

Bear-Human Interactions at Glacier Bay National Park and Preserve: Conflict Risk Assessment

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Many bear-human conflicts have occurred in Alaska parks and refuges, resulting in area closures, property damage, human injury, and loss of life. Human activity in bear country has also had negative and substantial consequences for bears: disruption of their natural activity patterns, displacement from important habitats, injury, and death. It is unfortunate for both people and bears when conflicts occur. Fortunately, however, solutions exist for reducing, and in some instances eliminating, bear-human conflict. This article presents ongoing work at Glacier Bay National Park and Preserve by U.S. Geological Survey (USGS) and National Park Service scientists who are committed to finding solutions for the bear-human conflicts that periodically occurs there.

People and Bears at Glacier Bay: A History of Coexistence and Conflict

Paleontological investigations reveal that both American black (*Ursus americanus*) and brown/grizzly (*U. arctos*) bears have continuously inhabited the Alexander

Archipelago for at least the last 35,000 years (Heaton *et al.* 1996). The oldest evidence of humans in this region dates approximately 10,000 years before present (BP). Native peoples throughout Southeast Alaska, primarily the Tlingit and Haida, integrated the bear into their myth, legend, and art, as well as depended upon them as sources of food, medicine, tools, and clothing. Tlingits preferred brown bear blankets for children's bedding not only for their warmth, but because the hides were believed to protect against illness. Tlingit social and ceremonial life emphasizes the close relationship between humans and bears, and traditional Tlingit bear hunters believed that adherence to certain behaviors was necessary to ensure the success of the hunt (Figure 1).

Native people and bears undoubtedly experienced conflict in Glacier Bay proper, although specific occurrences are now lost to time. The earliest written record of bear-human conflict in what is now the park occurred in August 1912 when frontiersman Allen Hasselborg nearly lost his life to a grizzly along the Bartlett River (Howe 1996). Tasked by C. Hart Merriam, then director of the Smithsonian Museum's mammal collections, to collect bear

specimens in the region, Hasselborg met up with a Tlingit hunting party. While talking with them, he boasted that he was not afraid of bears — a bravado deemed reckless and dangerous by the Tlingits. An elderly Tlingit man, Albert Jackson, sharply warned Hasselborg that if he kept boasting, he would anger a bear that would attack him. The next day, several miles up the Bartlett River, Hasselborg saw a large grizzly bear, fired four shots into it, and then pursued the wounded animal. The bear hid on a ledge, ambushed Hasselborg, and nearly killed him. Severely injured, Hasselborg was barely able to make his way back to the hunting party campsite. Upon his arrival, Hasselborg was told by Jackson that he deserved what happened (Howe 1996).

Nearly a century has passed since Hasselborg disregarded the Tlingit hunter's advice. The area has since become a national park, and bears are no longer hunted within its boundaries. People have discovered the unparalleled beauty of Glacier Bay National Park and Preserve, many exploring its pristine shorelines by sea kayak (Figure 2). As backcountry use increases in popularity, so do the reports of skirmishes between bears and people (Figures 3). Conflicts between bears and



National Park Service photograph

Figure 1. To the Tlingit and Haida, the grizzly was a Spirit Messenger, a source of power. The grizzly was portrayed in ceremonial dances and symbolically worn on clothing. Tribes honored the bear with names such as Elder Brother and Old Man with the Claws.

Figure 2. Left: From the safety of deep water, a kayaker observes a brown bear fishing for sockeye salmon (*Oncorhynchus nerka*) on the Alsek River near the Park/Canadian border.

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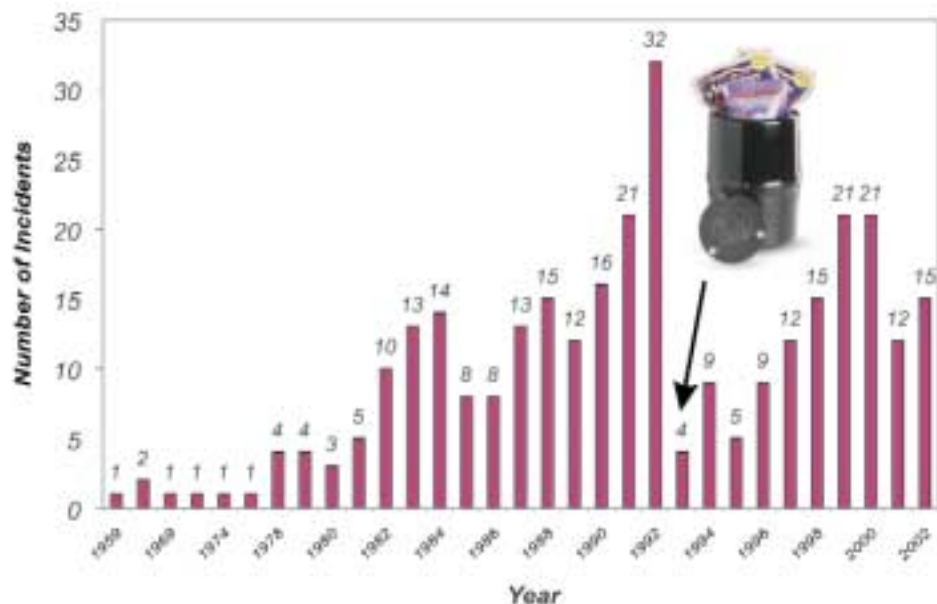


Figure 3. Trends in bear-human incidents at Glacier Bay National Park and Preserve, 1959-2002.

people in North America increased through the twentieth century (Herrero 2002). During that time, bear-human conflicts

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in Alaska resulted in 52 documented fatalities, hundreds of injuries, and extensive property damage (Smith unpublished, Middaugh 1987).

Today, sea kayaking is the predominant recreational activity in Glacier Bay’s extensive marine backcountry. Kayakers frequently stay several nights in the backcountry, camping within the narrow ribbon of terrain bordered by ocean and steep-walled mountains. Both brown and black bears inhabit and seasonally occupy these same areas. Beaches not only provide bears with unrestricted movement corridors, but also important foraging opportunities. Seaside habitats are among the earliest to provide bears with new plant growth and access to intertidal areas that host a variety of marine forage items (e.g., mussels, barnacles, and

other invertebrate species). Consequently, the potential for bear-human interaction at Glacier Bay’s campsites is likely higher than for other areas of the backcountry. It is also more likely that human activity in these areas will displace bears from important forage resources, or interfere with their movement. The majority of bear-human interactions occurring at Glacier Bay are resolved without incident. Nonetheless, there have been two human fatalities, two maulings, and thousands of dollars of property damage. Although no one has been injured in the park since 1980, bear-human conflict is still of great concern to park managers.

Notably, a sharp decline in bear-human conflicts occurred at Glacier Bay in the early 1990s as a direct result of a new policy that required campers to store all food in bear-resistant food containers. This illustrates the impact well-informed management decisions can have in reducing bear-human conflict (Figure 3). Consequently, the National Park Service solicited the aid of bear biologists to find ways to reduce, or even eliminate, bear-human conflict as well as the disturbance of bears by campers. By devising, applying, and evaluating a predictive model for bear-human interactions it may be possible to reduce bear displacement from important habitats, as well as minimize bear-human conflict through education and directives.

The more times people and bears interact, the more likely displacement and bear-human conflicts will occur (Figure 4). We cannot predict when a bear encounter will escalate to a conflict without knowing something about the past behavior of the



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Figure 4. Like the proverbial moth to flame, visitors’ fascination with bears occasionally brings the two unreasonably close together. Even when bears receive no food reward, seemingly benign close encounters habituate them to people. Bears unafraid of people, like the ones shown here at Geographic Harbor on the Katmai coast, are more likely to get into trouble.

bear around people, or about how people will behave around bears. We can, however, estimate the potential for bear-human encounters — understanding that the best way to avoid bear-human conflict is to avoid bears, by staying away from places they frequent.

Devising a Research Approach

We decided to first construct an accurate history of bear activity and conflict at Glacier Bay before attempting to devise research that would provide insight regarding bear-human conflict. Glacier Bay National Park staff have carefully documented instances of bear-human conflict (approximately 300 incidents between 1960-2002), bear sightings (>3700 sightings from 1932-2002), and backcountry campsite use (>8000 records from 1996-2000). Next, we created a computer database into which these records were entered

(Figure 5). This database of 'bear sightings and incidents' presents the distribution of sightings and incidents that have occurred in the bay and enables users to query for specific information through the use of key words. We also used geographic information system (GIS) software to perform spatial analyses of camper and bear use of the bay. This information, in turn, was used to create a temporal-spatial profile of bear and human activity and conflict in the backcountry.

To assess the potential for bear-human interaction at campsites, this research built upon the work of Herrero et al. (1986) and MacHutchon and Wellwood (2002). The assumption underlying these previous research efforts was that bears are not

randomly distributed across the terrain, but rather that the temporal-spatial pattern of bear whereabouts is largely a function of seasonal forage characteristics.

If this assumption is correct, an assessment of bear habitat quality at campsites should provide a relative index of the amount of seasonal bear activity at those sites. It follows then that if campers avoid areas seasonally important to bears, the number of bear-human encounters will decline. The chance of an encounter escalating to conflict is also affected by campsite characteristics that reduce the ability of bears and people to detect each other early enough to avoid conflicts and by terrain features that reduce options for bears and people to avoid each other. For example,

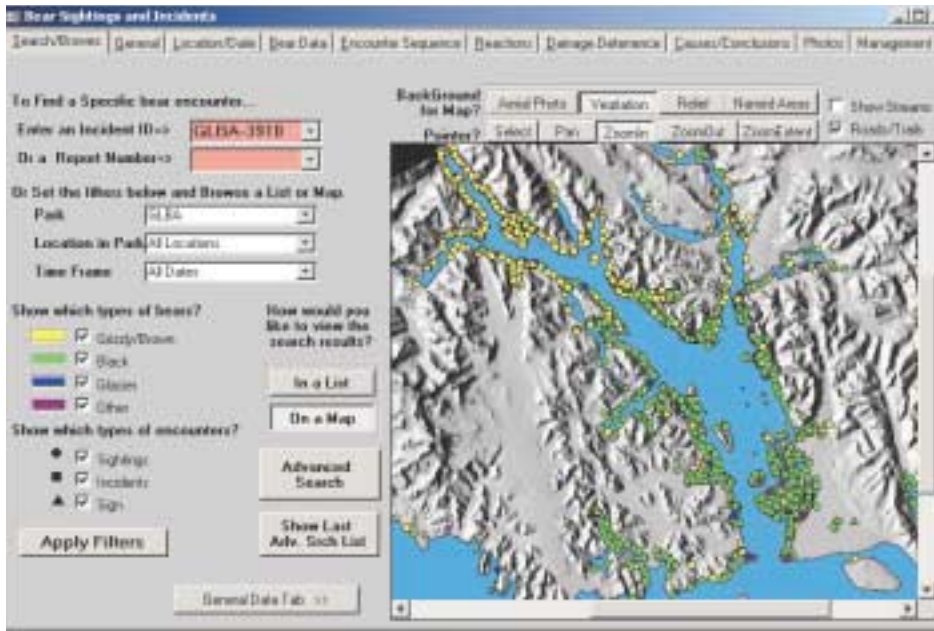


Figure 5. A computerized database contains Glacier Bay's bear sightings and incidents information.

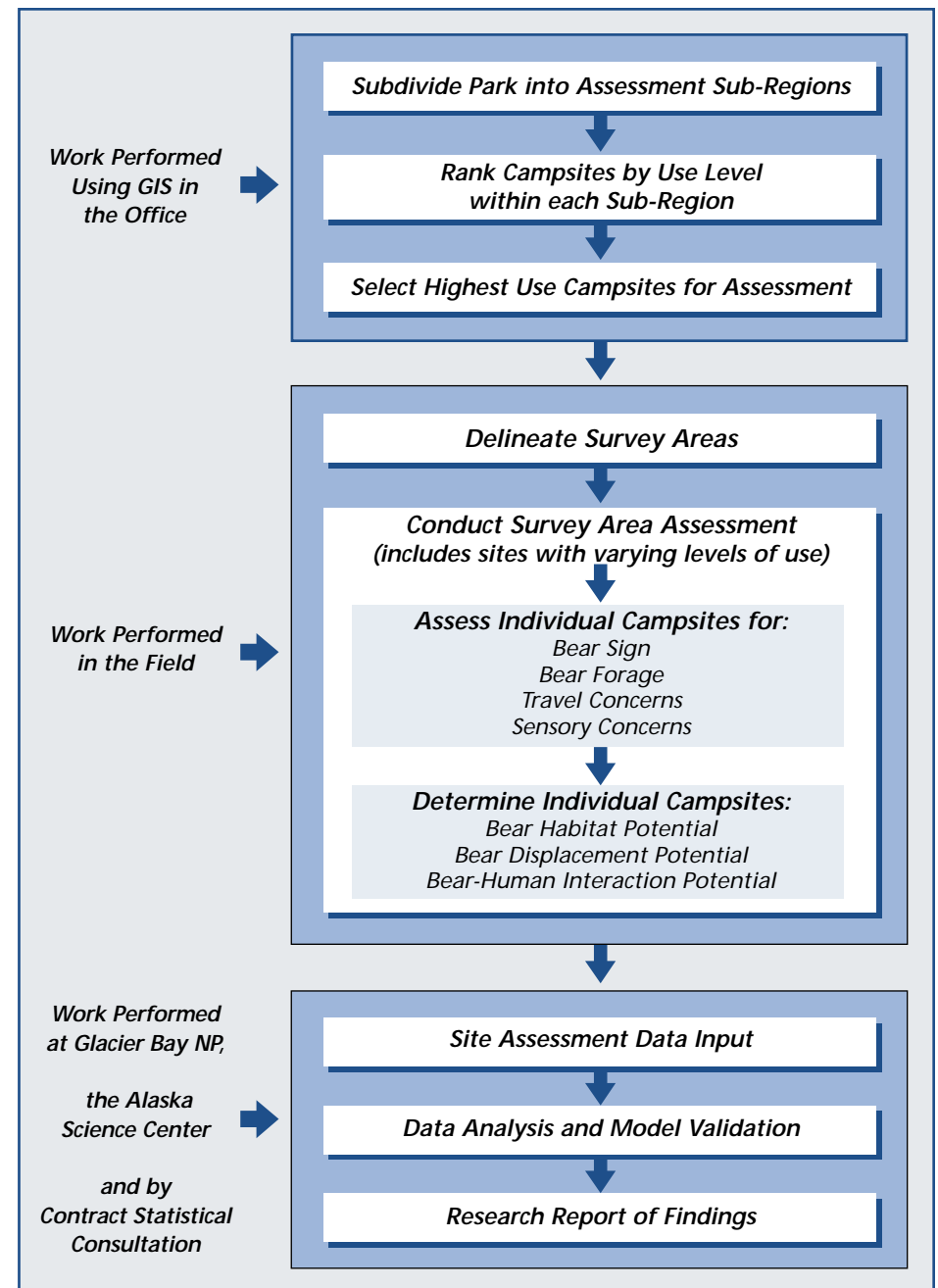


Figure 6. Steps in the campsite risk assessment process, Glacier Bay National Park, Alaska.



National Park Service photograph

Figure 7. Bear 'mark-trail' in Reid Inlet, Glacier Bay.

very brushy sites reduce visibility and increase the chance of surprise encounters. Also, steep cliffs may restrict bear movements such that bears are funneled into campsites, thus increasing the odds of bear-human encounters.

We incorporated this information into a research plan that enabled us to estimate bear habitat quality and bear encounter and conflict probabilities at the most frequently used campsites in the bay. Because Glacier Bay is comprised largely of steep-walled fjords, level areas that produce high quality bear forage are relatively rare and are important to bears. The presence of camping activity may displace bears from these areas; hence a rating of displacement potential was deemed an important aspect of this work. An overview of the steps in the campsite risk assessment process is presented in *Figure 6*.

Status of Research

During the summers of 2001-2002, we evaluated 162 campsites, traveling to campsites by kayak. We estimated bear habitat quality, bear displacement potential, and bear-human conflict potential at each site. Additionally, all bear sign (e.g., tracks, scats, digs, rubs, marked trees and trails) observed at each site was recorded and entered into the geographic information system (*Figure 7*). In the future, we will determine if the level of bear sign observed during our evaluations and the number of sightings in the historic database correspond. Subjective ratings for bear habitat quality will also be compared to the level of bear sign and sightings in the database.

*Many coastal habitats in Glacier Bay, particularly the upper reaches of the glacial fjords, appear to be marginal habitat for bears. Dominated by barren rock, sheer cliffs, alder scrub (*Alnus spp.*), and dryas (*Dryas spp.*), these areas offer inferior foraging opportunities and difficult travel conditions for bears. Nonetheless, bear sign was found in all of these places.*

Preliminary Research Findings

The Glacier Bay bear sightings and incidents database was completed in 2001. Campsite evaluations were completed in August 2002. Campsite data were analyzed during the winter of 2002-2003 and findings are to be released in 2003. Our analysis of 70 years of bear sightings and bear-human conflict from the database has revealed a number of interesting facts.

Bear Conflicts Database Findings

We found that in more than 98% of all reported encounters, bears did not injure people. Although black bear sightings (2100) outnumbered brown bear sightings (1300) nearly 2 to 1, both black and brown bears were almost equally involved in conflicts with people (56% vs. 44%). Eighty-five percent of bear conflicts occurred between 6 a.m. and 6 p.m., and human foods were a factor in conflict nearly half the time (42%). We also found that single campers were more often involved in bear conflicts than

camps with 2 or more people, and red pepper spray was successful in deterring bears in 5 of 8 instances reported. Our assessment of information supplied by those involved in bear conflicts suggests that people were responsible for precipitating conflicts twice as often as were the bears.

Preliminary Campsite Assessment Findings

Bears are ubiquitous at Glacier Bay. Backcountry users should realize that bears might appear anywhere at anytime, including islands. Indeed the saying, "Bears are where they find you," is particularly true at Glacier Bay. The West Arm of Glacier Bay has more abundant and diverse bear habitat than the East Arm. Consequently, more bear sign are present on West Arm beaches. The greater number of bear sightings and bear-human conflicts on the West Arm than on the East Arm support this finding. Many coastal habitats in Glacier Bay, particularly the upper reaches of the glacial fjords, appear to be marginal

habitat for bears. Dominated by barren rock, sheer cliffs, alder scrub (*Alnus spp.*), and dryas (*Dryas spp.*), these areas offer inferior foraging opportunities and difficult travel conditions for bears. Nonetheless, bear sign was found in all of these places. Bears using these areas likely travel constantly in search of food, suggesting that camper use of higher quality foraging areas here may have a pronounced negative effect on bears.

Implications

The Glacier Bay bear sightings and incidents database is a tool that can aid park managers in the management and analysis of bear information. Efforts are underway to implement a version of the database in the National Park Service's Regional Office in Anchorage. When completed, the database will enable park managers to track bear-human interactions at all Alaska National Park units. In addition to placing bear-human interactions that occur into a regionwide perspective, we anticipate that



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information from this system will help identify future research needs. Additional information may be accessed at: <http://www.absc.usgs.gov/research/brownbears/glacierbay/glba.htm>.

Acknowledgments

The authors gratefully acknowledge

the special efforts of Allison Banks, Nat Drumheller, Bill Eichenlaub, Nikki Koehler, Mary Beth Moss, Randy Ramey, and Rosemarie Salazar of Glacier Bay National Park and Preserve. We also thank Steve Herrero and Grant MacHutchon for valuable insight they provided regarding research design.

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