooks Camp; however, some challenged trespasses were only recorded in this log.
Figure 2. Location of Brooks Camp along Naknek Lake, Katmai National Park, Alaska.
We summarized the data using some of the general incident and interaction categories defined in the BMP. Some records fell into >1 incident category. For example, a property damage incident may also have been food-related. Consequently, in some cases counts of incidents/interactions by these general categories may not be additive. It is important to note that the number of records varied from year to year in large part due to staff turnover and varying priorities. Incidents that involved anthropogenic food, property damage, or use of deterrent rounds or bear spray were the only ones that were recorded with a relatively high degree of consistency among years. Therefore, trends across years can only be evaluated for this limited subset of the records.

We used a 1-tailed Student's $t$-test to determine whether the number of human-caught fish obtained annually by bears was lower during years when retention of fish was limited to below the floating bridge (1998–2006; Carden and McFarland 1998, Pierce and DeBruyn 2000, Proffitt 2002, Olson et al. 2002) than it was during 8 years in which bear incidents were documented immediately prior to the limitation (1990–1994 and 1996–1997; Holmes 1991, Holmes 1992, Squibb and Holmes 1992, Holmes 1993, Holmes 1994, Boyd 1996, Boyd 1997). No bear management technicians were stationed at Brooks Camp in 1995 and only limited records of human-bear interactions were maintained that year. Because records of human-bear interactions in 1995 were not maintained consistent with other years, data from this year were not used in the aforementioned multi-year comparison. We used a chi-square analysis to compare age-sex composition (subadults [independent bear judged to be <5.5 years old], females with offspring, and single adults) of BMRF and STF records with composition based on individual bear identification records. Three age-sex classes were used for this comparison. $P < 0.05$ was considered significant. Means are presented ± 95% confidence limit.

RESULTS

2003 Field Season

A total of 229 BMRFs and 77 STF entries were recorded for the 137 days between the first and last documented records at Brooks River in 2003. Fifty-eight percent of the BMRF records ($n = 133$), and all STF records ($n = 77$) were for events that occurred within the Brooks Camp residence area (including Brooks Lodge, NPS facilities, and the residence areas) and on the Naknek Lake beach between the campground and Brooks Camp. Most records (61%) were for events that occurred during July and September.

The majority of the combined BMRF and STF records with the age-sex class of the bear(s) specified involved subadults (59%) and/or females with offspring (29%). For the combined BMRF and STF records with age-sex of the bear(s) involved identified, subadults were over-represented and single adult bears were underrepresented relative to the age-sex composition of bears frequenting the area (age-sex composition of bears frequenting the area: 28% subadults, 22% females with offspring, and 50% single adults; $x^2 = 172.2, df = 2, P < 0.001$). Eighty-four percent of the BMRF records with a specific family group identified involved 4 of the 8 family groups that were observed regularly using Brooks River in 2003, and 89% of the BMRF records with a specific subadult identified involved 2 of the >10 subadults that were seen regularly using the river.

Dominance Interactions.—There were 13 records of a bear (or bears) directly approaching ($n = 10$) or charging people ($n = 3$) in non-management response situations. In all 3 records of charges, people were <50 m from the bears before they charged. Two charges involved a female with 4 spring cubs who was commonly seen around camp and the lower river. In 1 case she ran toward a photographer when he took 2 flash photos within 30 m of her cubs while she was in Naknek Lake fishing. In the other case, she charged a bear technician and 4 photographers to within 3 m while the technician was in the process.
of moving the photographers (who he found photographing the family group to within 8 m). The third case involved an unconfirmed second-hand report of a subadult charging a visitor on the beach. Four of the 10 directed approaches involved anglers; these included 2 in which anglers had fish on their lines. Seven of the directed approaches involved subadults, 2 involved family groups, and 1 involved a bear of unspecified age-sex class.

There were also 20 records of bears withdrawing slowly or running away from people on foot, planes, boats, or vehicles outside Brooks Camp (excluding management responses). Eight of these records involved NPS or Lodge employees operating motorized vehicles, boats, or planes.

**Food-Related Incidents.**—Five independent food-related incidents (incidents in which a bear obtained an angler-caught fish, human food, or garbage) were documented on BMRFs. Four of the 5 incidents occurred during June–July. The incidents included 2 cases in which bears obtained angler-caught fish. Both occurred in the river mouth below the floating bridge. In one case an angler struggled to release a caught fish with a bear approaching; however the fish didn’t revive and the bear obtained it. In the other case, an angler continued to fish while a bear approached to within <50 m; the angler failed to break the fish off and the bear obtained it. The other 3 food-related incidents involved bears obtaining human food or garbage. In one case, a subadult bit into a beer can that it had obtained from a cooler stored in the float compartment of a parked plane. NPS personnel responded to the incident with air horns and displaced the bear from the incident site. Another case involved a NPS trash can that had been left outdoors; it was apparent that a bear had rummaged through the can, but it was unclear whether any food had been obtained. In the third case, it was discovered after the incident that a bear had obtained food and garbage improperly stored in a wooden trash box (that was to only be used for cardboard trash) adjacent to the kitchen of Brooks Lodge. A planned management action was implemented in which NPS personnel, initially with assistance of a lodge employee, monitored the trash box during the following 3 nights to potentially respond if the bear(s) involved returned; however, no bear was seen during the action.

There were also 17 BMRFs that documented improper handling of food, fish, or garbage (without bears obtaining them). Five of these BMRFs documented events involving anglers, including 4 records of anglers fishing <50 from bears (in one case within 20 m of a bear), and 1 record of an angler carrying a bagged fish <50 m from a bear. In addition, 10 of these BMRFs documented unsecured food or garbage left potentially available to bears, specifically: garbage and/or food left unattended in the back of NPS vehicles behind the Lower Platform \((n = 4)\), a bus tour cooler left unattended on the Lower Platform stairs \((n = 1)\), food left in a plane on the Naknek Lake beach with a door unsecured \((n = 1)\), food left in the food cache at Brooks Lake with the door unsecured \((n = 1)\), food left unsecured in personal property that was abandoned on the Naknek Lake beach as a bear approached \((n = 1)\), a cooler left unattended on the floats of a plane at Brooks Lake \((n = 1)\), and a NPS garbage can left outdoors at Brooks Lake \((n = 1)\). The other 3 BMRFs related to improper food handling documented 2 instances of people consuming food outside of designated picnic areas, and a bear trespassing in camp <50 m from people continuing to eat food at the Visitor Center picnic site.

In addition to the directly food-related events, 7 BMRFs documented bear trespass events that were related to grey-water disposed outdoors. Five of these records documented bears digging in the gray-water pits underneath the NPS tent cabins numbered BRT-3 and BRT-4. These 2 tent cabins had sinks with running water, but the water drained directly from the sinks into a sunken 55-gallon barrel filled with rocks located beneath the deck of the 2 structures. Consequently, any food
matter washed down the drain accumulated in the barrel and surrounding mud. One record documented 2 subadults getting into grey water from the sewage system at BL-3 in the Brooks Lake residence area. Another BMRF documented a single female repeatedly investigating the grey water dump area used by lodge staff to dispose of water from mopping the lodge floors (the site was located just behind the lodge kitchen at the edge of the Oxbow marsh).

Property Damage.—Twenty-three instances of bear-caused property damage were recorded, including 18 associated with Brooks Camp or the adjacent beach, 2 associated with Brooks Lake, 1 involving the Lower River Platform, and 2 for events that occurred on the road between Naknek Lake and Brooks Lake. Bears were hazed to stop ongoing property damage in 4 cases; in the other instances responders arrived after the bear(s) involved had left or the damage was discovered at some point after it had occurred. Most commonly damaged were small items left unattended such as waders, a book, a camera, towels, and scatter rugs. Unattended property and/or improperly stored food were involved in half of the property damage incidents. Thirteen of the property damage incidents occurred during late June through August, and 10 occurred during September–October.

In addition to the Brooks BMRF records, one case of property damage was recorded on a backcountry BMRF for an incident that occurred at a camp in Mortuary Cove, within the 1.5-mile Brooks Camp Developed Area defined in the Superintendent’s Compendium as a no-camping zone (except for the Brooks Campground). Two tents, a camera bag, and a sleeping pad were damaged by a single subadult bear in late July. It is unclear whether the bear obtained any food from the camp. In response to this incident, NPS staff implemented a planned management action in which a camp was set up at the site and monitored overnight to respond if the bear returned; however, no bears were seen during the action.

Bear Management Responses.—There were 183 BMRF and STF records involving bears trespassing or attempting to trespass in Brooks Camp. In addition, there was one BMRF record of a yearling bear entering the Brooks Campground by passing through the electric fence (NPS personnel temporarily turned off the electric fence around the campground and opened all of the fence gates to allow that yearling to rejoin its mother outside the fence). Eight-two of the 106 BMRF trespass-related records documented NPS personnel displacing or attempting to displace bears from camp. Ninety-six percent of these records were classified as successful hazing actions (i.e., the bear left the area). Fifty-six percent of Brooks Camp trespass-related events documented on BMRFs occurred near the main trail through camp between the Fish Freezing Building and the Ranger Station, 35% occurred between the Ranger Station and the Generator Building and 8% occurred by the Oxbow Overlook Cabins/NPS Auditorium.

Bears were hazed 5 times outside of the Brooks Camp developed area in 2003, including once to dissuade property damage to a boat, once to move a family group off the spit for a helicopter landing (associated with a search and rescue operation; an unsuccessful hazing attempt in which the adult female hop charged the hazer), and 3 times to displace resting bears away from the trail between the Fish Freezing Building and the corner.

Air horn use was indicated in 28% of BMRF hazing records. In all cases, air horns were at least accompanied by yelling. Use of deterrent rounds was documented for 7 different responses (Aug, \( n = 2 \); Sep, \( n = 5 \)), including 6 involving bear trespass events, and 1 involving a subadult that was chewing on the float of an aircraft. Rubber slugs were used in 2 responses, and bean bag rounds were used in the other 5 responses (most in combination with other hazing techniques). Bears
were displaced from the immediate area by deterrent rounds in all but one case, when a subadult moved a few meters away, then lay down behind a cabin. Bear reaction to deterrent rounds varied from running away to retreating a short distance away and stopping. Also, in one case the bear turned around and “grumbled” at the responders before trotting away.

**2004 Field Season**

A total of 302 BMRFs and 58 STF entries were recorded for the 135 days between the first and last documented records. Sixty-one percent of the BMRF records ($n = 184$), and all STF records were for events that occurred within the Brooks Camp residence area (including Brooks Lodge, NPS facilities, and the residence areas) and on the Naknek Lake beach between the campground and Brooks Camp. Most records (64%) were for events that occurred during July and September.

The majority of the combined BMRF and STF records with the age-sex class of the bear(s) specified involved subadults (51%) and/or females with offspring (41%). For the combined BMRF and STF records with age-sex of the bear(s) involved identified, subadults and females with offspring were over-represented, and single adult bears were underrepresented relative to the age-sex composition of bears frequenting the area (age-sex composition of bears frequenting the area: 26% subadults, 19% females with offspring, and 55% single adults; $x^2 = 283.3$, df = 2, $P < 0.001$). Seventy-four percent of BMRF records with a specific family group identified involved 3 of the 14 family groups that were observed regularly using Brooks River in 2004, and 52% of the BMRF records with a subadult identified involved a specific known subadult female (>12 subadults were identified regularly using the river).

**Dominance Interactions.**—There were 14 records of a bear (or bears) directly approaching ($n = 13$) or charging people ($n = 1$) in non-management response situations. The single charge by an unclassified bear was described as a short “hop charge” at 25 m that occurred as a group of people (number of people was not reported) retreated from an approaching bear. Six of the 13 directed approaches involved anglers; in 4 of these cases anglers had fish on their lines <50 m from bears, and in another case an angler tossed a bagged fish into Naknek Lake as a female with 2-year-olds approached. All but one of the directed approaches with the age-sex class of the bear(s) specified involved females with dependent offspring ($n = 5$) or subadults ($n = 7$).

There were 29 records of bears withdrawing slowly or running away from people or planes outside Brooks Camp in non-management situations. The majority (69%) of these records involved aircraft operating on Naknek Lake <100 m from bears ($n = 14$) and other motorized vehicles, including boats, operating <50 m from bears ($n = 6$). Five of the records involving aircraft indicated that bears diverted away from planes either into camp or onto the campground trail adjacent to camp.

**Food-Related Incidents.**—Five independent food-related incidents (incidents in which a bear obtained an angler-caught fish, human food, or garbage) were documented on BMRFs. Four of the 5 incidents occurred during June–July. Three of the food-related incidents involved bears obtaining angler-caught fish. Two of these events occurred in the vicinity of the river corner area (see Fig. 2)—the aforementioned incident involving a bagged fish, and another incident in which an angler who was repeatedly warned of an approaching family group eventually dragged the fish on his line up onto the river bank (the angler appeared unable to break the fish off his line), and then abandoned his pole as the bear ran towards the fish. The third fish stealing incident occurred in the Cutbank area (see Fig. 2), where a witness reported that at least one fish was taken from a guided fishing group. Most notable regarding this incident was that the bear had reportedly gone after the group’s fish 6 times, yet the anglers continued fishing. Because it was unclear how
many fish the bear had obtained and there had been a few other reports of a bear cueing on anglers with fish on their lines, a temporary closure to sport fishing was instituted within a few hours following receipt of a report of the incident (this closure was lifted <3 days later). NPS personnel implemented a planned management action to attempt to aversively condition the bear involved. Two NPS personnel posed as anglers in the same area as the incident had occurred, while a third person monitored bear activity in the vicinity from a nearby tree stand. However, no bear responded overtly to fish caught on their lines. It should also be noted that there was an additional BMRF record that described a bear running toward an angler that had a fish on her line >>100 m from the bear, but no fish was obtained by the bear. The other 2 food-related incidents involved bears obtaining human food—in one case a can of beer was found consumed in a bear bed, and in the other case a bear obtained a piece of fruit from luggage left unattended on a lodge cabin porch for pick-up (per lodge standard operating procedures at that time). Following the luggage incident, management of luggage was changed so that no luggage was left unattended on individual lodge cabin porches.

There were also 16 BMRFs that documented improper handling of food, fish, or garbage (without bears obtaining them). Five of these BMRFs documented events involving anglers, including 4 records of anglers fishing <50 from bears, and 1 record of an angler carrying an un-bagged fish. In addition, 9 of these BMRFs documented unsecured food or garbage left potentially available to bears, specifically: food falling into the river and onto the bridge from an overloaded lodge tractor ($n = 1$), food left unsecured in boats parked on the Naknek Lake beach ($n = 5$), food left cooking unattended on a lodge grill ($n = 1$), food left unsecured in a bag on the Naknek Lake beach ($n = 1$), and beverage containers left unsecured on the porch of a lodge employee cabin ($n = 1$). The other 2 BMRFs related to improper food handling documented 2 instances of people consuming food outside of designated area. In addition to the directly food-related records, there were 2 records of bears digging in the grey-water pit underneath the NPS tent cabins numbered BRT-3 and BRT-4. After the second incident, an electric fence was installed to deter bears from investigating the pit.

**Property Damage.**—Ten cases of bear-caused property damage were recorded in 2004, including 4 in Brooks Camp or on the Naknek Lake beach and 6 in the vicinity of the river mouth below the floating bridge. Four of the property damage reports were for events that occurred during July–August and 6 were for damage that occurred during September–October. Bears were hazed to stop ongoing property damage in 5 cases; in the remaining instances responders arrived after the bear(s) involved had left or the damage was discovered at some point after it had occurred. Unattended gear was involved in 9 of the property damage incidents. Most commonly damaged items were boats and bicycles ($n = 3$ records each). It should be noted that there were also 7 records of property damage (to vehicles, $n = 2$; and to buildings and other structures, $n = 5$) that apparently occurred during late fall 2004 after bear management staff had left for the season (damage documented spring 2005).

**Bear Management Responses.**—There were 190 BMRF and STF records involving bears trespassing or attempting to trespass in Brooks Camp. Of the 132 trespass-related BMRFs, 109 documented NPS personnel displacing or attempting to displace bears from Brooks Camp (occasions to displace bears did not appear to be consistently recorded on the STFs). Ninety-five percent of these records were classified as successful hazing actions (i.e., the bear left the area). Fifty-two percent of Brooks Camp trespass-related BMRFs occurred near the main trail through camp between the Fish Freezing Building and the Ranger Station, 25% occurred between the Ranger Station and the Generator Building, and
23% occurred by the Oxbow Overlook Cab-ins/NPS Auditorium.

BMRFs documented 6 occasions during June–July and 13 occasions during the fall in which hazing of bears was conducted outside of the Brooks Camp residence area to facilitate human traffic movements across the floating bridge \( (n = 17) \), to allow access to a float plane \( (n = 1) \), and to facilitate human traffic movements on the road near the lower platform \( (n = 1) \). Most of the fall records \( (n = 15) \) involved a female with 3 spring cubs that often rested on the trail between the corner and the bridge, resulting in frequent human traffic movement delays of >30 minutes. The smallest cub in this family group had difficulty walking and swimming due to an injured hind leg; consequently, the family was often stationary. Efforts to haze this family group away from the trail were successful about half of the time \( (n = 7) \). On one occasion, multiple cracker shells and bird bangers were used to attempt to move the bedded family group away from the trail near the corner (Fig. 2). However, use of the rounds only appeared to heighten the alertness of the family group, which then resulted in the female bedding back down to nurse her cubs. In other failed attempts, the female similarly often moved reluctantly 1–2 m, then bedded down again and nursed her cubs. As an alternative to hazing the family directly, sometimes when the female left her cubs on the bank while she fished, NPS staff slowly moved towards the cubs, and then remained stationary to basically “occupy space” so that the cubs would be more likely to move away and join their mother. BMRFs also documented 7 occasions when NPS staff escorted people around sleeping or otherwise stationary bears at <50 m to facilitate traffic movement across the floating bridge. In one case, to assist a visitor in a wheelchair return to camp before dark, a bear management technician escorted the visitor within 3 m of 3 spring cubs.

Air horn use was indicated in 33% of BMRF hazing records. In all cases, air horns were at least accompanied by yelling. Other hazing techniques described included thrashing of vegetation, breaking of sticks, stomping feet, and pounding on buildings. Use of deterrent rounds was documented on 3 occasions: a bean bag round was used to haze a subadult out of camp near the auditorium, a rubber slug was used to dissuade a female with 2 cubs from digging in the leach field, and multiple cracker shells and bird bangers were used in an attempt to move a female with 3 spring cubs away from the access trail to the floating bridge (unsuccessful hazing attempt). In 4 cases, NPS management actions resulted in low-level hop charges \( (n = 2) \) or swatting the ground \( (n = 2) \). Three of these records involved females with offspring and the other 2 involved subadults.

**2005 Field Season**

A total of 382 BMRFs and 90 STF entries were recorded for the 143 days between the first and last documented records. Seventy-three percent of the BMRF records \( (n = 279) \), and all STF records were for events that occurred within the Brooks Camp residence area (including Brooks Lodge, NPS facilities, and the residence areas) and on the Naknek Lake beach between the campground and Brooks Camp. Most records \( (72\%) \) were for events that occurred during July and September.

The majority of the combined BMRF and STF records with the age-sex class of the bear(s) specified involved subadults \( (51\%) \) and/or females with offspring \( (37\%) \). For the combined BMRF and STF records with age-sex of the bear(s) involved identified, subadults and females with offspring were over-represented, and single adult bears were underrepresented relative to the age-sex composition of bears frequenting the area (age-sex composition of bears frequenting the area: 30% subadults, 12% females with offspring, and 58% single adults, respectively; \( x^2 = 432.7, df = 2, P < 0.001 \)). Eighty-two percent of the BMRF records with specific family groups identified involved 5 of the 15 family groups that were observed regularly using Brooks River in 2005.
**Dominance Interactions.**—There were 9 records of a bear (or bears) directly approaching \((n = 7)\) or charging people \((n = 2)\) in non-management response situations. The 2 charges occurred during June and involved family groups described as females with 2 yearlings. In both of these interactions, people backed away as the adult female briefly charged to within 5–8 m. Three of the 8 directed approaches involved anglers; in one case a bear obtained a fish when an angler continued to attempt to reel the fish in with a bear <50 m away. The other 4 directed approaches involved surprise close-range encounters with bears on trails (<50 m). All of the directed approaches were by subadults \((n = 5)\) or offspring in family groups \((n = 3)\).

There were also 31 records of bears withdrawing slowly or running away from people, planes or vehicles outside Brooks Camp in non-management situations. Twelve of these records were for planes observed operating <100 m from bears, predominantly resulting in bears trespassing into camp \((n = 7)\) or moving away quickly \((n = 3)\); in one additional case, a bear ran away from a turbine aircraft that fired up >100 m from the bear). An additional 12 records were for motorized vehicles and boats observed displacing bears; 11 of these interactions involved NPS employees. The remaining 6 records documented human-bear interactions in a variety of other contexts that resulted in displacement of bears.

**Food-Related Incidents.**—Two independent food-related incidents (incidents in which a bear obtained an angler-caught fish, human food, or garbage) were documented on BMRFs, both during July. There were no records of bears obtaining human food; however, there was a single record of some garbage items that included food packages found partially buried in the parking lot where the bus and other vehicles were kept. In addition as mentioned previously, there was one record of a bear obtaining a fish from an angler below the floating bridge after the angler landed the fish with a bear 20 m away—the fish was released dead and the approaching bear obtained it. There were also 5 BMRFs that documented improper handling of food, fish, or garbage (without bears obtaining them), specifically: 2 records of food or garbage left unsecured, 2 records of people consuming food outside of designated picnicking areas, and 1 record of people with fish on their lines <50 m from bears. In addition to the directly food-related records, 3 BMRFs documented bears investigating the grey-water pits under NPS tent cabins BRT-3 and BRT-4.

**Property Damage.**—Twenty-six BMRFs documented relatively minor bear-caused property damage. Thirty-one percent of the records documented damage that occurred during May–July, and 69% documented damage that occurred during August–October. Most of the damage records were for events that occurred in the vicinity of the mouth of the Brooks River at or below the floating bridge \((n = 17)\). Six records involved an individual male yearling who habitually investigated boats and floatplanes. Bears were hazed to stop ongoing property damage in 13 cases; in the remaining instances responders arrived after the bear(s) involved had left or the damage was discovered at some point after it had occurred. Unattended gear and boats left parked on the spit and in other locations within the river mouth were associated 8 of the property damage incidents. Most commonly damaged items were boats and/or gear left unsecured in boats \((n = 7)\) and buildings and other structures with wooden and/or plastic parts such as the Lower River Platform and the floating bridge \((n = 11)\); damage largely consisted of chunks of wooden removed by bears while chewing, clawing, and rubbing on structures).

**Bear Management Responses.**—There were 306 BMRF and STF records involving bears trespassing or attempting to trespass in Brooks Camp. Of the 216 trespass-related BMRFs, 194 documented NPS staff displacing or attempting to displace bears from Brooks Camp (occasions to
displace bears did not appear to be consistently recorded on the STFs). Ninety-nine percent of these records were classified as successful hazing actions (i.e., the bear left the area). For Brooks Camp BMRF trespass-related records with camp subarea specified, 55% occurred near the main trail through camp between the Fish Freezing Building and the Ranger Station, 26% occurred between the Ranger Station and the Generator Building, and 19% occurred by the Oxbow Overlook Cabins/NPS Auditorium.

Hazing of resting bears outside of the Brooks Camp residence area to facilitate human traffic movements across the floating bridge was documented on 12 different occasions, primarily during the fall \((n = 9)\). These actions involved 4 different females with offspring and 2 subadults. Most of the records \((n = 11)\) were for events that occurred along the trail between the Fish Freezing Building and the floating bridge. Although in most cases hazing resulted in resting bears moving away, on 3 occasions hazing attempts resulted only in the family group repositioning to a new nearby resting spot. In one additional case, bear management staff “occupied space” near 3 spring cubs to persuade them to move towards their mother and away from the floating bridge.

Air horn use was indicated in 12% of BMRF hazing records. In all cases, air horns were at least accompanied by yelling. Other hazing techniques included thrashing of vegetation, breaking of sticks, stomping feet, and pounding on buildings. On 5 occasions, bears responded defensively to hazing activities by swatting the ground and/or engaging in brief “hop charges.” One female with 2 yearlings was involved in 4 of these interactions (3 involved a yearling rather than the adult female). No deterrent rounds were used in 2005.

### 2006 Field Season

A total of 488 BMRFs and 92 STF entries were recorded for the 136 days between the first and last documented records at Brooks River in 2006. Seventy-five percent of the BMRF records \((n = 366)\), and all STF records were for events that occurred within the Brooks Camp residence area (including Brooks Lodge, NPS facilities, and the residence areas) and on the Naknek Lake beach between the campground and Brooks Camp. Most records \((81\%)\) were for events that occurred during July and September.

The majority of the combined BMRF and STF records with the age-sex class of the bear(s) specified involved subadults \((34\%)\) and/or females with offspring \((33\%)\). It should be noted that 29% of the records that involved a single adult identified a specific young adult female that had been classified as a subadult in previous years. For the combined BMRF and STF records with age-sex of the bear(s) involved identified, subadults were over-represented and single adult bears were underrepresented relative to the age-sex composition of bears frequenting the area \((\text{age-sex composition of bears frequenting the area: } 14\% \text{ subadults, } 27\% \text{ females with offspring, and } 59\% \text{ single adults}; x^2 = 239.0, df = 2, P < 0.001)\). Eighty-five percent of BMRF family group records with a specific family group identified involved 4 of the 10 family groups identified during observational sampling in 2006. All of these family groups were females with their first litters: 2 with spring cubs, 1 with a yearling, and 1 with a 2.5-year-old.

**Dominance Interactions.**—There were 13 records of bears directly approaching \((n = 12)\) or charging people \((n = 1)\) in non-management response situations. The one report of a charge involved a subadult that "hop charged" a few steps to within 10 m of a person during a surprise close encounter within the Brooks Camp residence area. Nine of the 12 directed approaches involved anglers; in 8 of these cases anglers had fish on their lines. The other 3 directed approaches involved surprise encounters with bears. Of the directed approaches with the age-sex class of the bear(s) specified, 4 involved females with dependent offspring, 2 involved subadults, and 4 involved single adult bears.
There were also 16 records of bears withdrawing slowly or running away from people, vehicles, or planes outside Brooks Camp in non-management response situations. Ten records involved bears that were displaced by aircraft \((n = 7)\), motorized vehicles \((n = 2)\) or boats \((n = 1)\). In one notable incident, a bear reacted strongly to a plane firing up by retreating rapidly from the beach through camp, passing closely by people with food out at the Visitor Center picnic area. The other most common scenario in which bears were displaced \((n = 4)\) involved anglers actively discouraging bears from using the river in the vicinity of where they were fishing.

**Food-Related Incidents.**—Three food-related incidents (incidents in which a bear obtained an angler-caught fish, human food, or garbage) were documented on BMRFs. Two involved bears obtaining fish off of angler’s lines; these incidents occurred within 5 days of each other near the start of the salmon run in late June through early July. One of the “fish-stealing” incidents involved a female with a yearling in the Oxbow, and the other involved a subadult on the Naknek Lake beach. In both instances, the anglers hooked fish with bears <50 m away. It should also be noted that there were 2 additional BMRFs that documented cases in which bears rapidly approached anglers from distances >>50 m apparently in response to splashing of hooked fish, but no fish was obtained by the bears involved. The other food-related incident involved a bear observed licking a candy wrapper that it had found under a sandbag at the bridge (occurred in Aug).

There were also 43 BMRFs that documented improper handling of food, fish, or garbage (without bears obtaining them). Twenty of these BMRFs involved anglers fishing <50 m from bears. In addition, 16 of these BMRFs documented unsecured food or garbage left potentially available to bears, specifically: food or garbage left unsecured in the campground \((n = 2)\) and in the open beds of small utility vehicles \((n = 2\) in camp, \(n = 4\) outside of camp); and food left unsecured on a table at the Visitor Center picnic area \((n = 1)\), in boats on the Naknek Lake beach \((n = 2)\), and on cabin porches in camp \((n = 5)\). The other 7 BMRFs related to improper handling of food documented 4 instances of people consuming food outside of designated areas and 3 cases of people continuing to consume food at the Visitor Center Picnic Area while bears trespassed very close by in camp. In addition to the directly food-related BMRFs, 2 other records documented bear trespass events that were associated with grey water disposed outdoors (mop bucket water from the lodge and the grey-water pit beneath NPS tent cabins BRT-3 and BRT-4).

**Property Damage.**—Eight cases of bear-caused property damage were recorded, including 3 in Brooks Camp and 5 in the vicinity of the mouth of Brooks River. Documented damage was to a fuel hose, the Lower River Platform, the floating bridge, and the corner of a cabin. Bears were hazed to stop ongoing property damage in 5 cases; in the 3 other instances responders arrived after the bear(s) involved had left or the damage was discovered at some point after it had occurred. Five of the property damage incidents occurred during late June through July and 3 occurred during the fall.

**Bear Management Responses.**—There were 354 BMRF and STF records of bears trespassing or attempting to trespass in Brooks Camp. Of the 276 trespass-related BMRFs, 222 documented NPS staff displacing or attempting to displace bears from Brooks Camp (occasions to displace bears did not appear to be consistently recorded on the STFs). Ninety-six percent of these records were classified as successful hazing actions (i.e., the bear left the area). Sixty-two percent of Brooks Camp trespass-related BMRFs occurred near the main trail through camp between the Fish Freezing Building and the Ranger Station, 24% occurred near the Overlook Cabins/NPS Auditorium, and 14% occurred
between the Ranger Station and the Generator Building.

There were 3 BMRFs that documented a female with a single spring cub (her first litter) climbing up trees in camp during July. This female appeared especially stressed when other bears were nearby, and she often then reacted by retreating rapidly. When her retreat led her into camp (typically huffing and salivating), she sometimes sent her cub up a cottonwood tree near the lodge restrooms, then followed the cub up the tree. The documented treeing events lasted from 1–3 hours. NPS personnel responded to the treed bears by routing human traffic away from the vicinity of the occupied tree and monitoring the situation. Typically when this female and cub entered camp and NPS personnel were able to immediately respond to the situation, low-level hazing was used to encourage them to leave and to route them away from the cottonwood trees near the lodge.

Hazing of bears outside of the Brooks Camp residence area was documented on 16 different occasions to move resting bears (or bears settling down) away from the trail between the Fish Freezing Building and the floating bridge (n = 11) and from other locations immediately outside of the camp boundary (n = 1); to allow access to the beach/floatplanes (n = 2); to move a sleeping bear off the road (n = 1); and to dissuade active bears from approaching while assisting a cold wet angler (n = 1). Nearly a third these hazing actions (n = 5) involved females with dependent offspring. Five of the documented hazing actions occurred during July and 11 occurred during the fall.

Air horn use was indicated in 19% of BMRF hazing records. In all cases, air horns were at least accompanied by yelling. Use of deterrent rounds was documented in one response in which a rubber slug was used to displace a resting subadult from the Brooks Camp leach field. The rubber slug caused the bear to get up, but the bear then trotted towards the person who fired the round before moving slowly out of camp in response to continued yelling and use of an air horn. Several new noisemakers were used to haze bears in 2006, including a percussion shaker that was used effectively on 6 occasions. On 4 occasions bears were documented as responding defensively to various hazing efforts by brief "hop charges" or swatting the ground. Two of these interactions involved females with first spring cub litters, and 2 involved single bears.

**DISCUSSION**

**Bear Management Issues and Observations**

**Food Conditioning.**—During the salmon migratory period at Brooks River, salmon have only recently entered freshwater and are very energetic, making them especially difficult for bears to catch in the deep water throughout much of the river below Brooks Falls. In addition, migrating salmon at Brooks River present one of the first opportunities of the season for bears to feed on this high-calorie resource during a period in which many bears are still losing weight following spring den emergence. Consequently, bears are especially keyed in on fish activity, including splashing of fish in the river. Bears often sprint and lunge toward fish, and this activity can be directed toward a fish on an angler’s line if the opportunity presents itself. Bears that obtain fish from anglers may learn to associate angler activity in general, or specific cues such as a reel playing out, with possible food rewards.

A multi-year comparison suggests that the regulation limiting human retention of fish to downstream of the bridge may have contributed to a reduction in “fish stealing” incidents. The documented annual number of human-caught fish obtained by bears was higher during 8 years without the regulation (1989–1994 and 1996-1997, range 2 to 11, \( \bar{x} = 5.0 \pm 2.19 \)) than it was during the 9 years following its implementation (range: 0 to 3, \( \bar{x} = 1.6 \pm 1.02 \); \( t = 3.35, df = 10, P \)).
Further, it should be noted that during the 8 years without the regulation more than half (58%) of documented "fish stealing" events occurred upstream of the bridge.

However, "fish stealing" incidents have continued to occur. Of the 8 documented instances in which bears obtained fish from anglers between 2003 and 2006, all but 2 incidents occurred below the floating bridge and all but 1 incident occurred during late June–July. In recent years, following every report of a bear obtaining a fish from a person, a concerted effort has been made to inform potential anglers of the incident (including posting signs on bulletin boards and sending email notification to Brooks River Guide Program participants) and to focus heightened attention of NPS personnel on angler activity in the lower river in particular. Although some directed approaches by bears toward anglers with fish on their lines have sometimes been reported following fish stealing events, there have been no documented cases of recurrent fish stealing incidents.

There were only a very few documented incidents of bears obtaining human food or garbage between 2003 and 2006, and all of the reported incidents appeared to have involved very limited quantities of food or garbage. There were no documented cases of recurrent attempts to obtain human food or garbage following any of these incidents. It is likely that availability of salmon nearby helped to minimize the consequences of the few food-related incidents that occurred, and perhaps this also partly accounts for the high proportion of incidents in which temporarily unattended food or garbage was left undisturbed by bears. Clearly, careful management of food and garbage will continue to be a primary management focus. Food-related BMRFs of particular note relative to future management planning are those that involved food and garbage left unattended on occasion in the open bed of a small utility vehicles, and close-range interactions between picnickers and bears at the Visitor Center picnic site (see further discussion below relative to the Brooks Camp Residence Area).

**Property Damage.**—Between 2003 and 2006, the majority of property damage records were for events that occurred during the fall. In addition to chewing on parts of the floating bridge and the lower railings on the Lower River Platform, bears occasionally damaged bicycles, boats, and vehicles left unattended in the vicinity of the lower river. In some cases, a specific known bear appeared to be involved in repeated minor property damage events following an initial incident in which the inherent interest value in exploring something novel apparently reinforced the bear to investigate other property that it encountered. For example, during 2005, there were multiple BMRF records of a specific single yearling climbing onto the floats of most planes that it encountered while walking along the beach. If not dissuaded, the bear then often nosed at float compartments and sometimes pulling float balls out of the floats. The first record of this bear investigating a float plane that year indicated that it obtained a small hand pump out of an unsecured float compartment before NPS personnel were able to haze the bear away.

Given the pattern of repeated minor property damage incidents involving specific bears, it is clear that bears should be hazed as soon as possible when they are actively exploring or damaging property to minimize the degree of damage and to minimize the likelihood that the experience is reinforcing. However, personnel may not be present when bear damage occurs, and at times bears may damage property in locations that are difficult to safely respond to in a timely manner. Therefore, preventative management should continue to be emphasized. Off-anchoring of boats, parking unattended vehicles away from the river, and securing bicycles away from the river are examples of some ways in which bear-caused property damage could be reduced. Use of fencing can also be a viable option, as can minor changes to existing structures, such as reposition-
ing gates on the lower platform so that bears cannot access the stairwells and access ramps. Use of materials that are less likely to be chewed on by bears could also reduce bear-caused damage to structures in particular. Because bear use is concentrated along the river corridor and lake shores, bears are especially likely to encounter and potentially investigate anything that is left unattended in these areas. Therefore, particular emphasis should be placed on implementing preventative management strategies in these areas.

**Human Traffic Management in the Vicinity of the Floating Bridge.**—Bear use patterns in the Brooks River area have been studied and documented over most of the past 30 years. Although the numbers of bears and bear use levels have increased considerably over this period, spatial patterns of bear use have remained relatively similar across years, particularly during the fall in areas near Brooks Camp.

Troyer (1980) reported that between 1975 and 1979, bears that used Brooks River during fall traveled little and remained relatively close to the river feeding and resting (the movements of some bears were studied using radio collars). Most bear activity was concentrated in the lower half of the river and along the Naknek Lake shoreline from the mouth of the river to the base of Dumpling Mountain north of the campground. Troyer described bears as feeding up and down both sides of the river, as well as up and down the middle of the river and along the lakeshore. Bears were also described lying on the beach to consume caught salmon. Troyer (1980) pointed out that in his view the NPS and concessioner camps "...could not have been placed in a worse location to interfere with regular movement patterns of bear when they fish the river." Some of the camp structures that Troyer referred to were located between what is now the Fish Freezing Building and the river mouth, and at some later date were removed or relocated; however, some of the camp structures he referred to are currently in the same location as when his study was conducted during the mid to late 1970s.

Braaten and Gilbert (1987) presented a figure highlighting areas along the lower Brooks River where fish carcasses tended to deposit (Fig. 3). These deposit areas tended to correspond with the more commonly used lower river bear travel routes that were also documented. In addition, Gilbert (1986) highlighted the lakeshore in front of Brooks Camp as an area where fish carcasses appeared to deposit during September, thus producing another feeding area for bears. He described the camp as "...surrounded on three sides by bears feeding on salmon." Braaten and Gilbert (1987) also suggested that high water and concomitant rapid currents appeared to deposit larger than usual numbers of fish carcasses along the Naknek lakeshore north of the river mouth. The tendency for salmon carcasses to drift downstream and accumulate in some lower river areas is likely why Olson and Gilbert (1994), and Olson et al. (1997) found that below Brooks Falls, bear fish capture rates during autumn were consistently highest near camp. They also reported that the river below Brooks Falls was a particularly important bear feeding area for some family groups and subadults.

Differences in bear use patterns between the salmon migratory period (late June–July) and the fall salmon spawning period (late Aug–Oct) to some degree present different considerations and challenges to minimizing impacts to bears while managing human traffic movements in this area. Although bear-caused human traffic delays occasionally occurred throughout the periods when bears are frequenting the area to feed on salmon, traffic delays tended to be more frequent and prolonged during later fall (after about 7 Sept; E. Groth and T. Olson, NPS, personal observation). Delays in human traffic movements of >1 hour were relatively infrequent prior to September. This was due to the typical pattern of increasing numbers of bears in the area throughout September, and increasing bear use of spawned-
Figure 3. Salmon carcass deposition areas in the lower Brooks River, Katmai National Park, Alaska. Although morphology of the river mouth changes somewhat annually, the river current flowed north into Naknek Lake, thus also depositing dead salmon into the lake in front of Brooks Camp.
out salmon carcasses that tended to accumulate in some areas near camp during the fall.

In addition to the seasonal and spatial patterns of availability salmon availability in the lower river, other seasonal patterns that we observed affecting human traffic management and movement across the floating bridge included: 1) new NPS staff gradually becoming accustomed to bears as well as the management scheme across the field season; 2) bears generally moving faster earlier in the season in response to movements of migrating fish and also due to several other season factors including courting behavior (courting bears can move quickly and some adult females that are accustomed to proximity of people may attract adult males that are not so accustomed to human presence) and the general seasonal trend toward bears acclimating to frequent close encounters with other bears; 3) females with spring cubs tending to be most overtly reactive to the activity of other bears early in the season when spring cubs are especially vulnerable (in addition, cubs can have difficulty swimming against the river current, so they have to be given ample space when they are crossing the river); and 4) the number of anglers fishing in the lower river with the intention of retaining salmon was highest during the salmon migratory period. There are also numerous considerations regarding human traffic movements that are specific to each particular situation (e.g., number of people involved, activity of bears in the vicinity, etc.).

Since 1998, Katmai’s BMP has included the option of hazing resting bears to facilitate human traffic movements between Brooks Camp and the Lower River Platform when human traffic movements are delayed for >30 minutes and certain other considerations are met (NPS 2006a). In practice NPS personnel typically explored other options for facilitating traffic movements when delays of >30 minutes occurred, such as foot-travel on routes around bears or use of boats or planes. In particular, when the primary trail from camp to the floating bridge was impassable due to the presence of resting bears, human foot-traffic was redirected when possible around the bear(s) in question following 2 alternate routes: 1) along the Naknek Lake beach, then upriver around the point at the river mouth to the primary trail paralleling the river; and 2) along the tree edge of the marsh from near the Fish Freezing Building and connecting to the primary trail about midway along the section of the trail that paralleled the river (Fig. 2). When sufficient NPS personnel were available, people were escorted along the alternative routes. Otherwise, people were typically directed to the route and a ranger stationed on the Lower River Platform monitored use of the route. The marsh route was generally not used after the third week of July because parts of the route became covered with water as the river level rose.

In more recent years, increased pressure to facilitate traffic flow across the river (and at times on the Naknek Lake beach) has resulted in increased management actions to haze resting bears. NPS personnel have continued to emphasize safety and minimizing impacts to bears by evaluating each traffic delay situation relative to the considerations outlined in the BMP (e.g., proximity of other bears that could be affected, presence and behavior of dependent offspring, etc.). However, the BMRF records indicated that at times, some NPS personnel took actions to attempt to facilitate human traffic movements that were inconsistent with BMP guidelines, possibly due to perceived pressure to keep the bridge open (for example, there were records of attempts to haze cubs that were not with their mother). It should also be noted that typically after about 7 September, there were often too many other bears within the vicinity of resting bears to consider hazing as an option. Still, due to the higher degree of bear use of the lower river during fall, nearly two thirds of the documented hazing actions to move resting bears occurred during September.

Hazing of resting bears started at the lowest level (e.g., human noise), followed by higher
intensity methods (e.g., air horns before noise-making deterrent rounds) only until the bear(s) moved off. The BMP stipulates that no other bears be present within 100 m. Attempts to haze resting bears to facilitate human traffic movements were not always successful. For example, in 2004 a female with 3 spring cubs, one of which was injured, was relatively unresponsive to noise-making deterrent rounds or even a small vehicle. Some bears that rested in the lower river such that human traffic flow was disrupted were clearly accustomed to close proximity with people and to the noise associated with camp (vehicles, aircraft, generator, human foot traffic, heavy equipment, etc.). This may be one reason why some bears were sometimes not responsive to low-level hazing efforts. Also, it was our experience that some of the bears that appeared accustomed to people and were often seen near camp were typically much more responsive to hazing when they were active within the Brooks Camp residence area than when they were resting outside of camp in a location where hazing was sometimes used.

Olson et al. (1998) reported that bear activity during daylight hours in September–October at Brooks River peaked 1800–2200 hours and was concentrated on the river below Brooks Falls. Over the years summarized in this report, NPS staffing was reduced by September, which resulted in no scheduled staff presence in the vicinity of the river mouth after about 1800 hour. Sometimes if a bear management technician was on duty during evening hours (about half of the Sep evenings when the lodge was open), that individual spent some time near the floating bridge, or they were called out to the bridge by bear monitoring staff collecting data from the Lower River Platform. However, sometimes spending time in the lower river area resulted in bear management staff being cut off from camp for prolonged periods by bear traffic. They were then unavailable to respond to any bear management issues that arose in or near camp. Bear monitoring staff sometimes resorted to shouting directions at people, but many times they were too busy tracking bears to either direct human traffic or document close-range human-bear interactions that occurred. Similar to previous years (Olson et al. 2002, Bentley et al. 2007), the behavior of people around bears during the hours of peak bear activity in the river mouth remained largely unsupervised and most close-range interactions went undocumented during 1–18 September. In addition, it should also be noted that during fall, the dwindling daylight hours are also an important aspect to human traffic movements across the lower river.

Conflicts between motorized vehicles and boats in the vicinity of the lower river also merit attention. In all years, there were records of some bear actively avoiding such equipment and thus being displaced from the river, and there were also records of some bears continuing their prior behavior as vehicles/boats operated nearby, potentially contributing to a very high degree of bear habituation to loud noises and close proximity to people. Minimizing use of motorized vehicles/boats, particularly near the river, and coordinating such traffic with any NPS staff stationed in the vicinity of the river mouth could help limit close encounters between bears and vehicles/boats in this area.

**Naknek Lake Beach.**—The Brooks River current tends to carry salmon carcasses downstream and along the Naknek Lake shoreline, depositing salmon most predominantly between the point (north side of the river mouth at Naknek Lake, see Fig. 2) and the NPS Visitor Center (Troyer 1980, Gilbert 1986, Braaten 1988). Consequently, bears frequent the Naknek Lake and adjacent beach in front of Brooks Camp to feed on salmon carcasses, particularly during fall. In addition, the beach in front of camp has been documented as a commonly used bear travel corridor and general bear use area (Troyer 1980, Gilbert 1986, Braaten 1988, Olson et al. 2002, Bentley et al. 2007). Generally, beginning about
the third week of July, the water level in the river and lake rose noticeably. Whereas early in the season there was a wide strip of beach, by August the beach in front of Brooks Camp was reduced to a relatively narrow strip in places. Early in the season if visitors were on the beach in the path of a bear, the bear would often continue its activity while staying close to the lake edge. Later in the season when the width of the beach was reduced, we observed bears sometimes move into camp, presumably because they had little room to negotiate their way around human activity and other bear traffic on the beach.

Aircraft traffic and other human activity on this same stretch of beach resulted in frequent bear-human interactions and the potential for bears to be displaced into camp. Consequently, NPS personnel spent considerable time managing bear and human activities on the beach. This included: “shadowing” bears that were walking along the beach by walking parallel to them on the main trail through camp while alerting staff and visitors of the bear’s presence, alerting aircraft of bears in the area and directing them accordingly, monitoring loading and unloading of planes, and attempting to keep bears from trespassing into camp from the beach. Unattended property was documented on the beach in front of Brooks Camp during all of the years summarized in this report. Although infrequent relative to the number of visitors, unattended property left on the beach sometimes contained food items. Most commonly, unattended property was associated with private boats left on the beach. In other cases, property was left by visitors that had not yet received the requisite orientation briefing.

Commercial pilots operating under Commercial Use Authorizations (CUAs) (previously IBPs [Incidental Business Permits]) were prohibited from operating aircraft within 100 m of a bear. Yet there were numerous BMRF records of bears displaced from the Naknek Lake beach into Brooks Camp by airplanes operating within 100 m, and sometimes by turbine engine aircraft farther away. There were also numerous records of bears trespassing into camp to avoid aircraft loading/unloading activities. Particularly during the fall some bears slept on the beach in front of Brooks Camp, which then affected where aircraft could land, and also sometimes affected access to planes. Whenever possible, NPS staff directed departing pilots to push off and paddle >100 m from sleeping bears. Of particular concern were turbine engine aircraft that are extremely loud upon take-off and landing, and were therefore more likely to cause overt reactions from bears. At least 2 commercial operators that were seen relatively regularly at Brooks Camp, in addition to Katmai Air, operated turbine engine aircraft at Brooks.

**Brooks Campground.**—An electric fence was maintained around the Brooks Campground until camp facilities were shut down in the fall. There were 2 documented instances between 2003 and 2006 in which bears entered the campground through the fence. In one case, the fence was turned off and the fence gates were opened so that a yearling was eventually able to exit, and in the other case a spring cub passed under the bottom fence wire when it entered and exited the campground. To effectively respond to such trespasses in a timely fashion it is important to know the locations of fence gates and how to turn the fence off.

Numerous interactions occurred between people using the trail to travel to and from the campground and bears near or on the trail. Interactions also occurred between people standing inside but close to the electric fence and bears close to the fence perimeter. The campground and campground trail will likely continue to be areas requiring management attention, because some bears use the beach regularly and the campground trail is immediately adjacent to the beach. Given that the beach is used as a travel corridor and feeding area by some bears, it is likely that relocating the campground trail inland away from the Naknek Lake beach could reduce
encounters between bears and people traveling to and from the campground.

**Brooks Camp Residence Area.**—Bears that entered the Brooks Camp residence area were typically displaced by yelling, clapping, using an air horn, or simply following them out. Although an effort was made to document these incidents, many went unrecorded. Trespass statistics should therefore be regarded as minimum documentation of occurrence. Bears trespassed into Brooks Camp for many reasons, including avoiding other bears, avoiding planes or other human activities on the beach, and curious investigation.

Deterrent rounds were seldom used to displace bears from camp, primarily due to limited availability of NPS personnel to secure the area, unpredictable presence of people, and presence of other bears nearby (which sometimes limited potential bear escape routes and increased the possibility of a hazing-caused bear-bear interaction). Typically, by the time that response personnel were able to generally secure the area for a response, the bear had moved on. Often lower-level hazing of bears by shouting, clapping, and sometimes use of air horns, resulted in slow withdrawal of a bear that was more manageable given the previously mentioned considerations.

A few food-related events documented within the Brooks Camp Residence Area during the years of this report merit specific mention relative to future management planning. In 2004, the lodge began using a grill early in the season behind the lodge dining hall, and food was sometimes left unattended on the grill. In response to bear management concerns, an electric fence was eventually installed around the grill. However, given the seasonally high levels of bear activity in the area and the potential for bears to travel through camp near the grills, close attention should continue to be paid to grill use. As previously mentioned, also in 2004 a bear obtained food from luggage left unattended on a cabin porch. After this incident baggage handling was changed so that luggage was picked up from inside cabins, rather than from cabin porches. This incident underscored concerns regarding any property left unattended, including on the main lodge porches, where baggage is still allowed to be left unattended while awaiting transfer via aircraft. A future modification that could be considered would be to require that any items that obviously contain food (for example, coolers) be kept within a building until active transfer.

Several BMRFs documented surprise encounters between people and bears at the Visitor Center picnic area. In some cases, people abandoned their food (but there was just one record in which a bear obtained anything from a picnicker). Although the picnic area is located within the Brooks Camp residence area, it is within about 30 m of the beach (Fig. 2), which is a commonly used bear travel route and an area frequented by bears searching for dead fish during fall. In addition, a main foot trail leads from the beach into camp past the picnic area and toward the Oxbow, thus sometimes funneling bear traffic through camp directly past the picnic area. To reduce encounters between bears and picnickers, the campground could be relocated farther away from the beach. However, moving the picnic area away from the Visitor Center and the main camp trail could result in less direct supervision of the picnic area, and so it would likely be important to enclose the site with an electric fence.

**Oxbow, Cutbank, and Upper River.**—The river extending from above the bridge through the Oxbow and Cutbank have been documented as productive bear feeding areas, particularly during the fall (Olson 1993, Olson and Gilbert 1994, Olson et al. 1997). The authors also indicated that these areas provide seasonal access to productive fishing for family groups that may be intolerant of the level of human activity associated with the lower river and Brooks Camp. Adult male activity tends to be focused toward Brooks Falls during July, but disperses to areas below the falls during autumn. Although bear use of the river above Brooks Falls has not been quantified, it is appar-
ent that this area of the river is fished by bears more commonly during the fall than in July, with travel and rest being more common activities during July (E. M. Groth, NPS, personal observation).

Human-bear interactions of concern documented along the river above the floating bridge primarily involved anglers continuing to fish and/or reel in fish in close proximity to bears, and anglers affecting bear access to the river either by actively hazing bears away or by refusing to yield for bears seeking to fish in the area of the river that they occupied. Some records of these records of close-range interactions between bears and anglers specifically identified Brooks River Guide Program participants involved. These records are of particular note because Guide Program participants are allowed to provide bear orientations to their clients in place of obtaining approved orientations from NPS rangers. Presence of NPS personnel above the floating bridge was largely limited to bear monitoring staff, who collected data on bear use of the river from a tree stand in the Cutbank area and who sometimes walked along the upper river bank to collect bear hair samples. Because these personnel were focused on other types of data collection, it is important to note that BMRF records were often completed only for bear-human interactions that were of particular concern, such as people fishing <<50 m from bears and people overtly attempting to displace bears while fishing. To encourage appropriate behavior around bears, in some cases monitoring staff resorted to shouting instructions to anglers from their observation stand. But direct patrol contacts would have been preferable, and periodic river patrols might encourage angler compliance with bear-related requirements.

Falls Trail, Road, and Brooks Lake Residence Area—Although occasionally interpretative, law enforcement, or bear monitoring staff accompanied visitors along the road and Falls Trail, people were largely on their own when travelling along these routes. In part due to often limited visibility (due to trees and other vegetative cover), as well as to inexperience of many visitors, reports of close encounters with bears were not uncommon. During the breeding season, from late June through July, various BMRFs document close encounters between people and courting bears. For example, in July 2005, the bear monitoring technician was nearly run over by 2 large males pursuing a female, who came silently trotting up behind him. Other visitors reported similar experiences with fast-moving bears during the same year.

It also appeared that sometimes people favored walking within extremely close proximity to bears resting close to the trail or road, over maintaining a reasonable distance by going around bears by walking off of established trails/roads. To reduce the frequency of close-range surprise encounters with resting bears in these situations, when NPS staff became aware of bear(s) resting near a road or trail, occasionally a decision was made to haze the bears in question away. However, this was usually not a viable option because there was rarely sufficient trained staff available to take such action. An effort was made when possible to directly escort people around bears or to hold people until the bear(s) in question moved off. However, given limited availability of staff, sometimes the best that could be done was to alert people at the Falls Platform and/or Lower Platform to the situation. People were also sometimes observed yelling at bears even when bears were clearly aware of their presence, and at times yelling and clapping at bears in an apparent attempt to scare them away, even at a distance.

Surprise or close encounters between vehicles, people, and bears along the road were rarely documented by NPS or Brooks Lodge staff but undoubtedly occurred given the level of traffic on the road. The few BMRF records of such encounters were recorded by bear monitoring personnel who travelled the road daily. Minor property
damage around the bus parking lot has also been documented, particularly during the fall.

**Data Limitations**

1) Events observed by NPS staff were more likely to be reported than those observed by concession staff or visitors, and NPS staff were most often present in and near Brooks Camp. Consequently, the BMRF data were biased toward that area and were likely not proportionately representative of interactions that occurred elsewhere through much of the season. By October, virtually all remaining NPS personnel were housed at Brooks Lake, and resource management personnel were focused on sampling bear activity below Brooks Falls. Consequently, during October sampling was biased toward the river below Brooks Falls and the residence areas along Brooks Lake.

2) Many interactions between bears and people at <50 m went unrewarded because they were brief and frequent enough to not draw the attention of staff who became accustomed to such events. This was also true to a lesser extent for commonplace bear management actions such as shouting or using an air horn to displace bears from Brooks Camp.

3) Because regulations prohibited feeding wildlife, leaving gear unattended, etc., people may have been hesitant to report such incidents to NPS staff. Our data largely reflect only incidents that staff observed or became aware of through casual conversations with visitors, guides, and lodge staff.

4) The BMRF and STF data were collected opportunistically. This resulted in variable sampling intensity. Rates of occurrence should be regarded only as minimum estimates, and caution should be exercised in comparing numbers among years in particular. For example, incident types that occurred infrequently and that were of significant management concern, such as bears obtaining fish from people, were likely documented whenever observed or reported; however, more common incident types such trespasses may have been variably recorded in different years.

5) Development of the BMRF database resulted in a few changes to BMRF coding across years. An attempt was made to recode any relevant records from previous years to reflect the current coding scheme; however, it is possible that a few records could have been overlooked.

6) Many of the bear-human interactions documented on BMRFs involved a small subset of the bears using the Brooks River area, and are likely not representative of most bears that frequented Brooks River. Generalizations to age-sex class should be viewed with caution.

7) Hazing records often documented use of multiple hazing techniques, and effectiveness was only very generally categorized as successful or unsuccessful. Often it was unclear which hazing technique resulted in the desired response from the bear(s) involved, and/or it was sometimes unclear whether a bear changed its behavior in response to hazing or to some other factor. In addition, hazing efforts categorized as successful incorporated a broad range of responses from bears, including sometimes very slow withdrawal movements.

**RECOMMENDATIONS**

Although the current location of Brooks Camp and the level of visitation are obvious factors contributing to the frequency and nature of human-bear conflicts at Brooks River, we offer the following recommendations regarding other aspects of Brooks Camp operations that we believe could help to minimize bear-human conflicts there.

**Staffing and Schedules**

1) To have sufficient bear management personnel available to respond to bear management concerns and assist with traffic management, increase bear management staffing by at least 2
additional positions. This level of staffing could also allow for mentoring opportunities between new and returning bear management staff (during 2003–06, the 2 technicians were scheduled to maximize coverage and so there was limited schedule overlap between them).

2) Increase NPS staff presence on the river above the floating bridge: a) to contact visitors and provide information regarding proper behavior around bears; b) to contact visitors who engage in undesirable behavior around bears; and c) to provide some degree of accountability to the Brooks River Guide Program.

3) To help minimize bear-human conflicts, increase scheduled NPS staff presence in the river mouth during evening hours in the fall.

4) To minimize vehicle and boat conflicts with bears in the lower river, reduce vehicle and boat traffic, in particular near the Lower River Platform and spit, and coordinate vehicle and boat access to the spit with NPS personnel stationed in the river mouth vicinity.

5) General seasonal and diurnal patterns of bear activity at Brooks River have been well documented (e.g., Warner 1987, Olson et al. 1990, Olson 1993, Olson and Gilbert 1994, Olson et al. 1997, Olson et al. 1998; T. Olson, National Park Service, unpublished data). To minimize human-bear conflicts in accordance with the park’s GMP and BMP, schedule project work that could affect bear use of the Brooks River area to avoid peak bear use periods whenever possible.

Structures

1) Reposition the gates on the Lower River Platform so that there are gates at both the bottom and top of the stairs and back ramp, and construct the lower gates with a material that is less likely to be chewed on by bears. This reconfiguration would keep bears off of the platform stairs and would likely also reduce damage to the stairway railings.

2) Eliminate grey-water sump of NPS cabin BRT-3 and BRT-4.

3) Regularly inspect food cache doors and any garbage containers within them to make sure that the latches work properly and that garbage is not left for prolonged periods.

4) Access to the floating bridge was often temporarily blocked due to bear activity on or near the main trail between camp and the bridge. Use of alternative routes often allowed access when people had been delayed from crossing due to bear activity; however, an alternate route was not always available. An alternative bridge placement, such as connecting the bridge perpendicular to the trail at the corner (Fig. 2) might alleviate some of the human traffic delays.

5) To reduce the potential for food-related bear-human conflicts, relocate the picnic area that is currently adjacent to the Brooks Camp Visitor Center to a site further removed from the beach. Any new site should also have good visibility so that picnickers can detect approaching bears and could be enclosed within an electric fence.

6) To reduce encounters between people and bears that use the beach as a travel corridor, consider moving the campground trail further inland away from the beach (for example, along the water pipe route to the campground).

7) Remove any items that could be damaged by a bear from boats left unattended, or store such items within a bear-resistant container. Also, off-anchor boats whenever possible to minimize any investigation by bears.

8) To minimize bear-caused damage to vehicles and to minimize conflicts with bears, park vehicles away from the Lower Platform whenever possible.

9) Carefully monitor any lodge use of grills behind the lodge dining hall relative to bear concerns. It would be preferable to minimize grill use there during periods of regular bear activity along the river.
10) Use of grills at the Brooks Lake and Brooks Camp Visitor Center picnic sites is problematic because grills cannot be easily secured if a bear suddenly shows up. Grilling could be limited to the Brooks Campground, which is at least enclosed within an electrified fence.

**Education**

1) When providing information to campers, emphasize that: (a) because the Naknek Lake beach is commonly used by some bears as a travel corridor, campers needs to be aware of the likelihood of encountering bears along the trail, and they need to be prepared to respond appropriately; and (b) the campground fence is not intended to be used to view and photograph bears at <=50 m.

2) Make staff aware of the BMRF and STF during training and encourage them to fill out the forms or report relevant information to resource management staff.

3) Continue to provide visitors with season-specific information regarding bears, for example remaining alert to the possibility of encounters with courting bears during July, and being aware of how quickly bears may respond to splashing fish during July in particular. In addition, emphasize such points during staff training sessions.

4) It was evident that some bears that obtained even a small item left unattended, for example a rug left hanging on a cabin porch, were involved in subsequent incidents involving unattended property. Emphasize the importance keeping all belongings secure from bears with visitors and in staff training sessions.

5) During staff training, review where electric fences are located, how to turn them off, and where any fence access gates are located. In addition, generally discuss what to do if a bear gets through a fence, but then appears reluctant to exit it.

6) Further emphasize with NPS staff the critical importance of food and garbage security. If any future cases arise in which NPS personnel leave food or garbage unattended, follow up immediately with the responsible parties and consider additional provisions, such as use of barrels with locking rims for garbage transport.

**Data Collection and Management**

1) Incorporate additional programming into the BMRF database to allow users to print out data entered in a format similar to the existing BMRF. In many cases, the printout could be signed and used as the completed data form, thus eliminating the handwritten form.

2) To better document bear-related incidents, bear management technicians should regularly query other staff and encourage them to enter information on a STF/BMRF. Information should also be actively solicited from lodge staff and commercial guides.

**LITERATURE CITED**


Appendix A

2006 Bear Management Report Form (BMRF)
and BMRF Instructions
**Figure A1.** Bear management report form for Brooks River, Katmai National Park, Alaska, 2006.
Figure A1, Continued. Bear management report form for Brooks River, Katmai National Park, Alaska, 2006.
Bear Management Report Form (BMRF) Instructions
Brooks River Form
Revised 2006

The BMRF is the primary tool for documenting bear-human interactions throughout the park. It is a means for monitoring bear activity, evaluating the bear management program, and identifying potential problems that need attention. Use the form to document all serious and unusual bear-human interactions. This includes the obvious such as bears obtaining food/garbage/fish from humans or their facilities, hazing of bears, property damage, bears behaving aggressively towards humans, human injuries/fatalities, bears killed in defense of life and property (DLP), and poaching incidents.

It is unnecessary to document innocuous events in which human behavior was appropriate and reasonable and bears were behaving naturally and non-aggressively outside of residence areas, i.e., do not try to complete a report for every time that visitors happen to be within 50 yards of bears when the visitors appropriately try to withdraw. However, when humans behave such that one would expect a bear to respond aggressively, the interaction should be reported regardless of the bear’s behavior. For example, if someone approaches a bear within a short distance or harasses it in some way, a form should be completed. This will be a subjective interpretation on your part.

Bears entering residence areas (trespasses) should be documented. It is not realistic to complete a BMRF every time a bear enters the Brooks Camp residence area; however, an effort should be made to record as many instances as possible.

A Ranger will also complete a case incident report (CIR) whenever a bear damages property, a bear injures or kills a human, or if a violation is involved. In those cases, a copy of the CIR should be attached to the BMRF.

Whenever NPS personnel discharge a firearm or bear pepper spray to haze a bear, or a bear charges a human, a CIR number should be obtained from Park Dispatch or the Chief Ranger and recorded on the BMRF (see section 5.0, BMP). For each BMRF assigned a CIR number, a copy of the form should be submitted to a Bear Management Technician or the Park Wildlife Biologist for incorporation into the BMRF database, and the original form should be submitted to the Chief Ranger.

Visitors should be able to fill out this form with minimal assistance. When a visitor completes a BMRF, be sure to read through it to be sure it is as complete as possible and that a sufficient description of the interaction was written in the “What happened” section. Then complete as much information in the “Management Use Only” section as you can. A Bear Management Technician or the Park Wildlife Biologist can determine the “Management Consequences” if you aren’t sure, assuming the interaction is sufficiently described.

If you do not have all the information requested on the BMRF, fill out as much as you can. A partially completed BMRF is better than no BMRF. Record exactly what you observed or exactly what the witnesses observed; do not fill in the missing parts or record witnesses attempts to do so. Make sure the observations described are tangible such as specific behaviors, sizes, or distances. Do not record intangible interpretations such as a bear’s intent or mood.

If you are not sure whether you should fill out a form, go ahead and do it.

Brooks River BMRF:
Use this form for all interactions occurring in the Brooks River area, along the VTTS road, and near the Three Forks cabin. This includes the area within a five mile radius of camp. Use the backcountry form for all other locations.

Leave the “BMRF #” in the upper right corner of page 1 blank. A Bear Management Technician will assign each form a unique record number.

CIR number - Include the case incident report number if applicable. If a CIR was written but you don’t know the number, write “Y-unknown” in pencil and the Bear Technician will add the number later.
When did the interaction happen? - Use numbers to indicate month, day, and year. Be sure to circle a.m. or p.m.

How long did it last? - Indicate the length of the interaction. Be sure to include units, i.e., hours, minutes, seconds.

Where did it happen? - Circle from the following choices:

General Location
0 Campground - Brooks Campground and vicinity, excluding the beach.
1 Beach - the beach of Naknek Lake as high as the trail just within the trees, from 50 m beyond Brooks Campground to the mouth of the river.
2 Brooks Camp - the area of the buildings and their vicinity from concessions housing and the generator to the Fish Freezing Building, and from the beach to the leach field, excluding the Pithouse and trail.
3 Mouth below bridge - mouth of Brooks River below and including the floating bridge, including the trail 25 m beyond the Fish Freezing Building, the old concessions housing area, marshy areas near the trail, and exposed land extending from the beach into the mouth.
4 Oxbow and marsh - Brooks River above the floating bridge to the upper end of the oxbow marsh, including the oxbow marsh to the foot of the bank below the Skytel.
5 Cutbank - Brooks River from Zone 4 upriver to the beginning of the riffles below Brooks Falls; include the Riffles Platform and boardwalk as part of 6 below.
6 Brooks Falls, the Riffles, and boardwalks - from 100 m above Brooks Falls to Zone 5, including the Falls Platform, Riffles Platform, boardwalks, and gathering area and immediate vicinity, excluding the riffles area of the river.
7 Upper river - from Zone 6 upriver to the river entrance.
8 Road/Falls trail/Cutbank trail - roads within 2 miles of Brooks River, the old overflow campground, Golden Squirrel Camp, the Falls Trail to the boardwalk, the Cutbank trail to the river, the residence areas and picnic area on Brooks Lake.
9 Brooks Lake residence area - the area of residence areas and their vicinity along Brooks Lake.
10 Other - Describe in the space provided. Use for other locations near Brooks River.

Brooks Camp subarea, if applicable (illustrated in Fig. 1)
0 Unknown
1 Fish freezing building and Brooks Lodge vicinity to Visitor Center (VC) - between the VC and the fish freezing building.
2 Overlook/Skytel to auditorium - Oxbow overlook to Skytel and to NPS auditorium.
3 VC to Ranger Station - between the Ranger Station and the VC.
4 NPS warehouse and NPS housing - NPS warehouse, ranger cache, incinerator building, and residence area; includes the trail that leads from warehouse down to Naknek Lake beach.
5 Leach field and Tuckerville - leach field to Tuckerville.
6 Other - Describe in the space provided.

You can further describe the location of the incident and/or attach a map or draw one in the “What happened?” section. If you are uncertain of the location category, just describe it in the “What happened” box, and a Bear Management Technician will complete this section.

People involved - List the names and addresses of the people involved in the interaction and the role each person played. Include the total number of people involved in the interaction. Indicate if the group was guided and the guide’s and company’s names if applicable. It is useful to identify where at least one of the people can be contacted that night if more information is needed.

Group type - Circle the group type. If “Other”, describe.

Closest distance between bears and people? - How close did the bear and nearest person get during the interaction? Write a range if necessary, i.e., 20-30 yards. Be sure to include units, i.e., feet, yards, meters. Write “Unknown” or “Not Applicable” if appropriate.
Bear descriptions - Each vertical column represents a different bear. Circle the color and age class of each bear (up to five) involved in the interaction. Add distinguishing characteristics if possible. If known, include the bear’s identification number. If you are not absolutely certain of the bear’s identification, qualify your suspected identification as such. Indicate the total number of independent bears involved in the interaction in the box in the upper right corner. Do not include dependent offspring in this count. If more than five bears were involved in the interaction, describe them in the “What happened?” section.

What was happening before the interaction? - Circle the activity the bear and human were engaged in immediately before the interaction occurred. If multiple bears or people interacted, circle the predominant activity exhibited by each species. For family groups, the predominant activity is typically considered that of the sow. For instance, if five people encountered a bear while three of them were fishing and two were simply watching, circle “Fishing.” If someone encountered a bear family in which the sow was fishing, one cub was playing with a pine cone, and another cub was sleeping, circle “Fishing.”

Choices in Bear column:
0 Unknown - There was no data or no bear was involved.
1 Stationary - The bear was standing, sleeping, suckling young, or otherwise not going anywhere.
2 Traveling (land) - The bear was walking or running to go somewhere.
3 Traveling (water) - The bear was swimming or wading to go somewhere. Do not include fishing.
4 Grazing/browsing - The bear was foraging for vegetation.
5 Fishing - The bear was apparently foraging for fish.
6 Playing - The bear was engaged in play. (Bears do not vocalize while playing.)
7 Fighting - Bears were engaged in dominance interactions with each other. This does not necessarily involve bears making physical contact with each other.
8 Eating a fish – The bear was eating a fish.
9 Not applicable
10 Other - Describe.

Choices in Human column:
0 Unknown - There was no data or no humans were involved prior to the interaction.
1 Stationary - People were not going anywhere and were not involved in other activities listed below.
2 Walking/wading - People were going somewhere by foot.
3 In automobile - People were in or traveling in a Cushman, Suburban, truck, bus, etc.
4 In boat - People were in or traveling in a boat. This includes fishing from a boat.
5 In airplane - People were in or traveling in a plane.
6 Photographing/filming - People were photographing, video taping, etc. bears. Report photographing other subjects as “Stationary.”
7 Fishing - People were actively fishing. Record fishing from a boat as “In boat.”
8 Bicycling - People were riding bicycles.
9 In building – People were inside a building.
10 Not applicable
11 Other - Describe.

What were the predominant responses to the interaction? – Circle the response category that best describes the main, predominant, or most noteworthy behavior for each species during the interaction. Prior activities and predominant behaviors do not necessarily relate in a chain of actions and reactions, i.e., they are not meant to document that the bear did this, then the person did that, then the bear did this, etc. For example, if an angler throws rocks to move a fishing bear out of the area, the bear charges, and then the angler runs away, circle “Assault” rather than “Run” as the predominant human behavior. The predominant bear behavior is “Aggressive approach.” The prior activity is “Fishing” for both the bear and the angler. If a group of three people encountered a bear while hiking to the Falls Platform, and one person talked to the bear while slowly backing away, one person played dead, and one person took a photo, the predominant human response would be recorded as “Other” with the specifics written in the blank space below the choices.

A note regarding hazing: use the guidance above to determine what the predominant behavior of humans was during the interaction. Two examples: (1) When people withdraw into a building in response to a bear in camp, then NPS
staff arrive and use deterrent rounds to displace the bear, the predominant human response should be recorded as “Withdrew slowly”, and the primary bear response as “Nonaggressively approached.” (2) If staff responded to a trespassing bear with deterrent rounds and other people were not involved, then the predominant human response should be recorded as “Assault” and the bear’s predominant behavior as “Nonaggressively approached.”

**Choices in Bear Column:**
0 Unknown - There were no data or no bear was involved.
1 Stopped - A bear’s progress was stopped by human actions.
2 Withdrew slowly - A bear left the immediate vicinity of the interaction without running.
3 Ran away - A bear ran from the immediate vicinity of the interaction.
4 Aggressively approached - A bear’s attention was obviously focused on the person it approached and it exhibited aggressive behavior(s) such as vocalizing, excessively salivating, jaw popping, baring teeth, lowering its head, flattening ears, approaching on hind legs, charging, swatting forepaws against the ground, or swinging forepaws in the air. A bear that approached a human while charging another bear would be recorded as “Inadvertently approached”, regardless of how terrified the human was.
5 Nonaggressively approached - A bear moved closer to a person, gear, vehicle, or facility in the course of continuing its ongoing behavior, i.e., traveling, foraging, play, etc. It would have likely followed a similar route even if these elements had not been there. Its behavior did not include aggressive elements.
6 Stationary aggression - A bear’s behavior indicated aggression focused on an object it did not approach.
7 Directed approach - A bear’s movements appeared directed toward a person or object in its environment, but no aggression was expressed. For example, a bear may have appeared to be traveling or foraging, but there was an acceleration or change of direction towards the person. A bear may run at someone in a bounding lope with ears up to steal a fish off the line in the same way that a sub-adult may run at gulls to flush them. Sometimes bears, especially subadults, will approach people out of curiosity.
8 Attacked - A bear aggressively made physical contact with a person.
9 None - A bear’s behavior did not appear to change in response to the interaction.
10 Not applicable
11 Other – Describe.

**Choices in Human Column:**
0 Unknown - There were no data or no humans were involved.
1 Stopped - Someone’s progress was stopped by a bear’s actions.
2 Withdrew slowly - The people left the immediate vicinity of the interaction.
3 Ran away - At least one person ran from the immediate vicinity of the interaction.
4 Aggressively approached - People approached a bear aggressively with obvious intent to displace it; includes use of air horns, shouting, and banging of pots and pans while approaching a bear. This include vehicles used for this purpose.
5 Non-aggressively approached - People approached a bear without intending to displace it. The bear’s awareness of the approach and its perception of the intent are not important.
6 Stationary aggression - People did not approach a bear, but aggressively tried to displace it. This includes stationary yelling, banging of pots and pans, and use of airhorns to displace a bear.
7 Assault - Humans threw things at a bear, used chemical repellents, used deterrent rounds, or struck at a bear. Even if assault was initiated from a stationary position, report it as assault.
8 None - The people’s behavior did not appear to change in response to the interaction.
9 Not applicable
10 Other – Describe.

**Where did the group receive bear safety information?** - Circle all that apply.
0 None - Received no information
1 Printed material (Katmai National Park) - This includes all Katmai publications, i.e., park newspaper, brochures (not Bear Facts), etc.
2 Brooks Camp Visitor Center
3 Interpretive program, Brooks Camp
4 Ranger contact
5 King Salmon office - Katmai National Park office in King Salmon.
6 Phoned Katmai
Was there food in the area? - Write “Yes”, “No”, or “Unknown.” Consider items provided by humans that a bear might eat like human food, garbage, scented toiletries, fish caught by anglers, and carcasses killed by hunters. List all of this type of food items that were in the area. Do not include natural food sources like vegetation, salmon that was not caught by anglers, and carcasses that died of natural causes.

If food was present in the area, circle the applicable food category:
1 Angler-caught fish, not secured per park regulations
2 Fish on line near bear - Fish on line within 50 m or less of a bear.
3 Beverage only, not secured per park regulations
4 Human food, not secured per park regulations - Choose this category if unsecured food or unsecured food and beverage were present.
5 Garbage containing food, not secured per park regulations
6 Harvested game - Describe how the game was stored.
7 Human food/fish/garbage secured per park regulations
8 Unknown

Was property damaged? - Write “Yes”, “No”, or “Unknown.” Estimate the cost of the damage. If a visitor plans to put a $2.00 patch on a $500.00 tent, write $2.00. Describe the items and level of damage to each. If more space is needed, continue in the “What happened?” section.

What was the source of this BMRF? - Circle the source of the report.
0 Unconfirmed rumor - Source unknown, story cannot be confirmed, or otherwise doesn’t fit below
1 Personal experience - Recorder was involved in a large part of the interaction
2 Direct observation - Recorder saw most of it happen
3 Direct report - Recorder interviewed someone who had personal experience or direct observation
4 Observed report - Recorder interviewed someone who received a direct report

What happened? - Describe the interaction in as much detail as possible. Include diagrams, drawings, etc. if helpful. Attach additional paper if necessary. This is the most important section on the form!

Report taken by - Write the name of the National Park Service staff member who completed the report. If a visitor completed the form, write the name of the staff member who helped them.

Date report taken - Write the date that the report was taken.

FOR MANAGEMENT USE ONLY - This section should only be completed by NPS staff. If you are uncertain how to complete any of the sections, a Bear Management Technician will finish it for you.

NPS Staff Action - Circle the action NPS staff took toward the people involved in the interaction.
0 None - No action was taken or minimal communication occurred which did not include a discussion of bear safety and how the interaction could have been handled differently.
1 Interpretation - NPS staff discussed the aspects of bear safety relevant to the interaction and made suggestions for avoiding or improving similar interactions.
2 Verbal warning - Interpretation and a verbal warning that their behavior violated regulations were given.
3 Written warning - Interpretation and a written warning that their behavior violated regulations were given.
4 Citation - Interpretation and a citation notice were given.
5 Not applicable
6 Other – Describe.
Other BMRFs - Record the BMRF numbers of other interactions related to this event.

Bear Management Action - Circle the predominant action of NPS staff during or in response to the interaction. Because this section is used to evaluate the Parks’ bear management program, do not include hazing conducted by other people here unless they were part of a hazing effort orchestrated by NPS personnel (but describe any hazing actions taken by other people under the “What happened” section). Also, indicate the number of people that were present during the management action (include in that total any people that you are aware of that were moved into buildings, etc.).

0 None - NPS staff did not respond.
1 Monitored - NPS staff monitored the situation.
2 Too late - NPS staff arrived after the interaction was over.
3 Unsuccessful hazing - NPS staff tried to haze the bear(s) out of the area, but the bear(s) would not leave (although they may have eventually left on their own).
4 Successful hazing - NPS staff drove the bear(s) out of the area by hazing them.
5 Posted warnings - Signs informing visitors about potential dangers were posted.
6 Closure - A closure was imposed as a result of bear activities.
7 Killed bear - A bear was killed by NPS staff.
8 Not applicable
9 Other – Describe.

Hazing Technique - Circle all of the hazing techniques that were used by NPS staff. Because this section is used to evaluate the Parks’ bear management program, do not include hazing conducted by other people unless they were part of a hazing effort orchestrated by NPS personnel (but describe any hazing actions taken by other people under the “What happened” section). If multiple techniques were used, describe the progression and the bear’s reaction to each in the “What happened?” section. Also report the number of times each technique was used, i.e., 3 cracker shells fired. If bean bag rounds were used, specify the model (e.g., MK Ballistics Deer Thumper).

Human Offense - Circle everything the person did that violated Park regulations and guidelines.
0 None - Nothing, or no knowledge of an offense.
1 Too close - People approached a bear to less than 50 years or remained less than 50 yards from a bear utilizing a concentrated food source.
2 Didn’t yield right-of-way - People did not withdraw to let a bear continue on its path.
3 Continued fishing - An angler continued fishing when a bear was within 100 yards, or after being directed by NPS staff to stop or withdraw from the river.
4 Didn’t break line - An angler tried to land a fish rather than break the line when a fish was within 100 yards, or after being directed by NPS personnel to do so.
5 Stacked fish - An angler stored a caught fish on the bank rather than immediately taking that fish to the Fish Freezing Building.
6 Improper food storage - Park regulations regarding food/garbage storage or consumption were violated.
7 Harassment - People actively harassed bears beyond what was necessary or reasonable for protection or to drive bears from the campground or residence area.
8 Gear left unattended – People left gear unattended.
9 Unknown or not applicable
10 Other - Describe.

Primary Incident Category - Circle the primary category for the incident. If an incident falls into more than one category, identify the category that appears to have the greatest management consequences as the primary incident category, and mark any others as secondary. For example, if a bear damaged a bike while trespassing in camp, “Property damage” would be the primary incident category, and “Trespass” would be a secondary category.

1 Food related - Human food or garbage was obtained by bear; a bear stole a fish from an angler; a bear attempted either of above; or human handling, storage, or behavior related to human food, garbage, or fish was improper. A bear's attempt must be active, e.g. loitering near the incinerator building or fish freezing building. is "trespass" whereas, attempted entry of a building containing food is "food related."
Surprise encounter - A bear responded when it was apparently surprised by a human at close range.

Dominance interaction - Competition for space occurred between bears and humans when a bear was not surprised (e.g., anglers did not withdraw for a bear coming down the river, photographers stalked too close to a bear, a taxying floatplane displaced a bear, or a bear aggressively displaces people).

Trespass - A bear was within the campground or developed area (and not involved in categories 1, 2, 3, or 6—may then indicate trespass as secondary category), or a bear was on a viewing structure.

Planned management action - The incident was a planned action of bear management whether or not successful, excluding responses to bear incidents (e.g. closures, ambushes).

Property damage - A bear damaged property and the incident was not food-related.

Curious investigation - A bear investigated unattended property, a boat, a plane, etc., the incident was not food-related, and no property damage occurred.

Other - Describe.

Predominant Management Consequence - Circle predominant management consequence of the interaction; others that are secondary may be noted as such.

0 None - There were no significant management consequences.
1 Human withdrew - Humans left the general area.
2 Bear withdrew - The bear(s) left the general area.
3 Directed approach or aggression unpunished - Although physical consequences (5, 6, 7, or 8 below) did not occur, human responses to the bear’s unprovoked directed approach or aggression may have resulted in undesirable learning by the bear. Incidents such as a bear repeatedly displacing human who had already gotten out of its path, or a bear rushing at anglers without stealing fish should be recorded here. An incident of a sow charging humans who could reasonably be perceived as a threat to her young should be recorded as 1 or 2 above.
4 Property damage - Property was damaged by a bear.
5 Fish stolen - A bear obtained a fish that it may associate with humans. This includes bears taking fish off fishing lines; bears obtaining fish from recently broken lines; bears obtaining recently abandoned fish; bears removing fish from boats, planes, coolers, or other human structures; and bears obtaining fish being transported by humans.
6 Obtained human food - A bear obtained items from people or their facilities that might be considered food (whether consumed or not). This includes human food and beverages, garbage, scented toiletries, fish caught by anglers, and carcasses killed by hunters. This does not include natural food sources like vegetation, salmon that was not caught by anglers, and carcasses that died of natural causes.
7 Bear killed - This includes bears being killed as Management Actions, Defense of Life and Property (DLP) kills, legal hunts, and incidents of poaching.
8 Human contact/injury/fatality - Any incident in which direct physical contact is made between a bear and a human.
9 Trespass unpunished and unchallenged - A bear was within a residence area and was neither punished nor challenged.
10 Enhanced habituation - The interaction likely contributed to habituation of the bear to humans, their activity, or habituation, although no immediately serious consequence resulted, e.g., people remained closer than 50 yards from a bear and the bear did not obviously respond.
11 Unknown or not applicable
12 Other – Explain.

Infer proximate cause leading to interaction - Circle the cause of the interaction. Beware of observer bias. Do not guess. Circle “Unknown” unless the evidence strongly indicates a certain event. Proximate means the event immediately preceding the interaction, as opposed to ultimate cause. For instance, a proximate cause could be that an angler failed to cut his line soon enough resulting in a bear stealing the fish; do not assign an ultimate cause such as fishing is allowed in the river.

0 Unknown - If you are unsure whether to use this choice or another, then you probably do not know the proximate cause.
1 Chance event - The human behaved appropriately according to Park regulations and management plans, the bear behaved appropriately according to management plans, the bear was apparently unaware of or did not respond to the human presence, and the interaction resulted from coincidence, i.e., a surprise encounter.
2  **Human error/action** - A human violated Park regulations or otherwise exhibited inappropriate behavior according to management plans. Choose this category even when there was inappropriate behavior by the bear if it was triggered by inappropriate human behavior. For instance, choose this category when a bear was among the buildings because a departing float plane scared it from the beach.

3  **Bear initiated** - Human behavior was entirely appropriate according to Park regulations and management plans, it was not a chance event, and bear’s behavior initiated the interaction. For example, a bear entered the residence area from the beach when the beach was completely clear of human activity.

4  **Not applicable**
Appendix B

2006 Brooks Camp Short Trespass Form (STF)
# Brooks Camp Bear Trespasses
## Short Form Records - 2006

*Please record no. of bears by age-sex category*

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Appendix C

Figure C1. Photos illustrating bear-related events documented in several 2003–2006 Brooks BMRF records, Katmai National Park, Alaska. (A) Anglers handling a fish within <50 m of a bear at the Cutbank. (B) Anglers fishing with a backpack left unattended within <<50 m of a bear in the Oxbow. (C) NPS bear management personnel attempting to move a female with 3 spring cubs to facilitate human traffic movements at the floating bridge. (D) NPS personnel working within <<50 m of 2 subadult bears; (E) Anglers continuing to fish at the Cutbank within <<50 m family groups on either side of them. (F) Unsecured food and unattended gear in a boat left on the Naknek Lake beach.