

British Columbia Grizzly Bear Population Estimate for 2012

Ministry of Forests, Lands and Natural Resource Operations
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Introduction

This report summarizes the current (2012) Grizzly bear population estimate for British Columbia. The previous population estimate was made in 2004 (Hamilton et al. 2004), and updated in 2008 (Hamilton 2008). The 2012 population estimate is primarily derived from a predictive population density model that uses all of the provincial Grizzly bear inventories (mark-recapture DNA estimates) and other inventories across North America to predict densities in areas without mark-recapture inventories on the basis of several environmental and human independent factors that are thought to influence bear numbers. Where they existed, inventory results were directly applied. Expert knowledge of local areas was used in addition to the information provided by the model to determine population estimates for each Grizzly bear Population Unit (GBPU) in the province.

The population estimate is one portion of the information used in managing harvest opportunities for Grizzly bears in BC. *The Grizzly Bear Hunting - Frequently Asked Questions* document (available at www.env.gov.bc.ca/fw/wildlife/management-issues/#grizzly) explains in detail the harvest management process.

Grizzly Bear Population Units

The current range of Grizzly bears in British Columbia has been divided into 56 GBPUs that delineate individual bear populations for conservation and management. In the south, GBPU boundaries follow natural (e.g. large rivers) and human-caused (e.g. settled valleys) fractures in Grizzly bear distribution. In the case of many southern GBPUs, the boundaries also reflect a degree of genetic isolation from other populations (Proctor et al. 2012). In northern and coastal British Columbia, GBPU boundaries follow natural and ecological boundaries or transition areas (primarily heights of land between watersheds) as there are few actual barriers to Grizzly bear movement.

GBPU boundaries at the edges of Grizzly bear distribution in the province represent the “occupied/unoccupied” line. This line was drawn to reflect the known and predicted distribution of resident adult females. Transient males, particularly subadults, are occasionally sighted in unoccupied areas. However, these lines are the expected limits of areas regularly inhabited by Grizzly bears. GBPUs serve as the key units for setting population objectives. They are also used for setting land-use priorities during strategic land-use planning. Each GBPU has been assigned a

conservation status of either Threatened or Viable. The objective for the 9 Threatened GBPU's in B.C. is population recovery to prevent range contraction and ensure long-term population viability. The objectives for the remaining 47 viable GBPU's includes maintaining current population abundance and distribution, and providing sustainable harvest and viewing opportunities where appropriate.

Population Estimation

Population estimates for Grizzly bears in BC have changed over the years, as new and more sophisticated methods for estimating populations have become available. In the 1970's the estimate was 6,600 bears. That changed to 13,000 (a minimum estimate) in 1990 and 17,000 in 2004. The last estimate from 2008 was 16,000. The 2012 estimate is 15,000. Because the methods used to estimate the population have evolved and improved over time, the variation in estimates from year to year do not reflect a trend in Grizzly bear numbers in the province. The current estimate uses all available inventories and incorporates the most rigorous statistical modelling approach used to date.

Direct inventories used DNA mark-recapture methods to determine bear density (the number of bears per 1000 km²) in a particular area. This type of inventory, that was first developed in British Columbia (Woods et al. 1999) has been carried out here since 1996 and provides the most reliable population estimates with a measure of confidence for the various studies areas (see summary in Proctor et al. 2010). In several areas, direct application of inventory was used to derive the 2012 population estimate.

In the majority of the province, a predictive population density model (using multiple regression analysis) was used to estimate the number of Grizzly bears. This model used 89 estimates of Grizzly bear density from study areas across western North America to predict Grizzly bear densities in areas of the province using independent variables such as precipitation, vegetation type and human and livestock densities. These variables were found to be significant as general landscape scale predictors of Grizzly bear density. The regression model did not find hunting (harvest/1000km²) to be a significant factor predicting density. The above model was derived for areas where grizzly bears ate little or no salmon (interior). Another model was built to predict density for coastal areas where salmon was a large part of the diet. The coastal model had 18 records of density and included 4 variables. A similar type of multiple regression model was used to obtain the 2008 Grizzly bear population estimate (Mowat et al. 2004). However, the current models incorporate additional data from recent inventories and employ more sophisticated statistical analysis. The new models were also applied at a finer scale (Wildlife Management Units) to better reflect density differences across GBPU's (GBPU's incorporate several Management Units).

Model estimates were carefully considered by ministry regional biologists. They took into

account the precision of the model estimate, local knowledge on bear distribution and movements, availability of major food sources such as salmon, as well as the age and sex of past hunter harvests and the frequency of problem bear occurrences. The model estimate was accepted or modified based on the above considerations. For example, the model for the interior areas of the province was better at predicting densities than the model for the coastal areas. For the coastal populations, information from inventories and local knowledge about the abundance of bears was used to estimate the population, rather than a strict reliance on the model.

In some areas the model estimate was modified to be lower or higher through expert opinion. In 17 of 184 Management Units (MUs), the opinion of experts differed greatly from model estimates. In six of these MUs, the model predicted no bears but, because bears do exist in these areas the model estimate was changed. Of the remaining 11 MUs, three were adjusted down and eight were adjusted up. In the majority of these cases (9), the MUs were on the coast or heavily influenced by the presence of spawning salmon. The authors of the model cautioned that the “coastal” version of the model was less reliable than the “interior” version, largely because of the limited number of reliable mark-recapture density estimates available for the coast and the high influence of rainfall as a model input parameter. In the final two MUs, regional biologists applied densities from adjacent Management Units and inventories that were done in nearby areas to adjust the estimate.

The revised Grizzly bear population estimate for British Columbia in 2012 is 15,075 bears. A quantitative measure of precision at the provincial level is not possible because the expert-based approach does not provide a statistical estimate of uncertainty.

The 2012 estimate of approximately 15,000 bears should not be interpreted as a decline in Grizzly bear numbers since 2008 but rather a more accurate estimate of the total population size in the Province. Differences between the 2008 and 2012 estimates are due to the updated model, the application of the model at the Management Unit scale, and the availability of new information, such as recent inventory and monitoring work which informed the revised estimates. Population estimates by GBPU are summarized in Table 1. Grizzly bear densities by GBPU in increments of 10 bears/1000km² are shown in Figure 1.

Grizzly Bear Hunting

There is no Grizzly bear hunting in extirpated areas or Threatened GBPU's (Figure 2). Other areas closed to Grizzly bear hunting include Grizzly Bear Management Areas and National Parks. Some GBPU's may be temporarily closed where known mortality has met or exceeded allowable limits, as established through the Ministry's Grizzly bear harvest management procedure. Two GBPU's, the Francois and Moberly, were closed in 2012 as a result of their new, lower, population estimates. In other areas open to hunting the allowable harvest has been adjusted up or down reflecting the new population estimates. While population estimates are

used to set allowable harvest limits, other information collected from harvested bears (e.g. sex and age) is also used to ensure a sustainable harvest. For more information on the management of Grizzly bear hunting in British Columbia please refer to the *Grizzly Bear Hunting – Frequently Asked Questions* document on the Fish, Wildlife and Habitat Management Branch website (www.env.gov.bc.ca/fw/wildlife/management-issues/#grizzly).

Figures

Figure 1. Grizzly bear density by Grizzly Bear Population Unit.

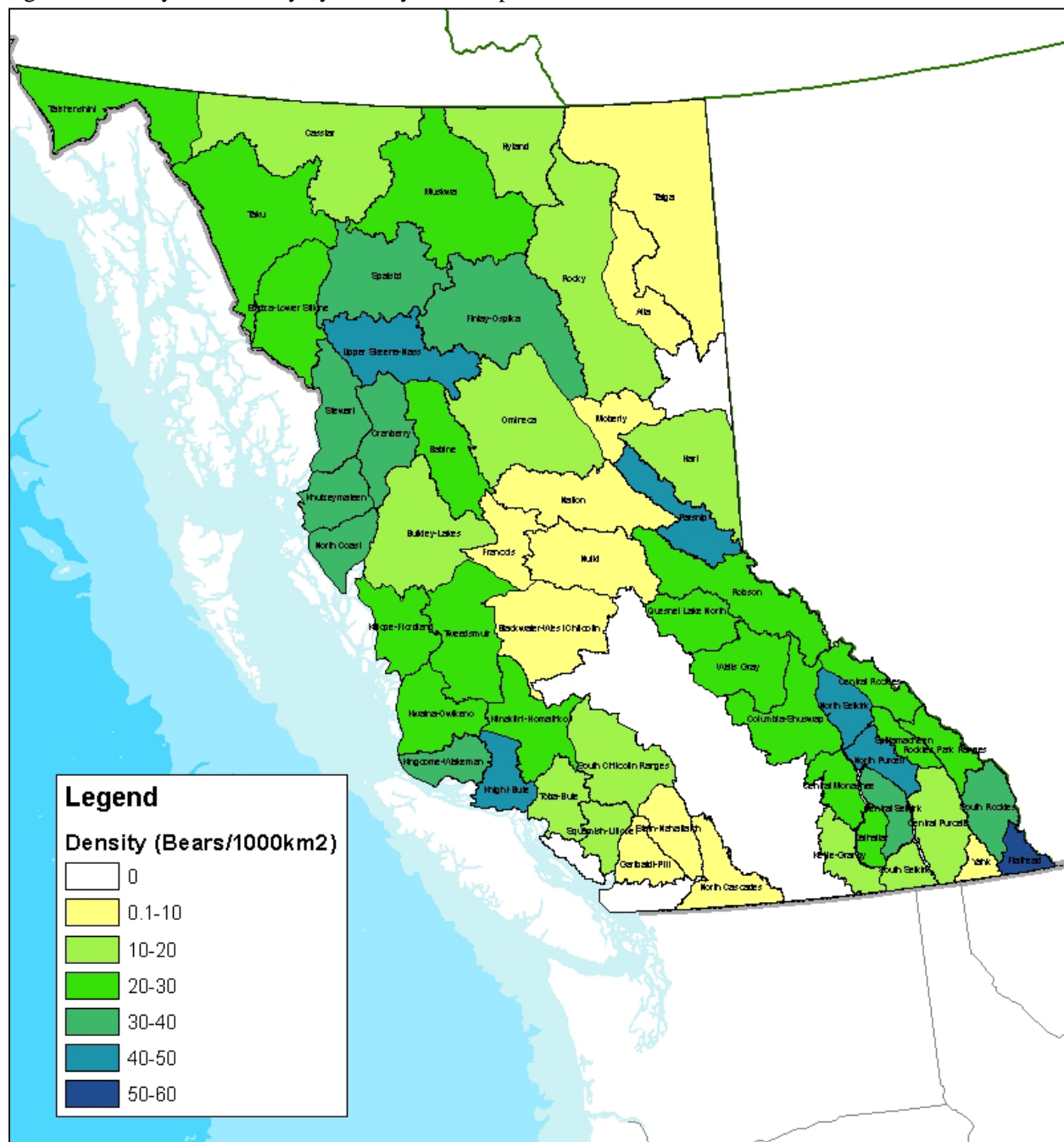
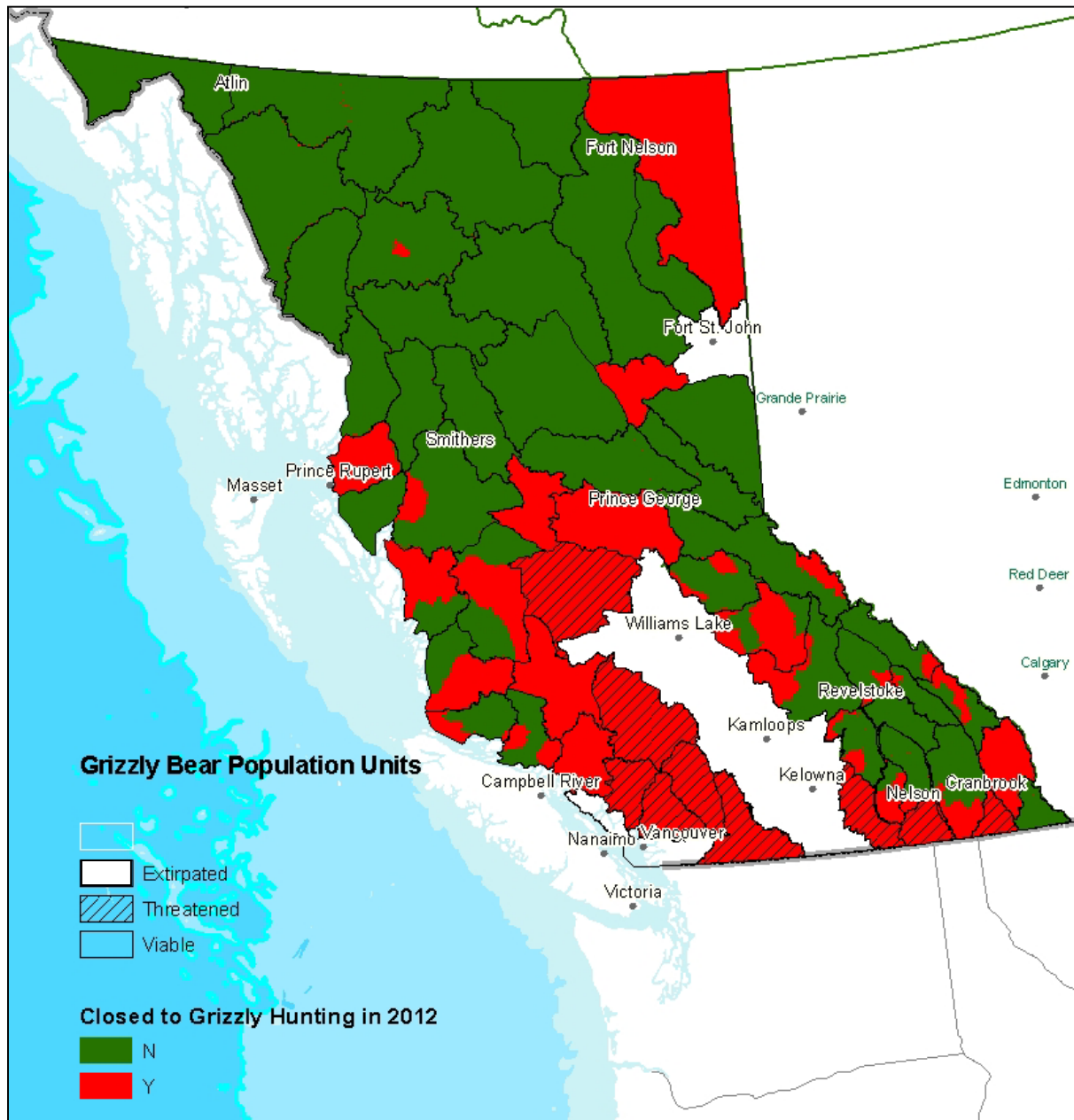


Figure 2. Areas open (green) and closed (red) to Grizzly bear hunting in British Columbia. Threatened units are identified by cross-hatching. White areas within BC are extirpated or never occupied.



Tables

Table 1. Grizzly Bear Population Estimates for British Columbia by GBPU, 2012. Dark grey indicates threatened units, light grey highlights additional units that are currently not hunted.

Grizzly Bear Population Unit	2012 Estimate
Alta	132
Babine	313
Blackwater-West Chilcotin	53
Bulkley-Lakes	439
Cassiar	612
Central Monashee	147
Central Purcell (formerly South and Central Purcell)	176
Central Rockies	169
Central Selkirk	188
Columbia-Shuswap	346
Cranberry	349
Edziza-Lower Stikine	398
Finlay-Ospika	971
Flathead	175
Francois	58
Garibaldi-Pitt	2
Hart	244
Hyland	231
Kettle-Granby	86
Khutzymateen	280
Kingcome-Wakeman	199
Kitlope-Fiordland	214
Klinaklini-Homathko	251
Knight-Bute	250
Kwatna-Owikenno	229
Moberly	71
Muskwa	840
Nation	170
North Cascades	6
North Coast	190
North Purcell	234
North Selkirk	265
Nulki	44
Omineca	402
Parsnip	455

Grizzly Bear Population Unit	2012 Estimate
Quesnel Lake North	187
Robson	534
Rockies Park Ranges	116
Rocky	538
South Chilcotin Ranges	203
South Rockies	305
South Selkirk	58
Spatsizi	666
Spillamacheen	98
Squamish-Lillooet	59
Stein-Nahatlatch	24
Stewart	358
Taiga	94
Taku	575
Tatshenshini	407
Toba-Bute	116
Tweedsmuir	368
Upper Skeena-Nass	755
Valhalla	88
Wells Gray	317
Yahk	20
Total	15,075

Threatened GBPUs	Dark grey
Additional un-hunted GBPUs	Light grey

References

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