

**GRIZZLY BEAR POPULATION AND HABITAT STATUS  
IN KANANASKIS COUNTRY, ALBERTA:**

**A Report to the Department of Environmental Protection,  
Natural Resources Service, Alberta**

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May, 1998

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## EXECUTIVE SUMMARY

Alberta's grizzly bear population has decreased from a pre-European time estimate of 6000 to a current estimate of about 800. Grizzly bears are nationally classified as vulnerable, and within Alberta as a species at risk (blue listed). Responding to concerns for the status and future of grizzly bears in Kananaskis Country, Banff National Park and surround, the Eastern Slopes Grizzly Bear Project began in 1994. Its primary mandate is to provide scientific data and understanding regarding the grizzly bear population and its habitat. Because this is one of the most developed and used places in North America where grizzly bears survive, particular emphasis is being placed on understanding the cumulative effects on grizzly bears of developments and people's activities throughout the region. The Project is funded and guided by a Steering Committee which has representatives from most of the major stakeholder groups active in the Project area. Stakeholders include representatives from the federal and provincial governments, businesses, university and environmental groups. Four years of research have been completed, supported by an average annual budget of \$350,000. Research has been carried out primarily as a series of Master's and Ph.D. research projects at the University of Calgary with cooperation from involved agencies, institutions and individuals.

This report and interpretation of the Project's research focuses on grizzly bears in Kananaskis Country and surround. It has been prepared by the Eastern Slopes Grizzly Bear Project team at the request of Alberta Environmental Protection, Natural Resources Service as part of their Kananaskis Country Recreation Policy Review. Our report on grizzly bear population and habitat status is based on preliminary interpretation of on-going research for which we will complete stage one in the year 2000. Many biological and behavioural characteristics of grizzly bears require long term study for acceptable levels of scientific understanding.

As part of our research we have trapped grizzly bears in the Bow River Watershed and have maintained radio-transmitters on approximately 25 grizzly bears a year. We regularly monitored these animals from air and ground to determine home ranges, movements, survivorship, habitat use and relationships with people's developments and activities. In parallel with radio-telemetry efforts we have classified habitat and its use by employing remote sensing, field analyses of landscape units, and mapping using Geographical Information System (GIS) technology. Some of our research presents the results of models developed by ourselves, and in the United States, to understand the effects of human activities and developments on grizzly bears. We have developed a habitat suitability model to represent the food value or quality (suitability) of a given area. Two models from the United States, the Cumulative Effects Model and Security Area Analysis, help us to understand human influences on habitat use and movements. The assumptions in these models are explicit and are based on interpretation of research results, however they only represent our best current understanding. The results of such modelling are an essential part of the science of trying to understand grizzly bear populations and habitat. They are not absolute representations of reality. They do summarize our current understanding and allow us and others to question, test and

improve assumptions. However, specific model assumptions such as the influence of different levels of human use on grizzly bear habitat use, and the extent of influence of human use as expressed by buffers (see pp. ix and **Error! Bookmark not defined.**) will continue to be refined.

### **The grizzly bear population**

(see *Introduction, Population overview* and *Grizzly bear mortality*, pp. 1-15; and Maps 2 and 3, pp. **Error! Bookmark not defined.** and **Error! Bookmark not defined.**)

The population and habitat status of grizzly bears in Kananaskis Country and the surrounding ecosystem can be viewed as an indicator of regional ecological integrity. This is because grizzly bears are a species with little resiliency. Because of large home ranges and movements, low population densities, low total population numbers, a very low reproductive rate and occasional direct conflict with people, grizzly bears are easy to remove or lose from any area.

Historically grizzly bears were distributed throughout what is today Kananaskis Country. Now they are apparently significantly reduced in density in eastern portions of Kananaskis Country, and somewhat reduced in density in western portions.

Today there are few grizzly bears in Kananaskis Country. Although the science behind current grizzly bear population estimates for Kananaskis Country is not exact, population estimates range from 50 to 38 for Kananaskis Country and adjacent portions of the Bow Crow Forest of south-western Alberta. These low numbers, coupled with some of the grizzlies' other biological traits, mean that grizzly bear mortality management is fundamental to population persistence. This is especially true for adult female grizzly bears which are the reproductive engine of the population.

Our study of grizzly bear mortalities and removals (here after referred to as mortalities) in Kananaskis Country revealed that the grizzly bear hunting closure instituted in 1970 appears to have been successful at bringing mortality levels within scientifically accepted limits. Human-induced mortalities have not been eliminated, though they have been significantly reduced. We estimate a human-induced, known mortality rate for the period 1972-1997 of 2.9% (32 known mortalities; 1.2/year). Females contributed only 0.9% to this overall rate. Even if these estimates are off by 100%, which is unlikely, the total human-caused mortality rate is still below 6.5%, the scientifically accepted rate below which such mortality is not considered a cause of population decline. However, current mortality rates may continue to increase, even without more recreational use or development, as older adult females, who have had many years to adjust to changing land uses, are replaced by young females who have to develop home ranges without long term knowledge of resources or human influences on the landscape.

Also, the Kananaskis mortality rate must be considered in the regional context where grizzly bear hunting still occurs. Other mortality sources are in some places not as conservatively managed as in Kananaskis Country. Both in Kananaskis Country and

regionally, human developments and activities both stress grizzly bears and increase mortality probabilities. Mortality probabilities through interaction with people will probably increase as Calgary and surround continue to grow and place more recreational and other resource demands on Kananaskis Country.

Human-induced grizzly bear mortality is still the primary management concern for grizzly bear persistence. Our study of mortalities showed that the majority (53%; 17/32) were related to ungulate hunting. The majority of these were classified as being illegal kills (8) or self-defence (6). Only one was the result of legal hunting. Two were killed by Treaty Indians. Problem wildlife related grizzly bear mortalities are becoming increasingly important. During 1981-1997, 44% (11/25), of all mortalities were of this type. Problem wildlife situations involving grizzly bears result from a juxtaposition of important grizzly bear resources, such as berries or early season grasses, with zones of human activities such as roadsides or golf courses. They also result from breakdowns in Kananaskis Country's generally excellent management of people's foods and garbage which may become dangerous attractants for grizzly bears. Most grizzly bears died in areas where human access was good. Ninety-six percent (24/25) of all mortalities where location could be determined were within 500 m of a road or 200 m of a trail. This demonstrates the strong relationship between access and grizzly bear mortalities.

While current mortality levels appear to be acceptable for population persistence, data regarding births and recruitment into the adult population, the other essential dimension of a viable population, suggest concern because of very low cub production. The only reported, scientifically vetted estimate of the average number of young produced by Kananaskis Country adult female grizzly bears per year is 0.46 (Wielgus and Bunnell 1994). This is one of the lowest reproductive rates reported in North America. Wielgus and Bunnell (1994) believe this low rate may be the complex consequence of high adult male mortality in the broader region, with this leading to a preponderance of young adult males that potentially and actually kill cubs, and because of this displace adult females from high quality habitats which they need to produce larger litters.

Currently we do not know whether the Kananaskis Country and regional population is increasing or decreasing. One of the major research objectives of the Eastern Slopes Grizzly Bear Research Project is to determine this. Unfortunately scientifically acceptable estimates of growth rate require 5-10 years of reproductive and mortality data. We will provide an estimate as soon as data are sufficient.

## **Grizzly bear habitat, movements and security**

### Habitat and movement areas

Relatively low grizzly bear population number, density and reproduction relate fundamentally to habitat productivity, especially of energy rich foods such as berries and ungulates. Our major efforts regarding grizzly bear habitat classification and mapping showed a patchy distribution of highly suitable habitat and associated food resources. This is the biophysical reason for the large home range sizes we have found for grizzly

bears in the region (300 sq. km. for females, 1500 sq. km. for males). Grizzly bears must be able to move widely and safely throughout their home ranges to access seasonally available resources. This is why developments and human activities must be carefully managed if grizzly bears are to be maintained. This is particularly important along important movement areas which give certain grizzly bears access to different watersheds isolated by mountain ranges. Examples of these are given (see *Wildlife movement areas of Kananaskis Country*, p.**Error! Bookmark not defined.**). Some particularly important ones, from north to south, appear to be: Skogan Pass, Goat Creek, the south end of Spray Lakes, Burstall Pass, Little Elbow/Evans Thomas Pass, North Kananaskis Pass, Elbow Pass, Elk Pass, Highwood Pass, Weary Creek Gap, Fording River Pass, and a series of drainages from south Kananaskis Country into the Oldman and Livingstone River Valleys.

Suitable habitat (habitat quality)

(see pp. **Error! Bookmark not defined.**-**Error! Bookmark not defined.**, and Maps 5 and 6, pp. **Error! Bookmark not defined.** and **Error! Bookmark not defined.**, for principal findings)

For analysis purposes we divided the grizzly bear foraging season into two ecologically defined periods. The first being before berries are ripe, and the second when berries are ripe and afterward. Generally, habitat suitability varies spatially and seasonally based on the occurrence of key plant and animal foods on the landscape.

During the pre-berry season concentrations of highly suitable habitat were found in the areas immediately south and north of Spray Lake, the Elk Pass area, the Smith-Dorrien River Valley, and on private lands between Bull Creek and the Highwood River east of Highway 541. During the pre-berry season, highly suitable habitat tends to cluster along most major river systems including the Kananaskis, Highwood and Bow River valleys. This was especially true for areas in the north-western Main Range portion of Kananaskis Country where there is a lot of rock and ice and only patches of grizzly bear habitat. Areas of high habitat suitability during the pre-berry season tended to be more extensive and evenly distributed in the Front Ranges. This was related to large amounts of south to west facing Aspen, Lodgepole Pine forests, low elevation grasslands, and riparian forests. This was consistent with grizzly bear telemetry research findings that show spring and early summer movements of especially male bears to front range habitats.

Patches of highly suitable habitat were more localized during the berry-and-after season. Notable areas of concentration of highly suitable berry-and-after season habitat included: the Odium and Loomis Creek valleys and the southwest-facing slopes of the Highwood Range; the headwaters of Etherington Creek, Baril Creek, and the valley sides of Cummins and Lost Creek; the Smuts Valley off of the Smith-Dorrien Creek; the Cox Hill - Jumpingpound Creek area; the upper extent of Threepoint Creek, and the Moose Mountain Creek - Jumpingpound Mountain area. Highly suitable berry-and-after season habitats are generally limited in eastern portions of the Front Ranges in Kananaskis Country.

Habitat effectiveness

(see pp. **Error! Bookmark not defined.**-**Error! Bookmark not defined.**, and Table 5, p. **Error! Bookmark not defined.**, for principal findings)

To estimate the extent to which peoples' developments and activities influenced grizzly bear use of habitat we applied two models developed in the United States and widely accepted as first approximations of human influence on habitat use, alienation and security. These were the habitat effectiveness model and security area analysis.

Habitat effectiveness values estimate the percentage of habitat that is available after subtracting habitat alienated as a result of human influences. Units of analysis approximate the size and character of a female grizzly bear's home range and are called Bear Management Units (BMUs). For 13 BMUs in Kananaskis Country, habitat effectiveness values ranged from 49% to 82% and averaged 71%. In Banff National Park prior work showed an average habitat effectiveness value of 83%. The lowest habitat effectiveness values (below 70%) in Kananaskis Country were found in BMUs in the western Main Ranges. Generally these were areas where roading and recreational development and activities were greatest. BMUs associated with the inter-mountain ranges further east generally had few primary or secondary roads and had highly effective habitat.

Research in the United States suggests that habitat effectiveness values of less than 70-80% could exceed the grizzlies' threshold of acceptance of disturbance and lead to abandonment of the area for other than occasional foraging. Low habitat effectiveness values also increase mortality probabilities for grizzly bears. Five of thirteen BMUs in Kananaskis Country had habitat effectiveness values of less than 70% suggesting considerable stress on grizzly bears using these areas.

Habitat and security

(see pp. **Error! Bookmark not defined.**-**Error! Bookmark not defined.**, and Maps 8-11, pp. **Error! Bookmark not defined.**-**Error! Bookmark not defined.**, for principal findings)

The other technique we used to understand the relationship between people's developments and activities and grizzly bear habitat was security area analysis. Through this technique, which we applied to female grizzly bear home ranges found in Kananaskis Country and the greater region (Central Canadian Rockies Ecosystem), we identified the percentage of each of 20 adult female grizzly bears' home ranges that was free enough from development to offer a low probability of disturbance during daily foraging activities. This "secure" habitat is fundamental to fostering behavioural avoidance of people. It helps to discourage habituation and food-conditioning which may lead to grizzly bears being removed as problem wildlife.

Security area analysis showed that of four jurisdictions studied, Kananaskis Country had the largest percentage (38%) of its landscape classified as being within the zone of high

human influence. An additional 24% of Kananaskis Country was classified as unsuitable habitat because it was non-productive rock or ice. This left only 38% of Kananaskis Country's land in secure status. Throughout the region of our analysis which included Banff, Yoho and Kootenay National Parks, and adjacent Alberta and British Columbia crown lands, the three most affected female home ranges were all exclusively within Kananaskis Country. All female home ranges in Kananaskis Country fell below regional average habitat security values of 44%. This helps to explain the growing problem with habituated grizzly bears and with grizzly bear mortalities classified as problem wildlife. Grizzly bears are finding fewer and fewer opportunities to meet their daily or yearly needs without association with people. In the United States target values for habitat security are tentative, but range from 57% - 67%, well beyond the Kananaskis Country value of 38%. Projection of proposed development and use trends into the future showed grizzly bear habitat being fractionated into ever smaller non-disturbed units thus further stressing individuals and the population.

Assessment of both habitat effectiveness and security area analysis suggest significant to severe stress on grizzly bears in Kananaskis Country. Our results suggest this contributes significantly to mortalities. It may also contribute to low cub production.

## **Recommendations**

### 1. Regarding grizzly bear mortality and reproduction:

Because effective management of human-caused grizzly bear mortality, especially for females, is fundamental to population persistence there is a need for explicit, sex specific, mortality targets and regular monitoring and analysis of mortalities in this regard. There is also a need for management actions that will continue to decrease mortality probabilities. Such actions should include:

- a. *To help decrease problem wildlife removal of grizzly bears*, continue the emphasis on decreasing the availability of human-related attractants such as peoples' food and garbage. This could be achieved by enacting regulations that would require all campers (hikers, equestrian, and hunters) to store food, garbage, and horse feed in bear proof metal or seamless PVC containers, or to effectively elevate such attractants between two trees.
- b. *To address the increased mortality risk for grizzly bears that have little habitat security and must live near people in high use areas (such as the Ribbon Creek-Evans-Thomas Creek area) and hence become habituated (used to being near people)*, better management of people with guns is needed. This could be achieved by: 1) implementing roadside wildlife sanctuaries, such as already exist in the Highwood Pass area, along all driveable roads in Kananaskis Country, 2) providing funding to continue and expand comprehensive and intensive management of grizzly bears including aversive conditioning of roadside grizzly bears and bears entering areas of concentrated human activities.

- c. *To address the increased mortality risk to grizzly bears associated with corridors of human access (95% of all human-caused grizzly bear mortality occurred nearby roads or trails) careful review and management of human access is needed.*
- d. *To further protect adult female grizzly bears and their families, continue to implement closures when grizzly bear family groups are using important feeding sites that have transient human use, or when a female displays defensive or protective aggressive behaviour.*
- e. *To further decrease chances of grizzly bear mortality and human injury, continue and expand efforts at informing the public about bear activity in Kananaskis Country. Also, continue the educational programs suggesting how to behave in grizzly bear country. Some programs should be developed specifically for groups most likely to cause avoidable grizzly bear mortality (e.g., ungulate hunters, backcountry campsite users, mountain bikers). A unique opportunity to inform ungulate hunters regarding grizzly bear behaviour and ecology exists for those chosen in limited entry draws which take place each year for Kananaskis Country.*
- f. *To scientifically determine whether the Kananaskis Country and regional grizzly bear population is increasing or decreasing, continue to financially support at least this aspect of the Eastern Slopes Grizzly Bear Project. This will require long term data not only on mortality but also on reproduction.*

2. Regarding grizzly bear habitat, security areas, and movements:

Suitable habitat has a restricted and patchy distribution, and both habitat effectiveness and habitat security were found to be significantly compromised, thus increasing mortality probabilities. For these reasons, policy changes and enabling planning and management actions are needed to restore and maintain productive habitat less compromised by people's developments and activities. We recommend the following:

- a. Particular attention should be given to preventing further loss of habitat effectiveness and security especially in high quality habitats where highly suitable seasonal grizzly bear habitat exists. Such areas have been tentatively identified in our research and in previous research by McCrory and Herrero (1983a,b) and by McCrory et al. (1982). Examples of such sites would be all valley bottom locations in the main ranges, but especially the southern end of Spray Lake and the Evans Thomas Creek fan. Each development proposal should be carefully weighed in terms habitat suitability, effectiveness loss and loss of habitat security.
- b. Human impacts on movement areas (see p. **Error! Bookmark not defined.**) that grizzly bears use should be managed at levels that will encourage movement by grizzly bears, taking into account the results of our habitat security analysis.

- c. Steps should be considered to increase habitat suitability (quality) for grizzly bears, especially for energy rich foods such as berries and ungulates. The use of fire, creation of selective clearings, and even certain designs of timber harvesting can potentially enhance grizzly bear habitat. Fire suppression policies have probably significantly decreased habitat productivity for ungulates and grizzly bears. Habitat enhancement measures must begin by creating suitable habitat. In addition, human access to this habitat must be managed to encourage grizzly bear use, as habitat effectiveness and security are also important.

3. Regarding scientific research on grizzly bears and the relationship of such knowledge to regional land use policy formation, planning, and management:

Because certain aspects of grizzly bear biology make their populations susceptible to decline, and because human activities and developments continue to expand in Kananaskis Country and impact grizzly bear population and habitat, there will be a continuing need to financially support research that provides defensible, scientific information on grizzly bear population and habitat status. Since some of this knowledge is best portrayed in models such as the habitat effectiveness model and Security Area Analysis, model assumptions such as thresholds related to human use levels and the zone of influence of human use need further research to gain greater precision. Also, research linking habitat suitability (quality), effectiveness, and security with population viability should be supported. This could contribute significantly to more science-based population and habitat management. This evolving knowledge needs to be formally and regularly input into regional policy and planning decisions. It needs to be implemented by managers who have the necessary finances and person power.