

GRIZZLY BEAR RECOVERY IN THE NORTH CASCADES ECOSYSTEM

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Abstract: The North Cascades Ecosystem harbors a small number of grizzly bears (*Ursus arctos*). During 1987-1992 an evaluation was conducted to determine the feasibility of pursuing grizzly bear recovery in the North Cascades. In 1992 the Interagency Grizzly Bear Committee recommended to the U.S. Fish and Wildlife Service to pursue recovery and The Grizzly Bear Recovery Chapter for the North Cascades Ecosystem was completed in 1997. Actions that have taken place since the completion of a recovery chapter include completion of a public attitude survey, development of a sanitation policy, and an assessment of core areas throughout the ecosystem. The public attitude survey revealed a high level (64-74% of Washington Residents) of support for grizzly bear recovery. The core area assessment showed that the availability of core areas averaged 65% over 46 bear management units (BMU) (range = 21% to 95%) during the early season. During the mid- and late-seasons the amount of core area averaged 54%/BMU and ranged from 15% to 90%. Additional analyses will be conducted to evaluate the distribution of seasonal foods within core areas for each BMU. The recovery actions to date should provide valuable information should resources become available to complete the necessary environmental analyses needed to address the key recovery action identified in the recovery chapter, augmentation of grizzly bears in the ecosystem.

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The conservation of rare large carnivores in the western United States has received considerable attention in recent years (Noss et al. 1996, Weaver et al. 1996, U.S. Fish and Wildlife Service 2000). Much discussion has centered around the recovery of the grizzly bear and gray wolf (*Canis lupus*), and the conservation of lynx (*Lynx canadensis*) in the Rocky Mountains, where considerable lands are devoted to national parks, wilderness and national forests. However, large carnivores, such as grizzly bear, have also been documented in the North Cascade Mountains of Washington State and southern British Columbia (BC), Canada, where vast areas are included in wilderness, national parks and other public ownerships.

Large carnivores have been described as "umbrella" species because their space requirements are large and encompass the spatial habitat requirements of many other species (Noss et al. 1996, Gaines et al. 1999). Thus they may be considered an important species in an ecosystem and their status may be indicative of system integrity (Noss et al. 1996). Because of this, large carnivores are often identified as "focal" species for conservation (Noss et al. 1999). Historically, populations of large carnivores were reduced by extensive predator control efforts, unregulated hunting, and trapping. Limiting factors for the recovery of large carnivore populations include: adequate space; small, isolated populations; loss of habitat and disturbance associated with human developments; fragmentation of habitat by highways and other corridors of human activities; and mortality associated with legal and illegal killing (Mech et al. 1988, Knick and Kasworm 1989, Mace et al. 1996, Weaver et al. 1996).

Our objectives in writing this paper include:

raising awareness of grizzly bear recovery in the North Cascades Ecosystem (NCE); providing a review of the current status of grizzly bear in the NCE; summarizing the recovery efforts that have been made to date in the NCE; and identifying important areas of research that could aid grizzly bear conservation efforts.

THE NORTH CASCADES ECOSYSTEM

The NCE includes one of the largest contiguous blocks of Federal land remaining in the lower 48 United States. In the USA, the ecosystem encompasses about 24,800 km² in north-central Washington State and extends for an additional 10,350 km² into south-central British Columbia, Canada (Fig. 1). The USA portion of the NCE consists of about 85% federal lands, 5% state lands, and 10% private lands. About 41% of the USA portion of the NCE is within U.S. Forest Service (USFS) designated wilderness or the North Cascades National Park. Gaines et al. (1994) reported that about 68% of the USA portion of the NCE is composed of areas with no open road access. Of the 32% of the area that is roaded, 10% has a road density of 0.1-1.0 km/km²; 18% has a road density of 1-3 km/km²; and 4% has a road density >3 km/km². In Canada, protected areas (i.e., provincial parks, ecological reserves, and recreation areas) comprise about 16% of the NCE and about 40% of this is unroaded (Gyug 1998).

Elevations in the NCE range from about 150 m on the west side to 3300 m at the summit of Mount Baker. The Cascade Crest ranges in elevations from 2100 to 3300 m, and elevations extend to ca. 750 m on the eastern edge of the ecosystem. On the west side of the NCE, annual precipitation ranges from

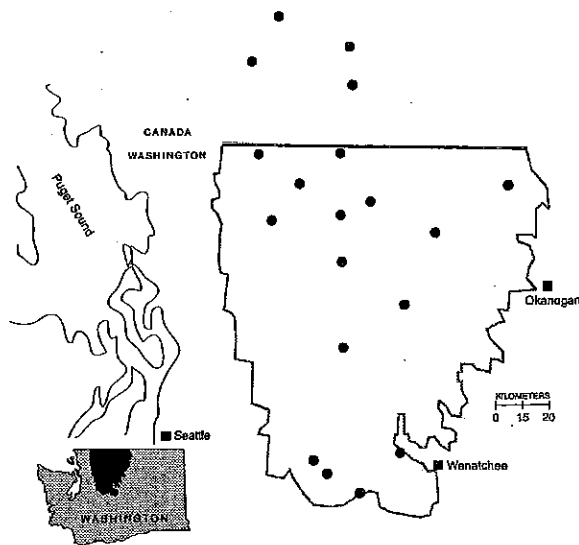


Figure 1. A map of the North Cascades Ecosystem showing the general location and distribution of Class 1 grizzly bear reports.

170-300 cm falling mostly as rain. In contrast, annual precipitation east of the Cascades Crest ranges from 25-50 cm falling mostly as snow. A range of elevations and moisture regimes create diverse vegetation patterns across the landscape. About 62% of the NCE consists of coniferous forests, 22% is composed of non-forested vegetation types such as alpine meadows or dry meadows on the eastern edge, and about 16% is composed of rock and ice. The most common coniferous forest types include areas dominated by subalpine fir (*Abies lasiocarpa*), Engelmann spruce (*Picea engelmannii*), and lodgepole pine (*Pinus contorta*) on the east side of the NCE, and Pacific fir (*A. amabilis*) and mountain hemlock (*Tsuga mertensiana*) on the west side (Gaines et al. 1994).

The NCE lies to the east of the heavily inhabited Puget Sound Trough, thus extensive human development occurs along the west slopes of the ecosystem. Large population centers located on the west side of the NCE greatly influence human use patterns. Much of the western NCE is heavily used by recreationists and was historically used for resource extraction industries such as logging and mining.

CONSERVATION STATUS OF THE GRIZZLY BEAR

The grizzly bear was listed as a threatened species in the US in 1975. The original recovery plan, completed in 1982, did not identify the NCE as a recovery area because of the lack of information available regarding the status of grizzly bears and their habitat in the region (USFWS 1982). Instead,

the NCE was identified as an evaluation area and in 1986 a study was initiated to gather information on the grizzly bear population, important habitat, and human influences on bear habitat. This investigation, completed in 1991, provided evidence that a small number of grizzly bears resided in the USA portion of the NCE, and that sufficient habitat was available for the recovery of a viable population (Almack et al. 1993, Gaines et al. 1994). These results and conclusions were then reviewed and supported by a panel of experts (Servheen et al. 1991). As a result of these findings, the NCE was designated a recovery area and a chapter specific to the NCE was developed for the overall grizzly bear recovery plan (USFWS 1997).

Historical records compiled by Bjorkland (1980), Sullivan (1983), and Almack et al. (1993) indicate that the grizzly bear once occurred throughout the NCE. Its decline was likely a result of intensive killing for the fur trade followed by rapid human encroachment into their habitat (Sullivan 1983, Almack et al. 1993). Sullivan (1983) compiled 233 reports of grizzly bear in the North Cascades and adjacent British Columbia from the mid 1800s through 1983. Almack et al. (1993) documented an additional 33 reports of grizzly bear from 1859-1982, and 153 reports from 1983 to 1991. Twenty of these reports were classified as Class 1 (confirmed) observations (Fig. 1). A Class 1 observation indicated a grizzly bear report that was confirmed by a biologist and/or by a photograph, carcass, track, hair, dig or food cache. Class 2 observations are those considered likely to be grizzly bears, but lack definitive confirmation. Class 1 observations in the NCE included 9 locations of grizzly bear tracks, 1 food cache, 6 visual observations, and a grizzly bear that was killed in 1967. Figure 2 shows the number of Class 1 and 2 observations that have been reported each year from 1990-1999. The decline in the number of reports beginning in 1992 is likely a result of a much-reduced effort in following up and verifying reports. The grizzly bear sighting data led Almack et al. (1993) to conclude that a small number of grizzly bears still resided in the USA portion of the NCE. In the BC portion of the NCE, sighting information and transplants of grizzly bears from other areas led biologists to estimate the number of grizzly bears to be 17 to 23 animals (Gyug 1998). These data suggest that the total number of grizzly bears within the NCE is likely <50 animals (Gaines et al. 2000). Shaffer (1978) and Shaffer and Sampson (1985) discussed the viability of small populations of grizzly bear. Populations of less than 50 individuals are generally in a decline and are of particular concern when isolated, which is likely the situation in the NCE. The nearest population of grizzly

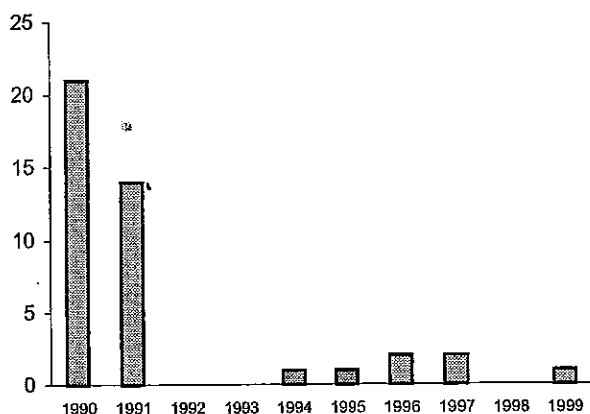


Figure 2. The number of Class 1 and 2 grizzly bear observations for the USA portion of the North Cascades Ecosystem from 1990-1999.

bear to the NCE is a low-density population located 20-30 km to the northwest in BC and is separated by a highway and associated human development along the Fraser River valley. This population is at a low density, has available habitat, and is therefore unlikely to emigrate into the NCE. In addition, the developed Fraser River Valley in BC may be a barrier to grizzly bears trying to disperse to the NCE. The second potential linkage occurs between the NCE and the Selkirk Recovery Area. The distance between these areas is about 170 km and the low density of grizzly bear in the Selkirks (USFWS 1993) makes successful dispersal unlikely. Because of the low potential of grizzly bears to disperse into the NCE from other populations, the few remaining grizzly bears in the NCE are likely isolated. Further information is needed, especially on the potential linkage across the Fraser River Valley to verify this. There are 4 "fractures" that could restrict the movement of grizzly bear within the NCE. These include highways 1 and 3 in BC and highways 2 and 20 in the USA (Fig. 3).

SUMMARY OF CONSERVATION EFFORTS IN THE NCE

The NCE chapter in the grizzly bear recovery plan outlines steps necessary to eventually recover the regional population (USFWS 1997). Some steps in the plan have been completed or are currently underway. These include development of a grizzly bear sighting report process and database, completion of a public attitude survey, adoption of a sanitation plan to minimize negative human-bear interactions in wilderness areas and national forest campgrounds, and an analysis of "core areas" (Puchlerz and Servheen 1994). Core areas are areas of relatively low human use and are 500 m or more from a high use trail, open road or concentrated human use area

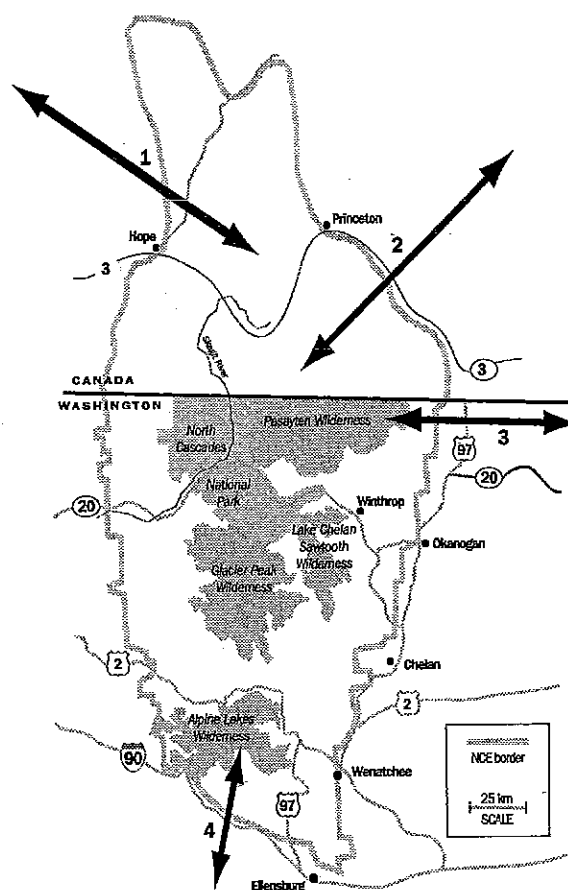


Figure 3. A regional map showing potential linkages and fracture zones (highways) within the North Cascades Ecosystem. (Linkage 1 is the potential for connectivity to grizzly bear populations north and west of the Fraser River. Linkage 2 is the potential for connectivity to grizzly bear populations to the north and east across the Okanogan Valley. Linkage 3 is the potential for connectivity to grizzly bear populations to the east in the Selkirk Mountains. Linkage 4 is the potential for connectivity to the south.)

(e.g., campground, town, etc.). Core areas provide bear habitat that has an inherent quality of isolation from human disturbance, providing solitude and safety for bears.

Public Opinion Survey

In 1996 a public attitude survey of USA-NCE residents was completed and showed a surprisingly high level of support for grizzly bear recovery in the NCE. For example, 64% of the respondents in the eastern NCE and 74% and on the west side supported or strongly supported grizzly bear recovery (Fig. 4) (Duda et al. 1996). In addition, 1,353 letters were received during the comment period on the draft recovery chapter for the NCE (USFWS 1997). A total of 845 comments addressed the issue of population augmentation, considered to be 1 of the

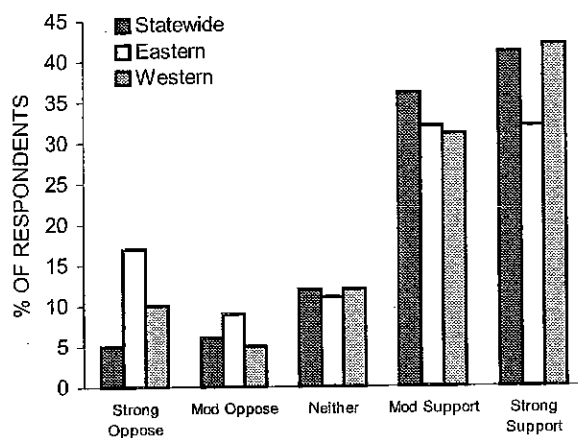


Figure 4. Results of the public opinion survey of Washington State residents about grizzly bear recovery in the North Cascades Ecosystem, 1996 (Based on Duda et al. 1996).

most controversial recovery actions. Of these comments, 526 (62%) were favorable to the idea of augmenting resident bears with grizzly bears from outside the NCE. These data suggest that grizzly bear recovery in the NCE may be acceptable to a majority of the residents.

Sanitation

The North Cascades Grizzly Bear Ecosystem Management Subcommittee (MSC) adopted recommendations to improve sanitation conditions within backcountry and front country camping sites in spring of 1997. These included: 1) resource management agency personnel will follow sanitation practices to reduce the availability of human foods to wildlife; 2) when existing dumpsters and garbage cans are replaced wildlife resistant structures will be used; 3) an information program about safe camping practices and available sanitation devices will be implemented for city and county planners, outfitters/guides, and agency employees who have regular visitor contacts; and 4) a loan program will be initiated within the NCE to make wildlife resistant panniers and backpacker canisters available to the public and outfitters/guides.

Core Area Analysis and Management

Core areas are important to grizzly bear, and many other wildlife species, for survival and population recovery (Mattson et al. 1987, McLellan and Shackleton 1988, Kasworm and Manley 1989, Puchlerz and Servheen 1994, Mace et al. 1996). An analysis of the availability and location of core areas within the NCE was initiated in 1997, following the process outlined by Puchlerz and Servheen (1994).

As an interim measure to protect core areas within the NCE, a "no net loss" strategy was applied to federally owned portions of the NCE. The strategy would remain in place until core area analyses are completed and new management recommendations are developed.

Results of core area analysis showed that the availability of core areas averaged 65% of a bear management unit (there are 46 bear management units in the NCE) and ranged from 21% to 95% during the early-season (den emergence to 31 May) (Fig. 5). During the mid and late-seasons (June 1 to den entrance) the average amount of core area/bear management unit was 54% and ranged from 15% to 90% (Fig. 5). The reduction in the amount of core area in the mid- and late-seasons is largely a result of trails becoming snow free and gaining high use status. A more detailed assessment of the habitat values within these core areas is in process and should be completed in late 2000.

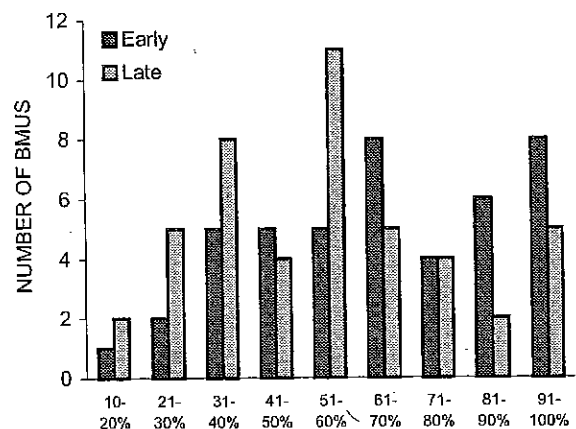


Figure 5. The availability of core areas within the 46 Bear Management Units located in the North Cascades Ecosystem, 1997.

Augmentation

One recovery action that was identified in the NCE recovery chapter was the option of augmenting the small number of resident grizzly bears with individuals from other areas (USFWS 1997). Given the small number of resident grizzly bears in the NCE and its apparent isolation from other grizzly bear populations, the only way to facilitate recovery and mitigate against extirpation is through an augmentation program. To implement an augmentation program it would first be necessary to conduct an environmental assessment that considers a range of options and assesses potential effects of grizzly bear recovery on a variety of social,

economic, and ecological issues. Limited resources and competing management priorities for grizzly bears in other recovery areas have prevented the initiation of the environmental assessment process in the NCE.

RESEARCH NEEDS

A grizzly bear research program is needed in the NCE to address important limiting factors. Major needs include an assessment of habitat and area requirements, viability of a small population, impacts of human disturbance and habitat loss, and potential mortality sources. A research agenda that includes 4 basic components is described below.

Biology and Distribution

Basic research is needed to determine the current distribution of grizzly bear in the NCE. Initially, surveys could be conducted to identify areas where bears are present in sufficient numbers to initiate more in-depth research, e.g. radiotelemetry. Further studies could address reproductive ecology, finer-scale habitat use and movement patterns, and genetic analysis of resident bears.

Habitat Assessment

Basic research is needed to determine the habitat relationships for grizzly bear in the NCE. The effects of human encroachment, especially along the major valley bottom habitats, recreational activities, forest roads, timber harvest, and prescribed fire, are of particular concern to managers.

Regional Assessment of Habitat Connectivity

Population isolation is a primary concern for grizzly bear in the NCE (USFWS 1997). Methods have been developed to assess habitat connectivity and could be applied to assess potential linkage zones in the NCE (Sandstrom 1990, Apps 1997). Areas to focus these assessments include the Fraser River Valley and the area between the NCE and the Selkirk recovery area (Fig. 3). An assessment of the effects of fracture zones within the NCE on grizzly bear movements and habitat use could be conducted. Specific areas to address include State Highways 2 and 20, and Canadian Highways 1 and 3 (Fig 3).

Population Monitoring

Population monitoring techniques are important to determine if conservation and management strategies are achieving desired objectives (USFWS 1997, Gaines et al. 1999). A variety of techniques, although typically expensive, have been developed to monitor populations. Research focused on the development of techniques that could be used to monitor grizzly bear in the NCE using DNA

technology may prove to be very useful and practical (Wasser et al. 1997, Mowat and Strobeck 2000).

SUMMARY

The NCE is 1 of the few large areas in the lower United States and adjacent Canada where contiguous federal lands and areas of relatively low human use (e.g., wilderness areas) are available in sufficient quantity to recover a viable population of grizzly bears (Servheen et al. 1991). Opportunities like this are extremely limited in much of North America (Noss et al. 1996, Noss et al. 1999, Gaines et al. 2000). We have provided a summary of the population status, conservation actions, and research needs for grizzly bear in the NCE in hopes of raising the awareness of scientists, managers, and the public. We hope this information highlights the tremendous opportunity to recover grizzly bear in this ecosystem while resident bears that evolved in this system still exist. However, without sufficient resources to develop and implement research and conservation strategies in a timely manner, this opportunity may be lost or become much more costly in the near future.

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