

Alberta Upstream Petroleum Research Fund (AUPRF)
2010 Project Status Update

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Foothills Research Institute Grizzly Bear Program

Project Title- Grizzly Bear Response to Oil and Gas Development and Activities in Alberta

Program Background:

The goal of this research project is to assist the oil and gas industry in providing scientific data to increase our understanding how grizzly bears respond to oil and gas operations in provincial grizzly bear range. At the current time no published literature exists on how grizzly bears respond (behaviorally or numerically) to energy sector activities in the province. By using our existing data sets, which have been compiled with 10 years of funding support from a number of CAPP, SEPAC and PTAC member oil/gas companies, we will utilize the current research investment to address pressing species at risk management questions. These data and analysis will be important in addressing management actions that may be associated with provincial grizzly bear recovery efforts and future land management decisions with provincial grizzly bear range.

This summary report is an update on research activities and progress in the first year of this two year research program.

Research Hypothesis:

1. Are grizzly bear movement patterns affected spatially and/or temporally by oil and gas development and activities?
2. Do grizzly bears show any avoidance or attraction to oil and gas operations or facilities?
3. Are grizzly bears displaced from high quality habitat when oil and gas activities are present, and do they return to these habitats at any point during the life cycle of oil and gas operations and facilities?

We also propose to analyze our data sets to address the following broader objectives:

4. Evaluate current grizzly bear cumulative effects assessment models (CEA) in relation to existing high resolution data sets to understand their applications and limitations.
5. Evaluate current landscape conditions associated with oil and gas and forestry activities in the Kakwa area in relation to current (2008- DNA inventory) grizzly bear population distribution and abundance.

Research Progress in 2010:

A. DATA SETS

1. The foundation of this research is based on three primary data sets:
 - GPS location data sets from radio collared grizzly bears
 - Annual landscape condition GIS data layers within the study area
 - 16 day landscape conditions GIS day layers associated with finer scale landscape change.

In 2010 we maintained a total of 10 GPS collared adult grizzly bears within the Kakwa study area. Capture and collaring activities took place in both May and October to ensure data collection was continuous and that working collars could be maintained on known individuals through the final year of data collection (2011). Denning locations for all study animals were identified in December 2010 and final data uploads for the 2010 field season was completed at this time. These data supplement our 2005-2009 GPS data sets from grizzly bears within this same area.

Using remote sensing imagery our research team completed the preparation of the annual landscape condition map layers for the period 2004-2010. These annual landscape condition maps utilized imagery from August – September each year. These map layers included all visible features associated with both forest management activities, oil and gas activities and all associated road construction within the study area. Our research team also compiled annual landscape condition layers dating back to 1972 using available satellite imagery and has a paper under review at this time (Wulder et al. 2010, in review).

In order to better match our hourly GPS grizzly bear location data our research team developed a new technique to identify and delineate landscape change at 16 day intervals. This work is now published (Gaulton et al 2011, Hiker et al 2010 a and b) and represents an important advance in relating animal movement data to landscape conditions at a finer scale. The team assembled a 16 day change layer for the study area for the period 2004-2010 to match GPS data sets.

Working with Alberta Energy we were also able to assemble and integrate a new data set that identifies oil and gas sites and their status (active, inactive, etc) for each year of interest and these data were integrated with landscape condition map layers. All needed data for the period 2004-2010 have now been assembled for analysis.

B. PRELIMINARY ANALYSIS

Although this is the first year of a two year project we have undertaken some preliminary analysis to test the linkages between the animal (GPS Bear Data) and habitat (Landscape

Condition) data sets. Two graduate students (Ellinor Sahleen - Sweden and Benjamin Stewart- U Victoria) were involved in two separate analyses. The key findings to date from this work are:

1. Some grizzly bears are readily attracted to wellsites but avoid human activity by making temporal adjustments in their behaviour, and by using cover as compensation when in proximity to human activity. Positive selection for wellsites which are easily accessible by humans increases the risk of bear-human conflicts, which may in turn lead to increased direct mortality for threatened bear populations.
2. Within the Kakwa study area roads are selected for by females, but avoided by males. Oil/gas pipelines show similar selection as roads, indicating edge habitat along these pipelines are also important to grizzly bear habitat use. Seasonal differences indicate that females and males select for these edges more in the fall, possibly due to changes in feeding requirements and security. These results indicate that while managing for anthropogenic disturbances in grizzly bear habitat is of utmost concern, understanding bears' reactions to natural transitions can provide new management opportunities. The home ranges of female bears are found to have a higher density of pipelines and roads than males. The difference between genders is significant ($\alpha = 0.05$) for spring and fall for pipelines, and spring and summer for roads.

Next Steps (2011):

We have applied for funding from AUPRF and our other program partners for funding to allow us to complete this research effort in 2011. At this time we are awaiting funding decisions.

However our program plan is to collar approximately 4 more grizzly bears in the Kakwa area in the spring of 2011 and monitor and collect GPS data from these bears until denning in the fall of 2011. We will remove all collars from our research bears in the fall of 2011 to meet provincial research permit conditions.

Our research team will again prepare annual and 16 landscape condition map layers for the 2011 field season and integrate these with our current data sets.

Detailed spatial analysis of all data will continue in 2011 with current data with reports to be completed and final papers submitted by April 2012.

References to date:

Gaulton, R., Hilker, T., Wulder, M.A., Coops, N.C., Stenhouse, G. 2011. Characterizing stand replacing disturbance in western Alberta grizzly bear habitat, using a satellite-derived high temporal and spatial resolution change sequence. *Forest Ecology and Management* 261:865-877.

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Stewart, B.P, Nelson, T., Wulder, M.A, Nielsen, S., Stenhouse, G.B. 2011.. Living on the edge: Grizzly bear habitat selection in forested landscapes of Alberta. Submitted and under review.