



## LANDFIRE Data Product Applications



### **Topic & Title of Project**    **Modeling Grizzly Bear Density using LANDFIRE Data Products**

**Date of Project**    November 2006

**Background**    The Northern Continental Divide grizzly bear population in northwest Montana is one of six threatened populations identified in the U.S. Fish and Wildlife Service's Grizzly Bear Recovery Plan. Whereas previous grizzly bear research in this region focused on specific issues in small areas – such as habitat use or the effects of roads on bears – little is known about the status of the population as a whole. The primary objectives of the Northern Divide Grizzly Bear Project (NDGBP) were to use non-invasive sampling and deoxyribonucleic acid (DNA) analysis of grizzly bear hair to: 1) develop a statistically rigorous estimate of grizzly bear population size and 2) assess variation in the density of bears. This project combined multiple variables that cover the entire study area, such as vegetation type and successional state, into a map with which to assess grizzly bear habitat quality.

### **Key Points**

**Use of LANDFIRE data**    Of the vegetation maps considered for use in this analysis, the LANDFIRE Project's vegetation layers best met project requirements. LANDFIRE provided the most accurate data covering the entire study area with a resolution appropriate for multi-scale analysis. In addition, the classification system used by LANDFIRE is relevant to bear ecology. For example, the data include classes pertaining to high quality bear habitat, such as riparian systems, moist forests, and avalanche chutes, which are often difficult to extract from maps of dominant tree species created for forestry applications. The LANDFIRE vegetation layers for this study area were created from 2001 National Land Cover Data (NLCD) satellite imagery; however, because approximately 7% of the NDGBP study area had burned since the creation of these layers, the analysis required that the time-stamp of the LANDFIRE data be updated to 2004.

Members of both the LANDFIRE team and the National Interagency Fuels Technology Team (NIFTT) used burn severity data created by USGS and the Forest Service Remote Sensing Applications Center to update the LANDFIRE vegetation layers in the NDGBP to 2004 conditions. The general approach was to modify layers of vegetation height and canopy cover for low- to moderate-severity fires and to adjust the vegetation type layer for high-severity fires. The process included a review by individuals familiar with the burned areas and resulted in burn severity and fire perimeter layers for the period spanning 2000-2004. The updated layers included vegetation type, canopy cover, and vegetation height. These updated data more accurately represented conditions that existed when the bear hair sampling was conducted in 2004. This effort also served as a pilot project for the nation-wide update strategy of LANDFIRE products.

**Description of analysis**    The analysis team investigated bear distribution to understand why some areas have many bears and others have few or no bears. Potential factors affecting density patterns included vegetation type, topographical complexity, climate variables, historical bear mortality, human density, food storage regulations, and road density. Maps of these variables had to cover the entire study area and be of an appropriate scale so that bear distribution could be examined at multiple scales. The field sampling effort consisted of collecting bear hair from bear rub trees and hair snares systematically distributed across the area. Genetic DNA analysis of the hair samples identified the species, sex, and individual identity of the bears sampled. The project used the updated LANDFIRE layers in a cumulative effects model (CEM) developed to evaluate impacts from multiple activities into a map assessing grizzly bear habitat quality.

**Multi-agency / organization effort**    As the largest grizzly bear DNA hair-sampling study ever undertaken, cooperation among numerous agencies and organizations proved essential. Partners included five national forests; Glacier National Park; the U.S. Fish and Wildlife Service; the U.S. Geological Service, the Bureau of Land Management; Montana Fish, Wildlife and Parks; the Montana Department of Natural Resources and Conservation; the Confederated Salish and Kootenai Tribes; the Blackfeet Nation; Northwest Connections; the University of Montana; and the Canadian provinces of Alberta and British Columbia.

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## Key Points, continued...

### Better decision-making capabilities

Results of this analysis provide managers with sound information to focus efforts on the factors most important to bear recovery and aid development of a conservation strategy for recovery of this population.

### Data can benefit additional projects

Updated LANDFIRE vegetation layers and CEM layers will also benefit other projects in this area, including those monitoring grizzly bear population trends, investigating habitat requirements of grizzly bears, and examining black bear distribution.

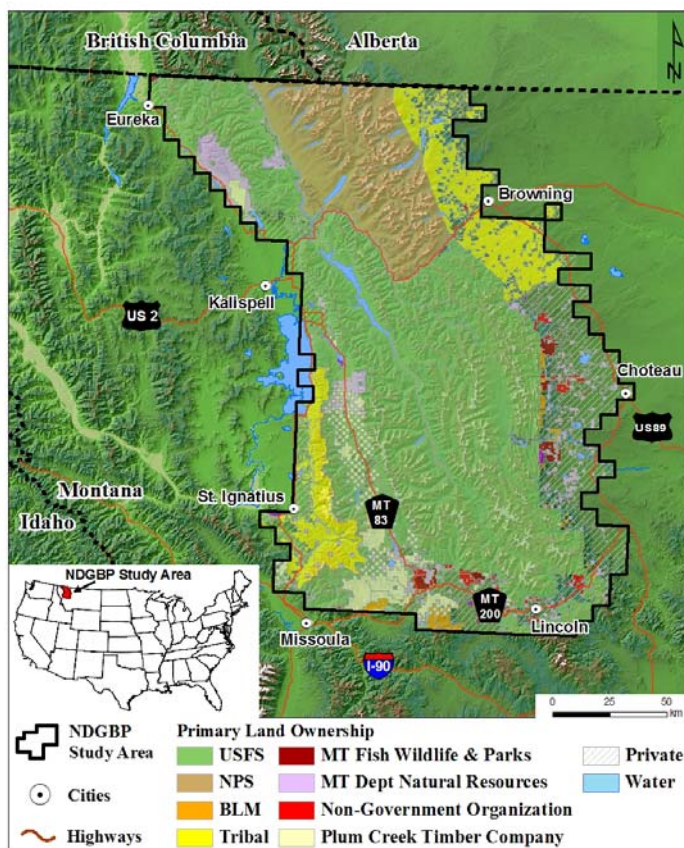
### Results / summary

LANDFIRE provided the most accurate data that covered the entire study area with an adequate resolution for multi-scale analysis. In addition, the analysis was more accurate because the LANDFIRE and NIFTT teams were able to update the data to the sampling year of 2004.

## Recommendations

### Importance of updated data

LANDFIRE data must be updated regularly to reflect current conditions; otherwise, its usefulness will diminish. Vegetation changes during the course of a few years that are not accounted for in the data can produce inaccurate or erroneous analysis results. LANDFIRE data should be assessed by individuals familiar with the analysis area to ensure the data accurately portray conditions on the landscape.



Northern Divide Grizzly Bear Project area map showing project and ownership boundaries for this cooperative multi-agency partnership.