

Northern Divide Grizzly Bear Project

A study to estimate the grizzly bear population size in the Northern Continental Divide Ecosystem, Montana, U.S.A.



INTRODUCTION

Limited to less than two percent of their original range in the lower 48 United States, grizzly bears (*Ursus arctos horribilis*) were listed as a threatened species in 1975 under the Endangered Species Act. With this legislation came the responsibility for regional land and wildlife managers to monitor their recovery. The Interagency Grizzly Bear Committee (IGBC) and six recovery zones were established to coordinate conservation measures. The six million-acre Northern Continental Divide Ecosystem (NCDE) in northwestern Montana is one of their last strongholds. Of the six recovery zones, the NCDE potentially harbors the greatest number of grizzlies and is the only zone contiguous to a strong Canadian population. For these reasons, it may have the best prospect of long-term survival for this threatened species in the lower 48 states. However, little information exists about the bear population in this region. In an effort to better understand and manage the grizzly bear population in the NCDE, managers and biologists are working to identify population trend, survival, and the corridors that link separate populations. The Northern Divide Grizzly Bear Project (NDGBP) is applying advances in genetic technology to estimate population size. The Project is a large, cooperative effort involving 12 federal, state, and tribal agencies as well as the participation of private and corporate landowners, non-profit organizations, and universities.

THE USE OF GENETICS

DNA is found within all cells but is most easily collected from bears from shed hair. Information contained within the root, or follicle, of a bear hair allows geneticists to determine species (grizzly or black bear), gender, unique identity, and even relatedness. The DNA is mapped producing a genotype or "DNA fingerprint" for each individual. These genotypes allow researchers to total the number of bears sampled and track their "captures" in time and space. Statistical models then calculate the number of bears not sampled and

incorporate them into an estimate of the total population size. While genetic techniques are a relatively new tool for biologists, they have been used in bear research for over a decade. From 1998-2000, bear hair was collected in the northern third of the NCDE for the Greater Glacier Area Bear DNA Project. Research Biologist Katherine C. Kendall of the US Geological Survey led that effort and now leads the

GENETIC ANALYSIS

Specific regions called microsatellites in the nuclear DNA are amplified using an optimized polymerase chain reaction (PCR) and analyzed. This process yields information from one locus to determine the species, six additional loci to determine unique identity, and a separate gender-specific locus to determine sex. This project will then use 9 additional loci to determine genetic variation in the population.

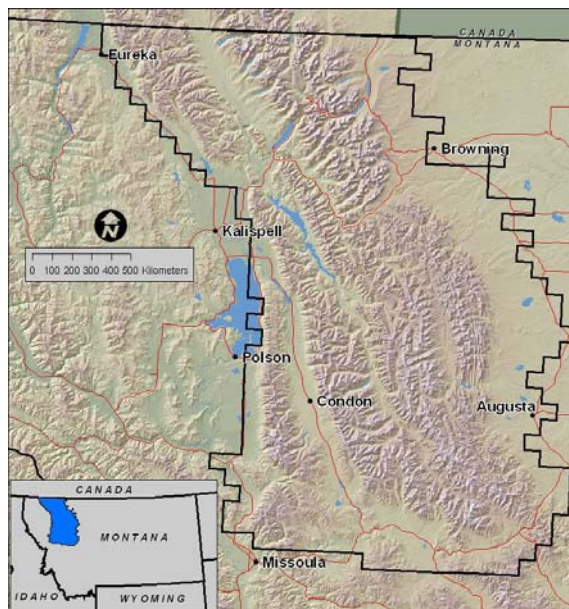
Northern Divide Grizzly Bear Project.

GRIZZLY BEAR RECOVERY

The Grizzly Bear Recovery Plan (US Fish & Wildlife Service 1993) specifies multiple thresholds that must be maintained before the grizzly bear population in the NCDE can be considered recovered. These include the distribution of females with cubs across the ecosystem, a human-caused mortality quota not to exceed 4% of the population estimate during any two consecutive years (with females accounting for less than 30%), and occupancy of the Mission Mountains. In recent years the mortality threshold has been exceeded, but the significance of these numbers cannot be evaluated until there is accurate information on population size. The IGBC's technical advisory group recommended the use of noninvasive genetic sampling techniques to accomplish this goal.

STUDY AREA

The Northern Divide Grizzly Bear Project study area comprises 7.75 million acres of diverse, largely roadless, mountainous terrain. Extending south from the Canadian border, it continues west into the Flathead and Mission valleys, south to the Blackfoot River basin, and eastward onto the Rocky Mountain Front. It includes a varied landscape encompassing five Wilderness areas (Bob Marshall, Scapegoat, Great Bear, Rattlesnake, and Mission Mountains), portions of five National Forests (Flathead, Kootenai, Lolo, Helena, and Lewis & Clark), Glacier National Park, the Blackfeet and Flathead Indian Reservations, and other federal, state, and private lands.



METHODS

Two sampling techniques, non-baited rub tree surveys and baited hair snagging, were used to collect bear hair in 2004. These non-invasive sampling methods allowed us to collect genetic material from bears without physical capture.



RUB TREES

We collected hair from naturally occurring bear rubs found along roads, trails, fences, and powerpole lines throughout the NCDE. It is believed that bears rub on trees to scratch or as a way to announce their presence to other bears. Short strips of barbed wire were attached to the rub trees helping to extract larger samples with more follicles. In areas where bear rubs were prone to being bumped by horseback riders and pack stock, a short strip of wire without barbs was placed vertically on the rub tree. This barbless wire was used after it was determined to be the best option for collecting large samples from bears rubbing on the bumped trees but also would not harm stock or riders. During the 2004 field season 5,100 bear rubs were surveyed at least twice, yielding nearly 13,000 hair samples.

HAIR SNAGS

A 7x7 km grid was superimposed on the study area (641 grid cells) and used to systematically distribute baited hair snag stations. Snag stations were located in bear travel routes and foraging habitats. They consisted of one 100-ft length of barbed wire stretched around four trees or posts at a height of 50 cm. A liquid scent lure, formulated to attract bears without providing a food reward, was poured on rotten logs in the center of the station. Bears deposit hair on the barbs as they cross under or over the wire to investigate the scent. Crews return 14 days after set up to collect the hair and move the station to another location within the grid cell. In areas with cattle, fences were built to prevent trampling of the station. During the 2004 field season 2,560 stations yielded nearly 21,000 hair samples, with 78% of the stations having at least one sample.

FIELD OPERATIONS

This project involved over 200 crew members distributed throughout the study area. Crews were trained in sampling protocols, wilderness safety, and backcountry ethics. During the 2003 field season, crews located rub trees and built fences to keep cattle from entering the hair snag stations. Bear hair was collected from rub trees and hair snag stations only during the summer of 2004. Four 14-day hair snag sessions were conducted with snag stations moved between sessions. Bear rubs were surveyed a minimum of twice. To facilitate the organization of project operations, the study area was divided into nine subunits that were coordinated by personnel familiar with local bear activity, access, and agency regulations.

PROJECT STATUS

During the 2004 field season there were 5,100 bear rubs with wire and 2,560 hair snag stations used to collect hair. Approximately 13,000 samples were collected from bear rub and 21,000 were collected from hair snag stations for a total of 34,000 hair samples. Genetic analysis of these samples resulted in 545 individual grizzly bears. Statistical models are currently being developed to estimate the size of the population.

PROJECT TIMELINE

In 2002, representatives of the agencies responsible for managing grizzly bears and their habitat in northwestern Montana sought support to gather data on grizzly bear population status within the NCDE. During 2003 study planning, rub tree survey route identification, cattle exclusion fencing, and private landowner permissions were conducted. During 2004 collection of hair samples, data entry, and removal of all materials from the field was conducted. Genetic analysis was complete spring of 2007. Data analysis and population modeling will be conducted during the summer and fall of 2007 and a paper submitted for publication in a peer-reviewed journal.

Further information regarding the Northern Divide Grizzly Bear Project can be found online at:

<http://nrmsc.usgs.gov/research/beardna.htm>