

Benn, Bryon. 1998. Grizzly bear mortality in the Central Rockies Ecosystem, Canada. Master's Degree Project, EVDS, University of Calgary, Calgary, Alberta.

## EXECUTIVE SUMMARY

The ecological integrity of the Central Rockies Ecosystem (CRE) is being compromised by resource extraction, cattle production, timber harvesting, transportation corridors, and outdoor recreation. Thus, the grizzly bear is suffering continuous habitat degradation, and potentially unsustainable mortality rates in some regions of the CRE. Grizzly bears, especially males, typically move through many jurisdictions with different management objectives. Outside of parks they are vulnerable to hunting, and habitat modification and loss associated with myriad land uses. Inside protected areas, bears are often either displaced from quality habitat by human activities, or may become habituated or food-conditioned, increasing their mortality risk.

The Eastern Slopes Grizzly Bear Project (ESGBP) was formed in response to a request for information about grizzly bear habitat use, human impacts on bear habitat use, and bear demographics. This project responds to a part of that need by analysing grizzly bear mortality throughout the CRE. I divided the CRE into three study areas, 1) the CRE portion of Alberta, 2) the CRE portion of the East Kootenays, B.C., and 3) Banff, Kootenay, and Yoho National Parks. As there were no recorded grizzly bear deaths in Kootenay National Park, analyses for the national park study area include only the contiguous Banff and Yoho National Parks.

Grizzly bear mortality and translocation databases and digital access data were provided by land management agencies from the CRE. Specific analyses conducted varied among the jurisdictions based on the major causes of grizzly bear death, and the quality of certain attributes of the data. The conclusions reached and recommendations offered are based on three assumptions, 1) the databases represent the minimum number of grizzly bear deaths and translocations, 2) the goal of management agencies is to maintain or enhance the present population size and distribution of grizzly bears in their respective jurisdictions, and 3) recreational hunting of grizzly bears is an acceptable use of the resource. For this research, mortalities are defined as dead bears and translocations of bears outside of their ecosystem of origin. The objectives and methodologies for this research were:

Objective 1. to prepare a synthesis of the historical and current mortality data and events that affected grizzly bear survival in the CRE.

Objective 2. to develop a centralized grizzly bear mortality database accessible to all agencies in the CRE.

Methods. I conducted a review of the scientific and grey literature, government documents, contract documents, and graduate theses to prepare a summary of events important to grizzly

bear survival (Appendix 1). I integrated information from these sources with mortality and translocation databases supplied to construct an historical mortality database (Appendix 2), and up to date mortality databases for the three CRE study areas (Appendices 3,4, & 5).

Objective 3. to summarize human-caused mortality and estimate total human-caused and harvest mortality rates. To analyse mortality rates spatially and temporally with respect to changing management policies.

Methods. Human-caused grizzly bear mortality was summarized by cause of death and the sex, age, and cohort of bears that died. I stratified mortality data by legal harvest and non sport mortality. The Alberta study area was subdivided into Kananaskis Country (no hunting) and north of the Bow R. (hunting permitted). As there is no hunting in the national parks, only non sport mortality was analysed. I generated total human-caused mortality rates based on population estimates from each jurisdiction. Similarly, harvest mortality rates were estimated for the provincial jurisdictions. Temporally, mortality rates were estimated and compared among periods defined by specific management policies in each jurisdiction. Some examples are changes from general hunting seasons to limited entry hunts, regional scale road closures, and improved garbage management strategies. The total number of mortalities is a conservative figure, as I used only the recorded deaths and translocations, and did not apply correction factors for estimating unreported mortality.

Objective 4. to generate a preliminary analysis of mortality risk posed to grizzly bears by human access into grizzly habitat.

Methods. I integrated accurate mortality locations and access data, and created zones of influence (ZOI) of 500m around roads and front country developments (open to the public and 2WD accessible), and 200m zones around trails and back country developments. In the East Kootenay region, ZOIs were of 1000m width due to less accurate mortality locations available. I performed elevational analyses on the Alberta and National Park data to describe the vertical distribution of mortalities.

Results. Human-related causes were the primary sources of grizzly bear mortality in the CRE study area (627 of 639 known mortalities). Grizzly bears spend much of the year at lower elevations in this region, and roads and trails usually follow valley bottoms, often negatively affecting bear use of riparian and montane habitats. Eighty-five percent of 462 human-caused grizzly bear deaths with known locations occurred in ZOIs along roads and trails and around settlements. Area-concentrated kills occurred around Banff townsite, the village of Lake Louise, along the Trans Canada Highway, and along roads and trails accessing many valley systems throughout the study area. Planning for, and managing appropriate development and levels of

access into grizzly bear habitat, such that encounters between humans and bears are minimized, is a critical issue with respect to managing grizzly bear mortality in the CRE.

In the national park study area from 1971-96, there were 118 recorded human-caused grizzly bear deaths (107 in BNP, 11 in YNP and 0 in KNP). Problem wildlife control (PW) accounted for 72% of these mortalities followed by highway and railway mortalities at 19%. The annual number of grizzly bear deaths (average 4.5/year) declined significantly into the 1980s. Total human-caused mortality rates were estimated at 8-10% for the 1971-83 period and less than 2% during 1984-96. However, the female portion of this mortality (80%) for the period 1984-96 was higher than reported in any grizzly bear population. One hundred percent of 95 human-caused mortalities with known accurate locations fell within 500m of roads and front country developments, and 200m of trails and back country facilities (ZOIs occupied 25% of the area of suitable habitat in the study area). Forty-six of these 95 mortalities occurred at park townsites and associated landfills (Lake Louise 26, Banff 17, Field 3), 19 took place at ski resorts and commercial lodges, and 16 occurred at public campgrounds. Of 72 mortalities with month of kill known 57% happened during the berry season. Of 48 dated PW mortalities, 75% fell in the peak tourist season and 42% occurred during the berry season.

In the Alberta study area from 1972-96, there were 190 recorded human-caused mortalities (average 7.6/year). Legally harvested (LH) grizzly bears accounted for 53% of these, followed by hunting related non sport kills (29%) and problem wildlife control (16%). The annual number of LH mortalities increased through the mid-1980s and declined with the implementation of limited entry hunting (LEH). Fifty-one percent of all non sport kills occurred during the berry season. The degree of hunting-related non sport mortality remained consistent throughout the 25-year period. Ninety-two percent of 48 illegal and self-defence kills fell during spring and fall hunting seasons. The annual number of PW mortalities increased significantly in the 1984-96 period. The Alberta government (AFWD 1990) has set current harvest and total human-caused mortality rates at 2% and 6% respectively, to prevent a population decline. The harvest mortality rate will be increased to 4% when the provincial grizzly bear population is estimated at 1000 animals. Estimated total human-caused mortality rates for south of the Bow R. were within acceptable parameters, whereas total human-caused and harvest mortality rates north of the Bow R. were above provincial mortality targets (these results held even after applying a 25% correction factor for unreported mortality). Eighty-nine percent of 172 human-caused mortalities with known accurate locations fell within ZOIs (55% of the area of suitable habitat in the study area). South of the Bow R., 92% of 32 mortalities occurred below 2000m, and 71% of 139 mortalities north of the Bow R. fell below 1700m.

In the East Kootenay study area from 1976-96, there were 319 recorded human-caused mortalities (average 15/year) of which 81% were the result of legal harvests. I believe that many non sport mortalities have gone unreported and/or unrecorded. The annual number of

mortalities (total human-caused and LH) increased throughout the 21-year analysis period, even following the implementation of LEH. This was the result of increasing hunting permit allocations to maximize the legal harvest within the provincial target harvest rate of 4%, and justified by an assumed increasing grizzly bear population. The mortality rates based on an upper population estimate of 616 were within acceptable parameters for this aspect of population sustainability (4% harvest and 6% total mortality rates), whereas rates calculated with a lower estimate (214) were above provincial mortality targets (these results held even after applying a 50% correction factor for unreported mortality). Seventy-one percent of 303 human-caused mortalities with reasonably accurate locations fell within 1000m of roads and trails (62% of the area of suitable habitat in the study area).

The results from these analyses, combined with the results of previously published research on grizzly bear ecology throughout North America, allowed me to reach the following general conclusions, and to make recommendations with respect to managing grizzly bear mortality, for each jurisdiction in the CRE. These recommendations are explained in more detail, in the chapter(s) of the specific jurisdiction(s), for which they were developed.

Conclusion 1: Human actions account for the greatest proportion of all grizzly bear deaths throughout all jurisdictions in the CRE. Thus, mortality management entails management of human activities in grizzly bear habitat.

Recommendations: 1) Interagency planning for effective land use at the regional scale should consider the needs of grizzly bears. This requires that 2) accurate, consistent, and complete reporting and recording of all known grizzly bear deaths and translocations be made, and 3) all jurisdictions develop the same conventions for recording mortality data. Agencies responsible for bear management should, 4) secure funds to employ a full time Bear Management Specialist and increase aversive conditioning programs, in particular to develop a Karelian Bear Dog program in Canada and 5) continue to improve educational programs regarding how to live and recreate safely in bear country. Some grizzlies have died during handling, and some have been translocated without marking or follow-up. 6) Study the effects of translocating problem grizzly bears, on both the relocated animals and the resident bears in the relocation site, to understand the effectiveness of translocations. 7) Use more on-site or within home range translocations in conjunction with appropriate aversive conditioning. 8) Area closures should be proactive and not just after an incident. They should be based on indicators such as habitat quality and known bear use of an area.

Conclusion 2: In jurisdictions where hunting is permitted, harvest and total mortality rates have been within acceptable parameters in some regions, and above mortality targets in others. This conclusion is contingent on the population estimates used. Self-defense, illegal, and mistaken identity kills by ungulate and black bear hunters account for a large percentage of grizzly bear deaths in some regions of the CRE.

Recommendations: 9) Continue to closely monitor harvest and total mortality, and adjust hunting permit allocations accordingly. 10) In jurisdictions where any hunting is permitted, create No Hunting Zones adjacent to parks and high human use areas, and along driveable roads to reduce the killing of habituated grizzlies by hunters and other people with guns who encounter these bears at close range. 11) All hunters going into grizzly bear habitat should be required to show a proficient understanding of bear identification, behavior, and safety.

Conclusion 3: Most PW mortalities occur where bears are attracted to human food and garbage, livestock and feed.

Recommendations: Effective legislation and enforcement should be enacted to ensure that 12) concessionaires in the parks and provinces secure all food attractants, 13) landfills are bear proofed with appropriate safeguards, preferably electric fencing, 14) all back country users (campers and hunters) secure food attractants including feed for stock and carcasses. 15) in the provinces, agency personnel should continue to assist landowners in reducing livestock-bear conflicts. 16) Continue to improve the predator compensation program. Fair compensation for loss for landowners exercising good husbandry techniques will instill tolerance for bears on their land.

Conclusion 4: Mortality rates presented are estimates, as they are based on population estimates with wide confidence limits.

Recommendations: 17) Continue to increase the level of commitment to developing and using appropriate population assessment techniques.

Conclusion 5: Spatial analyses clearly showed that most grizzlies died within a narrow zone along roads and trails, and around human settlements. Yet, roads and major developments continue to be constructed into the last unroaded areas.

Recommendations: 18) Collect more detailed access-related and location information with each grizzly bear mortality. 19) Access into grizzly habitat, particularly in areas with past concentrations of mortality, should be regulated through quotas and/or closures of roads. 20) Commit to no new roads into the remaining secure grizzly bear habitat, and require the decommissioning of industrial roads at project termination.

Conclusion 6: Temporal analyses of the mortality data, as conducted in this project, are snapshots in time.

Recommendations: 21) This type of analysis should be conducted at future times with improved population estimates, to assess changing management strategies, and events that affect grizzly bear survival.

Throughout the period of this study, and as part of the Eastern Slopes Grizzly Bear Project Team, I prepared analyses of grizzly bear mortality for presentations and/or documents to the

Central Rockies Ecosystem Interagency Liaison Group, the Eastern Slopes Grizzly Bear Project Steering Committee, the Banff-Bow Valley Task Force, the Rocky Mountain Grizzly Bear Planning Committee, and for the Kananaskis Country Recreational Review Process. The results of these efforts have been increased interagency communication with respect to grizzly bear mortality management. Two recommendations presented to the Banff-Bow Valley Task Force by the Eastern Slopes Grizzly Bear Project were written into the 1997 Banff National Park Management Plan. They were, 1) grizzly bear mortality should not exceed 1% of the park's estimated grizzly bear population annually, and 2) targets will be implemented to restore habitat effectiveness in key carnivore management units in the park, and thereby reduce mortality risk for grizzly bears.

Grizzly bears exist at low population densities because they have a low reproductive potential and require large home ranges. As a result the grizzly population is susceptible to rising mortality risk with increasing exposure to people. The Central Rockies Ecosystem will face increasing pressure from human activities as nearby urban populations grow. Thus, there will be an ongoing need to fund 1) scientific research on the effects of human access and presence in grizzly bear habitat, and 2) the integration of the above recommendations into regional planning and management policy.