

Backpackers and Backcountry Bears The Sierra Nevada Experience

By David M. Graber

Conflicts between black bears and wilderness users increased sharply beginning in the 1970s in the national parks of California's Sierra Nevada, and have continued unabated to the present time. These encounters, while rarely resulting in injury, often result in a loss of food and damage to important equipment many miles from a trailhead, and occasionally provoke visitors to shoot their ursine assailants. Some park visitors have expressed outrage at what they perceive to be a failure of the National Park Service in protecting them.

Continuing problems have generally been credited to a marked increase in the number of backpackers using the Sierra Nevada high country in the past 15 years, and a changing philosophy about bear management that has emphasized protection over manipulation of wildlife. Traditional practices that included harassment and killing bears as a means of controlling depredations seriously compromised natural ecological conditions; however, the ready availability of human food in habitats that were not previously used by black bears imposes its own measure of disturbance.

My research on black bear ecology and behavior began in 1974 in Yosemite NP and continued in Sequoia and Kings Canyon NPs from 1980 through 1984. During that same decade, the Resources Management divisions of both park units (Sequoia and Kings Canyon are administered jointly) collected substantial information about the nature and extent of conflicts between humans and bears and developed strategies to reduce those conflicts. This work has led to the evolution of "Human/Bear Management" programs with two principal objectives: (1) to restore and maintain the natural distribution, ecology, and behavior of black bears free of human influence; (2) to minimize the threat to human safety and property.

The Setting

Yosemite, Kings Canyon, and Sequoia NPs are located on the western slope of the Sierra Nevada. Elevations range from 1,500 m in the foothills to more than 4,400 m along the Sierra crest. Black bears originally occupied principally the oak and mixed conifer forests at mid-elevations. But the bulk of all 3 parks lies above 2,000 m in elevation, and the majority of backcountry use takes place in these subalpine and alpine zones.

Backcountry use increased dramatically during the 1960s and 1970s. For example, Yosemite recorded 78,000 visitor-nights in 1967 and 197,000 in 1975, declining slowly since that time. The pattern for Sequoia and Kings Canyon is similar, except that use has increased slightly in recent years. Circumstantial evidence suggests that over the same period, seasonal and permanent occupation of the "backpacking zones" by bears increased manifold.

During the study period, 1974-1984, managers experimented with control of bears, and with control of visitors and their foodstuffs as means of reducing human-bear incidents (property damage and personal injury). Bear controls included capture and relocation, aversive conditioning, and intentional destruction. Food control included visitor information, regulation of food storage and disposal, and the use

of several devices (cable, pole, locker, cannister) designed to physically prevent bear access to anthropogenic food and garbage.

Personal injury by black bears is relatively uncommon and rarely serious. From 1966 through 1976, the annual number of personal injuries for all of Yosemite NP ranged from 3 to 29 – an average of 13, or 1 injury per 292,000 visitors; only a few of these injuries took place in the backcountry. Human nature and the evidence at hand suggest that nearly all personal injuries caused by black bears are reported.

Property damage incidents are far more common, but less well documented. For all of Yosemite NP from 1966 through 1980, the number of recorded incidents rose steadily from 49 to 975 in 1975, then declined slowly for the next 5 years. Backcountry incident numbers for the Sierra Nevada national parks are unavailable prior to 1975, but old-timers claim they were far lower. Since then, reporting has varied in its manner of collection and hence its consistency, accuracy, and comparability. For 1976 through 1979, Jeffrey Keay and Brad Cella in Yosemite calculated that only 8-11% of actual backcountry bear incidents were reported. Thus the average annual number of recorded incidents for this period, 260, likely represent between 2,000 and more than 3,000 incidents. The average number of visitor-nights during that period was 167,480, thus there were 644 visitor-nights per reported incident. During 1980 through 1984, that ratio declined somewhat to 405; the real rate probably was one incident per 40 visitor-nights or worse. From 1982-1984 in Sequoia and Kings Canyon NPs, a period of relatively consistent reporting procedures, reported backcountry incidents ranged from 251 to 258. Average visitor-nights for that period were 189,042, or 747 visitor-nights per incident. Reported values for both backcountry visitor-nights and incidents are only uncertain indices of actual numbers. This uncertainty is a serious problem, because it compromises any evaluation of management actions.

Bear Management Options and Consequences

Relocation. – Removal of problem bears to other locations has long been a favorite management tool. In Yosemite, where many relocations took place from 1974-1978, we found this practice functioned like a high mortality rate, probably contributing – through compensation – to the high reproductive rate in the remaining bears and inducing social dislocation in both contributing and recipient populations. For the period 1980-1984 in Sequoia and Kings Canyon, only one relocated bear (of 44) fitted with a transmitter successfully established a new home range away from developed areas (and abandoned it in 1985).

Destruction. – From an ecological standpoint, killing problem bears induces dislocation in only one population instead of two, and it is less expensive than relocation. Identification of problem individuals, however, generally requires one capture to mark each candidate bear, an observation period, and then location and destruction of the identified problem



Warning sign, Yosemite NP

bear. Both relocation and destruction alter natural mortality patterns. However, since mortality rates for subadults, especially males, are already high, removal of these individuals from a population has less effect than removal of adults. In the three Sierran parks, managers have destroyed bears that injured people or seemed likely to do so in future. Neither relocation nor destruction, by themselves, correct the conditions that lead to bear incidents.

Aversive conditioning. – Attempts to condition black bears to avoid humans and their food in field conditions have been notably unsuccessful. Although food aversion might succeed in a single campground where only a few bears require conditioning and experimental conditions could be controlled, these techniques cannot be applied generally over vast wilderness areas. Resource managers in Sequoia and Kings Canyon NPs experimented on a few aggressive bears, using stones and rock-salt fired from shotguns as aversive conditioning. The treatments were difficult to apply safely and without offending visitors; the only response we could detect was that some treated bears became more wiley in their quest for campers' food. Denali NP in Alaska has experimented with rubber bullets to induce fear of humans in aggressive grizzly bears, while others have tested a variety of chemical repellents that could be applied by backpackers. These techniques are still experimental, labor intensive, and at best may be applied to a small number of individual bears.

Human Management Options

Visitor information. – Park visitors, even wilderness users, are poorly informed about the nature of black bears and the protective options available. A survey of backcountry campers in Yosemite found that although 95% had received at least a brochure about proper food control, and 92% reported their food was protected, only 3% were actually managing their food by recommended techniques. Many visitors don't know whether they are dealing with black or grizzly bears, or have a poor understanding of the differences. Although both park management units utilize extensive written and pictorial material to inform park

visitors, including special handouts to those applying for Wilderness Permits, communication of the relatively complex information has best been accomplished personally. This last option holds promise so long as funding levels can support it.

Behavior around bears. – There is increasing evidence that human timidity sometimes leads to increasing aggressiveness in both black and grizzly bears. In particular, readiness of people to give up their food to a bear without imposing some cost on the bear (such as yelling or throwing rocks) may encourage that individual to be bolder at the next encounter. As bold bears are more likely to provoke fear rather than combativeness in people, there is a positive feedback loop. After handling and observing black bears hundreds of times we never encountered a situation in which our aggressiveness provoked greater aggressiveness on the part of the bear; however there certainly are circumstances, especially at close quarters, in which visitors unfamiliar with bear behavior should opt for cautious retreat. Whereas the Sierra Nevada parks five years ago advised backcountry visitors never to contest with bears for ownership of food, rangers now are cautiously suggesting to more sophisticated backpackers that there are circumstances in which controlled aggressiveness is appropriate.

Hardware solutions. – The Sierran parks presently offer five different technological means of protecting food from bears:

1. **Counter-balance.** Tossing a food sack and line over a high limb and tying it off to the trunk or another tree to outsmart bears no longer works in the Sierra; if a bear is physically capable of reaching food or line, the food is not secure. Counterbalancing, a technique developed in Yosemite, requires the user to carry about 20 m of light, strong cord, and at least one stuff sack. Two sacks or a sack and weight are balanced over a small, live limb at least 3 m from the trunk, with the sacks at least 6 m above the ground. This technique is difficult to apply; it requires dexterity

and the proper kind of tree – unavailable at higher elevations. A small but possibly increasing number of bears are able to foil the system by breaking the limb or diving at the food sack from a branch above. (They are locally called "kamikaze bears.")

2. **Bear-proof cable.** This technique creates an artificial limb of aircraft cable suspended between two trees. Unlike the limb, it will not break, and if a portion of it is sufficiently clear of vegetation above, it is easier to counter-balance and less subject to a bear leaping from above. Cables installed in all three parks have been popular with wilderness users. Bear-proof cables must be installed by park management, and annually maintained to correct for stretching, rusting, and accumulation of tangled cord on the cable. These artificial intrusions in wilderness tend to aggregate campers in their vicinity and may actually draw bears to a site, increasing the risk for those who fail to protect their food.

3. **Bear-proof pole.** This device – developed in Grand Teton NP – looks like a tall metal hat rack with hooks at the top; it is anchored in rock or concrete. A second free pole is used to hoist food sacks to the hooks. The device is constructed so that it cannot be bent or climbed by bears, and food is too high for bears to reach. A small number are in experimental use in Kings Canyon and Yosemite NP wilderness. Poles are an obvious intrusion in wilderness, and tend to aggregate campers. However, Glacier NP is using the poles and is deliberately grouping people in backcountry campgrounds.

4. **Food locker.** These are heavy steel boxes that cannot be opened by bears. After experimental successes at White Wolf Campground in Yosemite (1977) and Lodgepole Campground in Sequoia (1982), the three Sierran parks are installing these lockers at most frontcountry campsites and some trailheads. Eleven food lockers installed in Little Yosemite Valley backcountry campsites were accompanied by a 61% drop in incidents there between 1979 and 1980. However, food lockers are expensive to purchase and install; they must be transported by

helicopter to backcountry and are a physical intrusion in wilderness. Either a great many would be required, or present dispersed camping would have to be replaced by designated sites.

All three fixtures – cable, pole, locker – by attracting campers to specific sites raise legal questions about government liability for visitor safety where they are provided. Imposition of traditional frontcountry safety standards in these areas would significantly compromise wilderness.

5. **Food canister.** This is a portable cylinder or rectangle of plastic (e.g. PVC, ABS, or Lexan), presently 20 cm diameter and 30 cm long, 15 cm x 20 cm x 30 cm long, weighing 1.2-1.5 kg. The top fits flush with the container; the latch requires a tool to open; the overall dimensions are such that a black bear cannot get purchase with its teeth. Originally developed in Yosemite by Bruce Hastings, Barrie Gilbert, Brad Cella, and Jeff Keay, versions have been field tested by staff and visitors in the three Sierran parks, and in Denali NP. The canister can be carried inside a backpack, strapped on, or carried on packstock. The canister is just about ready to mass-produce and distribute. This method appears most promising because of its portability and minimal impact on wilderness.

The minimal data available suggest an equilibrium may have been established between visitor density and black bear use at the high elevations of the Sierra Nevada where most incidents occur. A variety of tools for reducing the number of bear incidents exist, but most of these impose penalties on wilderness values. At present, high-quality visitor information and the bear-proof portable food canister offer the best potential for lowering conflicts, minimizing other wilderness effects, and permitting a wild and natural black bear population in the Sierra Nevada.

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Bear-proof food pole, Kings Canyon NP.



Bear-proof food canister, Sequoia NP.



Bear-proof food cable, Yosemite.