

BIOLOGICAL CONSIDERATIONS IN THE DELINEATION OF CRITICAL HABITAT

RICHARD R. KNIGHT, Interagency Grizzly Bear Study Team, P.O. Box 1376, Bozeman, Montana 59715

Abstract: Grizzly bears (*Ursus arctos*) require large areas to satisfy their needs for food, cover, and space. They thrive best where disturbance by man is minimal. It is not a coincidence that the two major grizzly bear populations in the lower 48 states exist in large wilderness systems closely associated with two large national parks and a relatively large game preserve. If management objectives for these areas do not change, and man-bear interactions can be kept low, viable grizzly bear populations can probably be maintained. Outside of parks and wilderness areas, the picture is less clear. Grizzly bears adapt to some habitat modifications. The extent of their adaptability to habitat modification or human interaction is largely unknown. Answers to many pertinent questions will be slow in coming. In the meantime, management policies based on common sense rather than on adversary reactions among agencies are the best insurance of the grizzlies' survival.

The necessity of declaring habitat critical to grizzly bears within the contiguous 48 states raises 2 major questions: (1) How many grizzly bears do we want? (2) What are the environmental requirements for a viable population of grizzly bears? This paper attempts to deal with the latter.

The term *critical habitat* refers to specific habitats or habitat components that, if destroyed or adversely modified, would pose a threat to the survival of the population. Critical habitat is most easily explained and understood in reference to species that are more highly specialized than the grizzly bear or about which we are better informed. Winter ranges for ungulates and breeding areas for waterfowl, for example, are relatively easily defined, but analogous areas for grizzly bears are not recognized at this time.

We do have information about the types of habitat where grizzly bears are now found in the lower 48 states. Sumner and Craighead (1973), Mealey (1975), Craighead (1976), and Jonkel (1976) have all given good descriptions of grizzly bear habitat in Montana and Wyoming. Erickson (1975, 1976) has evaluated areas of apparent low bear density in the Lolo National Forest that have potential for grizzly bear management. Although bears inhabit these areas, we still are uncertain of their relationships with habitat components. Complicating our understanding is the bears' adaptability, which may adequately compensate for the lack of a given component in any one portion of their range.

Distribution of grizzly bears in North America indicates that they are extremely versatile. This indication is reinforced by the wide range of habitats utilized by any one population. The combination of omnivorous food habits, a nongregarious social structure, and a high degree of mobility enables grizzlies to utilize most of the resources an area has to offer: Since these capabilities evolved over thousands of years, it is axiomatic that both the capabilities and the opportunities to exercise them are important to survival.

FOOD REQUIREMENTS

Since the grizzly bear is an omnivore, its food habits can be highly variable. Most popular opinions on bear food habits originate either from spectacular events, such as predation, or from items easily recognized in scats, such as berries and pine nuts.

Animal matter is the most nutritionally complete food for the bear. The grizzly is usually not an efficient predator and must depend on special circumstances to obtain meat. Common but unreliable sources exist in spring when ungulates may be present as "winter-kills" or "walking carrion," in spring and summer when there are high population densities of rodents, during fish-spawning runs in early summer, and during fall hunting seasons when offal and crippled ungulates are available. Domestic livestock are eaten as carrion; sheep are taken occasionally as prey but cattle rarely so. Insects are actively sought and taken when opportunity permits.

Berries and pine nuts are popularly recognized as important bear foods. However, they are seasonal, and each species is subject to severe fluctuations in production. Roots, bulbs, and corms of some herbaceous plants provide a major proportion of the diet and are probably more reliable food sources than meat or fruits. Taken altogether, the plants that we know bears use are common but not abundant.

Succulent grasses, sedges, and forbs are eaten throughout the year. Many species are eaten, but the relative importance of individual species varies with locality. As a group, these foods are the most abundant and possibly the most important staple of the bear's diet.

A cursory look at the omnivorous habits of the grizzly bear might indicate that food is not likely to be a critical problem. With the exception of herbaceous materials, however, the grizzly bear depends on sporadic food sources. Even succulent herbaceous materials may be scarce during dry years. Since the

grizzly bear does not use cured plant material, it must seek areas where succulent vegetation persists if other foods are not available. The bear has many options, but a variety of habitat types is essential to exercise these options during the course of a year.

COVER

All occupied grizzly bear habitat in the conterminous states is characterized by extensive timber cover as well as by open grasslands and meadows. Bear populations can thrive in open areas, as they do in the less settled portions of Alaska and Canada. Although the species apparently has no intrinsic need for extensive timber cover, populations living relatively close to settled areas may require the isolation. Whether required or not, bears spend most of their time in or near timbered areas. Although areas occupied by grizzly populations contain large openings, few bears are observed in them at any one time. Most day beds used by grizzly bears are found in timber stands, even at times when bears are commonly observed foraging in the open.

Denning sites may or may not be critical. Craighead and Craighead (1972) suggested that bears prefer isolated northern exposures, but supplementary data indicate that other exposures and less isolated areas are used. All known den sites are in areas that normally receive heavy snowfall.

SPATIAL REQUIREMENTS

Several biological characteristics of bears indicate vast spatial requirements. Home ranges of individual bears are large. Sumner and Craighead (1973) stated that mature males may have home ranges exceeding 2,590 km². Current studies show that even a female with cubs-of-the-year may have a home range exceeding 518 km². Size of the range is probably influenced by sex, age, and reproductive status of the animal as well as by availability and distribution of foods and cover. Interspersion and diversity of habitat types probably have important influence on home range size, as does prior experience of individual bears. The home ranges of individuals overlap. Bears are highly mobile, and movements of 48-80 km in a few days are not rare.

The grizzly bear, under most circumstances, is not gregarious. While there is no evidence of territorialism, the hierarchy of social dominance suggests a low probability for sustaining high densities or the formation of large social groups, except at times in areas of exceptionally high food availability.

The reproductive rate of the grizzly is low. Craighead et al. (1974) calculated a female reproductive rate

of 0.626 in Yellowstone National Park. Females may be 5 years of age or older before bringing forth their first young. At least 2 years and often 3 or more elapse between litters. Litter size may be from 1 to 4 but averages less than 2. It is unlikely that the reproductive rate appreciably exceeds 1.0.

Comparative isolation from human activity seems imperative, for it is generally agreed that bear-man confrontations pose a threat to the bear's survival equal to, or greater than, the threat created by probable habitat modifications.

The above factors — large home ranges, high mobility, nongregarious habits, low reproductive rates, and the need for isolation — all suggest large spatial needs for a viable grizzly population.

A further indication of space needs is the requirement of available alternative sources of food. Some major foods fluctuate between extremes of abundance. Bears must substitute for scarce items. A particularly favored site under periods of average or greater food supply may attract and serve several bears. During periods of food scarcity, bears probably take longer foraging treks that carry them beyond their "average" home ranges.

Most grizzly bear habitat in the conterminous states has been modified, either by physical alteration or intrusion by man. Since grizzly bears still survive in some areas, we assume that some human activities are tolerated. On the other hand, the drastic reduction in grizzly bear distribution in the 19th and 20th centuries indicates that many human activities are not compatible with bear survival and that man removed some grizzly bear populations. Delineation of critical habitat should include recognition of types and levels of human activities compatible with viable bear populations. In many cases, effects of activities are not known; and although they may not be completely restricted, they should be allowed with caution until their relationship to the bears is clarified.

Most types and levels of human activity presently occurring within occupied grizzly bear habitat are not known to be detrimental to the bear population if excessive man-caused mortality by shooting, trapping, or poisoning is excluded. However, any activity that superimposes more people and their property on grizzly bear range will increase the potential for human-bear interactions and may result in destruction of bears. This statement does not imply that man-caused bear mortality should be eliminated or that a policy to this effect is desirable. In fact, some man-caused mortality will probably be necessary to maintain grizzly bear popula-

tion levels within acceptable socioeconomic limits. Such mortality is acceptable as long as it does not exceed the desired growth rate of the population.

Grizzly bear habitat presently provides many diversified recreational uses that need not be excluded if restricted to acceptable levels. These uses include hiking, backpacking, camping, hunting, fishing, picnicking, horseback riding, and snowmobiling. All can be tolerated at some time, within certain levels. However, means must be available to regulate numbers of participants in some or all of these activities for periods of time when risks of man-bear encounters are high.

The major physical modifications affecting bear habitat at this time are logging, fire, geothermal development, mining, livestock grazing, urban intrusion, commercial recreational development, and water impoundment. With the exception of fire and grazing, these activities promote new roads, which in turn increase the opportunities for bear-man confrontation.

Roads associated with logging and small mining operations are easily restricted from public access, involve relatively few people while in use, and can be permanently closed when the activities have ceased. Roads associated with most other uses, particularly urban development and commercial recreational development, are characterized by larger traffic volumes inconsistent with public restrictions.

Fire and logging modify extensive areas of habitat but usually only temporarily. Both have the potential for improving bear habitat. Water impoundment may be extensive and is destructive of terrestrial habitats.

Other activities modify or destroy relatively little habitat but have long-term or permanent effects. Too, off-site impacts from ancillary developments may be greater than on-site effects. As with water impoundment, their greatest impact may result from high levels of human use. In most cases, the resulting levels of bear-man interaction could be detrimental to bear populations.

LITERATURE CITED

- CRAIGHEAD, F. C., JR., AND J. J. CRAIGHEAD. 1972. Grizzly bear prehibernation and denning activities as determined by radiotracking. *Wildl. Monogr.* 32. 35pp.
- CRAIGHEAD, J. J. 1976. Studying grizzly habitat by satellite. *Natl. Geog.* 150(1):148-158.
- _____, J. R. VARNEY, AND F. C. CRAIGHEAD, JR. 1974. A population analysis of the Yellowstone grizzly bears. *Montana For. and Conserv. Exp. Stn. Bull.* 40. 20pp.
- ERICKSON, A. W. 1975. Grizzly bear management in the Seeley Lake Ranger District. U.S. For. Serv. Contract No. 26-3157. 30pp. (Mimeogr.)
- _____. 1976. Grizzly bear management in the Thompson Falls area and adjacent environs. U.S. For. Serv. Contract No. 26-3405. 58pp. (Mimeogr.)
- JONKEL, C. 1976. Annual report — Border Grizzly Project. Univ. of Montana, School of For. 111pp. (Mimeogr.)
- MEALEY, S. P. 1975. The natural food habits of free ranging grizzly bears in Yellowstone National Park, 1973-1974. M.S. Thesis. Montana State Univ., Bozeman. 158pp.
- SUMNER, J., AND J. J. CRAIGHEAD. 1973. Grizzly bear habitat survey in the Scapegoat Wilderness, Montana. *Montana Coop. Wildl. Res. Unit, Missoula.* 49pp. (Mimeogr.)