



Grizzly bear study helps land managers make better decisions

by Carla Wainwright *

A six-year study in the central interior of British Columbia has provided new insight into understanding how human activities affect both the populations and habitat selection behaviours of the grizzly bear (*Ursus arctos*). The study will help determine strategies that may allow resource extraction to successfully co-exist with grizzly bears in the region.

Led by **Dr. Lana Ciarniello**, the study specifically examines how industrial human activities are affecting grizzly bear distribution and abundance in two distinct regions: the relatively undisturbed landscape of the Rocky Mountains' Hart Ranges and the surrounding plateau area of the Parsnip River watershed, the site of logging during the past 50 years.

With support from the provincial government, local forest industries, the University of Alberta, and the National Sciences and Engineering Research Council of Canada, Ciarniello and her team monitored the grizzly bear populations through DNA mark recapture estimates, and radio tracked up to 59 radio-collared bears by single-engine airplane and helicopter. Once sufficient data had been collected, the habitats for these animals were statistically modelled using resource selection functions (RSF), along with geographic information systems (GIS).

"RSF was used to develop statistical

models based on our observations of use (i.e., bear locations) compared with the availability of a selected attribute, or variable(s), across mountain or plateau landscapes," Ciarniello said.

Ciarniello estimated RSF models, primarily using logistic regression and discriminate functions analysis, which allowed her to determine 1) whether grizzly bears were selecting or avoiding specific forest attributes, such as pine-dominated stands versus spruce stands versus riparian areas. Or, 2) from a land-development perspective, whether grizzly bears were avoiding certain road types, such as Highway 97, primary logging roads (used to transport timber from the block to the mill), or secondary logging roads (on-block roads).

Ciarniello explained that an RSF is any statistical model that yields values proportional to the probability of use, thereby offering statistically defensible projections. Ciarniello linked the RSF results to population models using the latest statistical techniques in an attempt to examine what was contributing to the large differences in density between the mountain and plateau landscapes. This work allowed the team to determine which areas had a higher probability of grizzly bear occurrences, and to then compare findings to previous knowledge of grizzly bear use within the study area.

In addition to looking at habitat preferences, population estimates were made for both the pristine, higher elevation (mountain) areas and the plateau.

"We found in the pristine area there were 49 bears for every 1,000 square kilometers, whereas in the plateau area there were 12 bears for every 1,000 square kilometers. We wanted to find out what is responsible for these density differences. Is it human activity, is it simply differences in habitat types/vegetation, is it human access and hunting, or are other forces causing the decrease?"

Ciarniello's PhD thesis, which was defended this winter at the University of Alberta, showed that plateau bears were not limited by available forage but rather that low population distribution on the plateau was attributable to the following three main factors:

*written while Carla Wainwright was FORREX's Conservation Biology Extension Specialist

continued on page 17...



Eppo Erntes photo

Protecting grizzlies key focus


...continued from page 16

1. There was no female, and limited male, migration of bears from the mountains to the plateau.
2. There was increased human access via high road densities in plateau areas.
3. Bears were using areas where human-caused bear mortality is high.

Establishing habitat-management tools that ensure a viable grizzly bear population is a key outcome for the project. "We're looking to establish core security areas for grizzly bears and to decommission all roads in a particular area once the logging is complete," said Ciarniello. "When we know the things that grizzly bears select for, we can make certain areas more attractive to them and similarly we can discourage them from other areas where it is more difficult to control human access. This kind of application can allow for a balance between human consumerism and protection of wildlife, which is especially important within the working forest."

The final results of this research project will be available on the project Web site (<http://web.unbc.ca/parsnip-grizzly/progress.htm>) in the spring

of 2006. Currently, Ciarniello is completing a five-phase project for the BC Ministry of Forests and Range that establishes management recommendations aimed at identifying forest management practices consistent with the long-term maintenance of grizzly bears and their habitat within the working forests of central British Columbia. One peer-reviewed journal article on grizzly bear den site selection has already been published and three additional papers are complete and being submitted to journals. Pending secure funding, two more papers are planned, one of which will focus solely on grizzly bear use of clearcuts in central British Columbia. All of these papers will also be available on the project Web site.

Managing and conserving grizzly bears is often under great scrutiny worldwide. Research that furthers our knowledge of how habitat loss and fragmentation affects this species allows us to ensure that management practices, based on the best available science, are in place to protect and safeguard this important species. 

For more information visit: <http://web.unbc.ca/parsnip-grizzly/progress.htm>