

VISITOR IMPACT ON BROWN BEARS, ADMIRALTY ISLAND, ALASKA

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Abstract: Human disturbance of brown bears (*Ursus arctos*) was studied in the Pack Creek area of Admiralty Island in Southeast Alaska during the summers of 1983 and 1984. The Pack Creek watershed has been closed to bear hunting since 1934, but use of the area by bear watchers and photographers is increasing. Instantaneous scan sampling and focal animal sampling techniques were used to observe bears and visitors at a control area with negligible human activity and at the popular Pack Creek area. Analysis of diel use of the 2 areas showed a crepuscular pattern for both the control and Pack Creek bears. Bears that are conditioned to human food or highly habituated to visitors tended to use the Pack Creek area during the midday periods of high visitor use more than other bears. Over 80% of the observations of Pack Creek bears were of female bears, suggesting that visitor use may differentially affect sexes. Bears that associated people with food showed levels of boldness that could lead to undesirable incidents.

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The effect of human population growth and activities on brown or grizzly bears is obvious from the drastic decline in their numbers and range. Although direct impacts such as uncontrolled hunting and habitat loss are often the problem, more subtle disturbances can also play a role. In parks and refuges where wildlife is afforded a high degree of protection, human activities such as camping, hiking, and photography can be stressful to bears. This stress may cause bears to make temporal or spatial adjustments in their activity patterns, become more aggressive, develop secretive habits, and develop physiological problems such as illness and reduced reproduction (McArthur 1979).

Frequent human contact also can cause bears to become habituated to people. Opinions differ on the effects of habituation. McCullough (1982) believes habituated bears may be more dangerous to people than nonhabituated bears because there is a greater likelihood of close encounters. In contrast, Jope (1985) suggests that aggression toward humans may diminish when bears become accustomed to their presence, suggesting that habituated bears pose less of a threat to humans. The most dangerous situation appears to be when habituated bears associate people with food sources such as improperly stored foods, garbage, and edible handouts (Herrero 1985:51). When dangerous situations develop, the lives of the bears involved are also threatened; this is especially true in areas where firearms are allowed (Follmann et al. 1980).

This study was designed to assess the impacts of people on brown bears in an area where hunting is prohibited and where activities such as bear viewing and photography are gaining in popularity. Funding was provided through the Alaska Coop. Wildl. Res. Unit by the Alaska Dep. of Fish and Game from a special appropriation of the Alaska State Legislature.

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STUDY AREA

Admiralty Island is a 4,075-km² island located at the northern end of the Alexander Archipelago in Southeast Alaska (Fig. 1). The island is topographically rugged; mountains rise abruptly from sea level to over 1,300 m. Climate is characterized by ocean-moderated temperatures and heavy rainfall. A dense canopy of conifers dominates the island at elevations below 850 m. These forests are bisected by numerous streams that are used by large numbers of anadromous salmon (*Oncorhynchus* spp.). Brown bears, the only large terrestrial carnivores on the island, are at their historical level of abundance. Schoen and Beier (1985) estimate a density of greater than 40 bears per 100 km².

Admiralty has been managed by the Tongass National Forest since 1909, and in 1980 it was designated a national monument. About 90% of the island is designated wilderness, which protects bears from major habitat alteration; however, hunting is allowed on most of the island.

The 54-km² watershed encompassing Pack Creek is 1 of 2 areas on Admiralty Island where brown bear hunting has been prohibited for over 50 years. The lower reaches of Pack Creek run through a 30-ha grassy intertidal meadow and a large delta tide flat at low tides. In this open area, people can easily view brown bears as they fish for chum (*O. keta*) and pink (*O. gorbuscha*) salmon during the annual spawning run from early July through early September. About 20-25 bears use the lower Pack Creek area at some

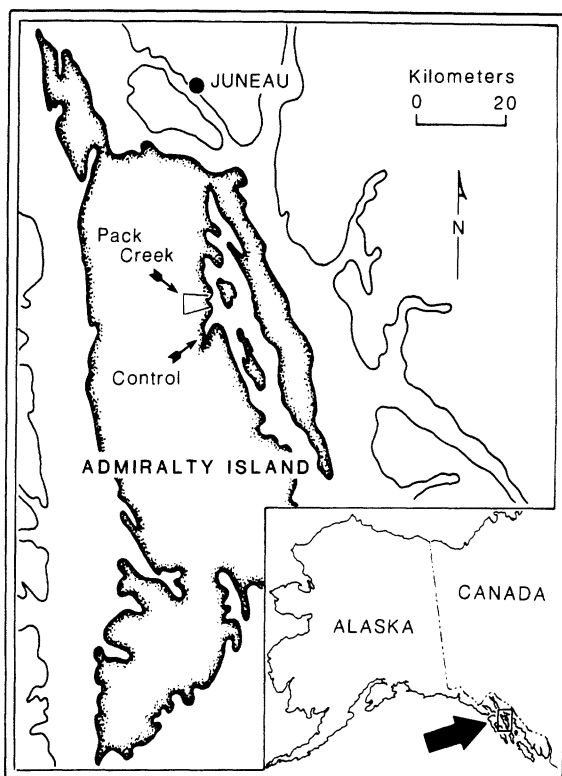


Fig. 1. Pack Creek and control area.

time during the summer. There is a single residence in this area; occupied by an octogenarian with a non-transferable lifetime lease.

Although Pack Creek is fairly remote and is accessible only by boat or float plane, more and more visitors are coming to view and photograph the resident bears (Post 1982). Numbers and most activities of people are not restricted at this time; however, camping is not permitted in the lower Pack Creek watershed.

The control area for this study is an intertidal meadow of a salmon stream about 9 km west of Pack Creek. It has similar attributes to the Pack Creek area, but it has negligible human activity. Although this area is now closed to bear hunting, it was not protected during the course of this study.

METHODS

Research took place during 2 periods: 27 June–26 August 1983 and 8 July–23 August 1984. Observers were on 5-m-high viewing platforms built in trees at the edges of the intertidal meadows of Pack Creek and the control area. These platforms were somewhat

concealed, minimizing the chance of disrupting visitor or bear behavior. We collected data with instantaneous scan sampling (Altmann 1974). Starting on the hour, we recorded the behavioral states of all bears and visitors in view at 5-min intervals for the 1st 45 min of each hour sampled. Also recorded were weather and tide data, bear types, distances between bears, and distances and interactions between bears and people. The observations made at the beginning of each 5-min interval constituted a single scan. There were 9 instantaneous scans for each hour. A bear observation was defined as 1 bear seen during 1 instantaneous scan. Thus, 1 bear could be represented by 9 bear observations in 1 hour if that bear were present for all the scans in that hour. Nine bear observations in 1 hour could also represent 9 different bears seen for 1 scan each during that hour. If more than 1 bear were present during any 1 hour, there could be an excess of 9 observations for that hour. A scan of a family group was considered 1 observation. Systematic sampling on a 24-hour schedule occurred in the Pack Creek area and the control area; however, the heaviest sampling took place in the Pack Creek area during daytime hours. A nightscope facilitated nighttime observations, but visibility was limited during the darkest hours of the night, especially during periods of cloud cover. Small sample sizes of data collected between 2400 and 0300 hours reflect this limitation.

Averaging the number of bear or visitor observations of each hour sampled demonstrated patterns of use for the 2 study areas. The sex of many of the bears was determined mainly by the presence of cubs during or before the study. The sex of 7 individuals was known because they had been captured and handled.

RESULTS AND DISCUSSION

Observers made 4,606 instantaneous scans at Pack Creek. During these scans there were 2,718 observations of bears or families of bears and 2,804 observations of visitors. The 1,654 scans made in the control area included 428 observations of bears and 38 observations of people.

Diel Patterns

Visitor use of the control area was minimal. One group of 6 people appeared in only 6 scans. In contrast, there was almost daily use of the Pack Creek area by visitors during the study periods. An average

of 6 people visited Pack Creek each day during July and August. The diel pattern of visitor use was unimodal, peaking between the hours of 1100 and 1700 (Fig. 2). Because camping is not allowed in the Pack Creek watershed, people left the area at night or stayed at the small private cabin located near the creek.

Bear use of the control area showed a bimodal, crepuscular pattern with a small early morning peak between 0200 and 0500 and a well-defined evening peak between 2100 and 2400 h (Fig. 3). It was relatively uncommon to see bears at this area during midday. We did not observe bears during the scans of the 2-hour period between 2400 and 0200, but we sampled these hours for only about 36 scans each. Pack Creek bears also showed a crepuscular pattern of use (Fig. 3). Morning use peaked between 0400 and 0600, and a more pronounced evening use increased from 1500 until it peaked at 2200 and then dropped off at midnight.

Roth (1983) has suggested that bears shift their activity cycles in response to human disturbance. Bear activity at Pack Creek contrasts sharply with the diurnal pattern of visitor use, suggesting that bears are avoiding people; however, Pack Creek bears show similar patterns to the control bears, where visitation is negligible. In fact, a noticeable difference between the 2 areas is the likelihood of seeing a bear during midday; bear use is several times greater in the Pack Creek area during this time in spite of the presence of people.

The relatively high use of Pack Creek during the day may be explained by habituation and food-conditioning. There appear to be 2 types of bears in that area distinguished by their behavior in the presence of people. There were 5 identified bears or families of bears at Pack Creek that showed minimal wariness of visitors and allowed people to approach within less than 10 m. In fact, some of these bears were frequently seen approaching people. Four of them were known to associate people with food because they had been fed by people, had obtained food from unattended backpacks, or both. On the other hand, some bears seemed to avoid people. One lone radio-collared female consistently used an area of Pack Creek a few hundred meters upstream from the unforested area where visitors spent most of their time. Another female, who had 3 young, was commonly seen late in the evening but never during the high visitor-use daytime hours.

I compared the diel patterns of the 5 bears who

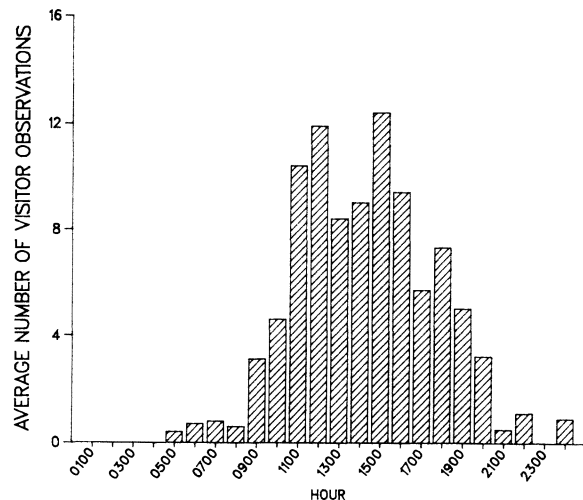


Fig. 2. Visitor use of the Pack Creek intertidal area during July and August of 1983 and 1984. Average number of observations are based on 9 instantaneous scans per hour.

appeared to be highly tolerant of visitor presence with the rest of the Pack Creek bears. The crepuscular pattern appears to level off when only the unwary individuals or families are considered (Fig. 4). If bears naturally have a crepuscular pattern of activity, these data suggest that the unwary bears are being drawn to people and their food. If, however, the crepuscular activity patterns are a result of hunting pressure, perhaps the bears who have learned not to fear people are returning to a diel pattern that is preferred in an undisturbed environment.

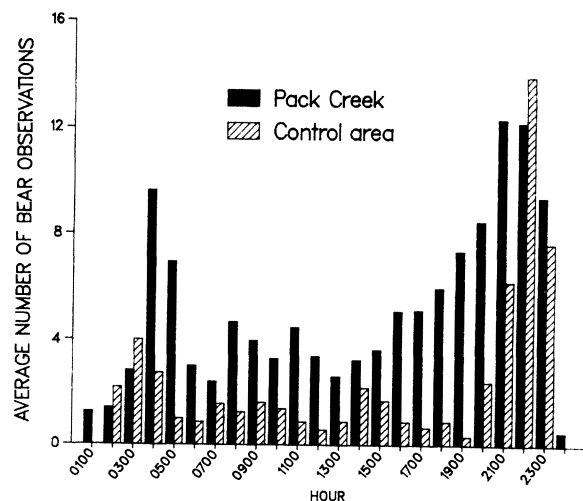


Fig. 3. Brown bear use of Pack Creek and control intertidal areas during July and August of 1983 and 1984. Average number of observations are based on 9 instantaneous scans per hour.

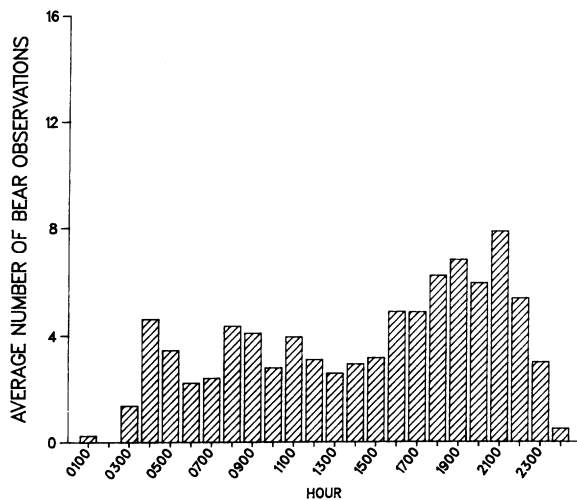


Fig. 4. Use of Pack Creek intertidal area during July and August of 1983 and 1984 by 5 bears considered to be highly tolerant of visitors. Average number of observations are based on 9 instantaneous scans per hour.

Sex Ratio

Although it was not always possible to determine the sex of the bears observed in this study, there appeared to be a much higher percentage of females using the Pack Creek study area than would be expected. Over 80% of the bear observations in that area were of bears known to be females and only 0.4% were of bears known to be males (Table 1). Most females were identified by the presence of cubs. It follows that there was a high percentage of family groups using the Pack Creek area. Over 45% of all observations were of females in a family group.

At the control area, we saw only 1 bear with young, and we observed her for only a few scans. Thus, the known females at the control area represented only 1.6% of all the observations. Known males accounted for 2.1% of the total observations. Although the other 96.3% of the bear observations in the area were of unknown sex, they were all lone bears. Because at any 1 time a certain percentage of females will be with cubs, it should be reasonable to assume that there were more males using the control area than females.

This disparity in sex ratios may be a result of human activity. Tracy (1977) observed a higher percentage of females and family groups along the heavily used road that runs through Denali National Park. She suggests that single bears are underrepresented because they may be more wary of people. Single bears, especially males, have larger home ranges than

do family groups; thus they may spend more time in the backcountry and have less opportunity to become accustomed to visitors. Wariness of people could also increase if a bear's home range included hunted areas beyond the park boundary.

The average home range size of female brown bears on Admiralty Island is 34 km²; for males it is 112 km² (Schoen and Beier 1985). The size of the Pack Creek watershed is 54 km², indicating it would be possible for a female to limit her movements to the boundaries of this nonhunted region. Unpublished home range data from this study support this assumption (Warner, unpubl. data). Thus, processes of habituation, conditioning, and learning through previous generations may allow females at Pack Creek to exhibit minimal levels of wariness to humans. The 5 bears in the area that showed the greatest tolerance of people were females.

Males, however, often leave their natal areas (Bunnell and Tait 1981), so a male cub raised at Pack Creek would probably leave the area once it was weaned. Thus, the process of learning not to fear people would be undesirable for young males because their survival depends in part on their ability to avoid humans. The home range of a male that includes Pack Creek will usually be large enough to make traveling beyond the borders of the protected area common. This proposed differential level of wariness may be the reason that few males are observed at the Pack Creek area where interactions with humans are almost unavoidable.

Food Association

Bears known to associate people with food had some intentional interactions with visitors. Some visitors reported that a bear had charged or acted aggressively toward them. The bear involved was a subadult female who, as a cub, had been fed by people.

Table 1. Sex ratios of brown bears observed at 2 salmon streams on Admiralty Island, Alaska, 1983–84.*

	Pack Creek	Control
Total observations	2,716	428
Females	2,190 (80.6%)	7 (1.6%)
Males	10 (0.4%)	9 (2.1%)
Unknown	518 (19.1%)	412 (96.3%)

* Young bears associated with their mothers are excluded.

This bear was frequently seen approaching people. She chased a group of visitors who ran from her, and she circled another group of visitors and pawed at the ground as these people remained stationary. Occasionally visitors rewarded this type of behavior by leaving food items behind as they backed away from her. Three other bears were seen approaching people in a seemingly unaggressive, curious manner. These bears had all been fed or had procured unattended human food.

People and brown bears have been able to coexist with minimal problems at the McNeil River State Game Sanctuary in Southwest Alaska. Visitor activity is strictly controlled, and bears are not exposed to human foods (L. Aumiller, pers. commun.). I believe that Pack Creek would be a safer place for bears and people if visitor behavior were controlled so that bears never had access to human food. Although no serious incidents have been reported, the potential for problems may be greatest with bears associating people with food. The aggression seen at Pack Creek is probably attributable to a bear searching for food. The nonaggressive approaches may have been made by bears searching for something to eat. Although I considered some of these approaches to be nonthreatening to the visitor, the person involved sometimes had a different point of view. Because firearms are allowed at the Pack Creek area, bears that associate people with food may be increasing their chances of getting killed or injured because of their bold or aggressive interactions with visitors.

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