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Criteria for Habitat-based Management of Grizzly Bears and their Recovery

My name is Barrie Gilbert. I am a research scientist specializing in animal behavior and wildlife management at Utah State University.

I appreciate the opportunity to provide information which will, I hope, be of direct value in the scientific process of developing habitat-based criteria for grizzly bear recovery in the Greater Yellowstone Ecosystem.

My presentation here is based on over 25 years of research on all 3 species of North American bears; for the last 13 years involving direct observational studies on interaction of Alaskan brown bears and people on salmon streams. Habitat issues for bears is of particular interest in my research and teaching. I have guided graduate students and consulted for federal and provincial agencies on grizzly bear responses to people, bear-human conflicts and needs of bear habitat.

Today I intend to emphasize broad conceptual issues as a guide to developing scientific measures of the components of habitat for grizzly bear recovery limiting my comments to the contributions of behavioral science to our understanding of bear habitat needs. Others here will present authoritative summaries of the linkages between viable population and the habitat base and how these can be operationally defined and quantitatively measured. I hope to present a conceptual framework as an introduction for a comprehensive view of habitat-based criteria for grizzly recovery and speak to the mechanisms linking individual grizzly bears to their biophysical environment. I chose this area because the process being planned for the USFWS needs an inclusive set of components that are simple enough to be measured or accurately estimated for a rather large land area, as opposed to a set of complex, untested models.

A MODERN, DYNAMIC VIEW OF HABITAT

The habitat of any organism, in the broadest sense of the term, is the set of conditions and interactions with its environment that are necessary and sufficient for survival and reproduction of the individuals in that habitat. In the past, wildlife biologists have used the term "habitat" narrowly as a place and often the food resources in that place, with some allusion to an ill-defined component called "cover".

The broad definitions of grizzly bear habitat incorporates at least three main components: 1) nutritional aspects, 2) shelter, and 3) security or habitat effectiveness.

The nutritional component involves the richness(quality) and abundance (quantity) of the food base in bear management units. Measurements of spatial and temporal availability are particularly important because the density of foods is significant for high rates of birth and recruitment to the population. Resource parameters need to include: abundance (biological productivity); availability (access to foods); patchiness (spatial dispersion); predictability (temporal constancy); renewal rate (depletion potential); substitutability (food options elsewhere); durability (ephemerality of foods).

The shelter component, while essential for winter hibernation, is generally not limiting for Yellowstone grizzly bears and as a component of cover, is overshadowed in importance habitat security.

Habitat effectiveness or security include interactions which have been identified as leading to excessive mortality of grizzly bears, predominantly at the hand of man. A bear management unit categorized as a high security unit for bears will be one with no attractants for bears or other close contacts with people that lead to human-caused mortality. For over twenty years there has been wide recognition among grizzly bear experts that mortality from humans is the major, overwhelming source of loss of bears. The nature of these interactions includes extensive roading of wild land, livestock in occupied bear habitat, outfitter camps, garbage, summer home development, etc. needs to be incorporated as threshold values in a system of habitat-based criteria for bears.

NUTRITION AND SECURITY INTERACTIONS

A number of scientific studies in the Canada and the US point to the importance of high abundance and concentration of rich foods in areas of high security for bears. Under these conditions grizzlies have low mortality from humans because their food seraching is remote from people. Rich food patches permit bears to reach their maximum rates of reproduction. This scenario obtains in parks when bears aggregate on white-bark pine seeds, for example, or in Alaska when brown bears concentrate seasonally on super abundant, easily caught salmon. Conversely, when the food base is sparse, or low quality and widely spaced, grizzly bears not only travel more widely, thereby exposing them to human activities and developments, but they also are more aggressive in their foraging near people and on crops and livestock. This is what we would expect of a food-limited omnivore and it is the cause of high mortality rates in Rocky Mountain grizzly populations.

We have an obligation in this effort not only to categorize the habitat units available for grizzly bear recovery but also to plan with all relevant stakeholders and agencies to improve the food base for grizzly bears while severely reducing the negative interactions between bears and people through education about sanitation, new bylaws, reducing road densities, etc.

NUTRITION AND BEAR DENSITIES

Recent analysis of the most rigorous population studies in Alaska (Miller et al., Wildlife Monographs 1997), shows that bear populations have extremely varied population densities. The densest bear population on record, in Katmai National Park, has access to almost unlimited food, primarily sockeye salmon. All of the bear populations that have salmon as a significant part of their diet are populations with densities10 to 20 times as high as those Alaskan bears wthout access to salmon streams. The implications of this for habitat management for recovering Rocky Mountain bears is clear. More bears, with higher natality rates and increased recruitment to recovering populations, can be obtained by improving the quality, quantity and security of access to foods. If improvement of the food density of grizzly habitat is not part of the recovery process then the politically difficult alternative of securing more land and restricting current activities on that land would appear to be necessary for maintaining a larger population and increased reproductive rates of populations.

Recommendations

A. A comprehensive definition of habitat is needed that includes all the components required for grizzly bear survival and reproduction (nutrition, security as measured by risk of disturbance and mortality, vulnerability to conflicts, etc.). Quantitative measures of habitat must go well beyond food resources to encompass all aspects of habitat suitability.

B. Classification of each of the land units on a week by week basis in objective and operationally measurable terms for:

1. *Energy abundance and availability:* food quantity , quality and accessibility.

2. *Habitat disturbance:* overall reduction in use of habitat to bears due to human activities, road densities, mortality risk to bears from attractants in the habitat unit. This is one component of current CEAs and habitat capability models as used by Alaska Department of Fish and Game and Banff National Park, Alberta.

3. *Landscape acceptability:* size of the secure habitat block in relation to the sensitivity of this particular population of bears to disturbance. Absolute size of the block and scale in relationship to the sensitivity of the local population are important variables.

4. *Security coefficients:* rating of the habitat unit that reflects the history of sport hunting, capture, poaching, disturbance, etc. on that unit. This is different from asecurity coefficient based on proximity of roads, road density, landfills, hunting camps etc. It is a habitat measure because it is a measure of the relationship of the bear to the habitat . This would be considered as a risk factor in behavioural ecology, a consequence of the combined effects of intrinsic awareness of risky habitats and a learningcomponent based on individual experience. This may be a ranked variable based on best available scientific information or professional judgment.

5. *Mortality component*: a measure of the history of bear loss for the management unit, e.g. population sinks.

6. *Seasonal availability*: habitat ratings on a temporal basis need to be made for discrete areas to account for changing abundance and accessibility. Habitat criteria should incorporate theoretical and empirical advances in the ecology of habitat patch choice and optimal foraging theory. Partitioning of bear use of habitat is affected by risks such as other bears, human disturbance, hunting seasons etc. Assessment of bear food resources should include the following parameters: abundance, accessibility, temporal predictability; patchiness (spatial dispersion), renewal rate, substitutability (alternative foods of equivalent value) and durability.

C. Seasonal closures of large areas of productive habitat are required to provide secure access for bears. Where regional densitities of human settlement increase, a policy of compensatory limitation of access needs to be institutionalized.

D. Wildlife management based on ecosystem nutrient cycles is required to maintain the productivity of public land for wildlife use. For example, all national park species including bison and elk should remain as nutrient sources for scavengers like bears within the park by every means possible.