Grizzly Bear Response to Oil and Gas Development and Activities in Alberta

2011 Resource Access and Ecological Issues Forum
Gordon Stenhouse – Foothills Research Institute
Key Research Questions

1. Are Grizzly Bears attracted to or displaced by oil and Gas activities?

2. Are there changes in grizzly bear movement patterns in response to oil and gas activities?

3. Do home ranges of grizzly bears change with the amount of oil and gas activity?
Method for determining habitat selection or avoidance

• Grizzly bear points were randomized within grizzly bear home ranges in order to generate an expectation of grizzly bear habitat use.

• All observed and randomized grizzly bear points were compared to oil and gas activities.

• Distance from observed locations to oil/gas activities was compared to expected distance.

• Significantly further than expected = avoidance

• Significantly closer than expected = selection

• No significant difference = neutral

• Results were summarized by sex and age class (adult or subadult).
Seasonality of well site drilling

Julian Day of SPUD

Frequency

Season: Spring, Summer, Fall

Julian Day
Summer All Points

<table>
<thead>
<tr>
<th></th>
<th>Further</th>
<th>Neutral</th>
<th>Closer</th>
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</thead>
<tbody>
<tr>
<td>Roads</td>
<td></td>
<td></td>
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<tr>
<td>SF</td>
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Mean Distance:
- Roads: 2184, 4027, 3191, 3537
- Active Wells: 1271, 2491, 1508, 1962
- Inactive Wells: 575, 1851, 483, 865

CoV:
- Roads: 0.908, 0.867, 0.83, 0.708
- Active Wells: 1.189, 1.316, 1.477, 1.066
- Inactive Wells: 2.975, 1.973, 4.271, 2.557
TRENDS IN HABITAT USE

• **Active vs. inactive well sites**—differences seen in fall; very little difference in summer.

• **Very little avoidance of all oil and gas features during spring.**

• **Adult males avoid habitat with oil and gas features during summer, while other groups select habitat with these features to a greater extent.**

• **Subadult males selected habitat with oil and gas features the most, but this diminishes somewhat over the seasons.**
Ongoing Analysis

- Do grizzly bears use habitat containing oil and gas features differently between night and day?
- How does the age of disturbance change the use of habitat by grizzly bears?
- Is grizzly bear movement altered by oil and gas features on the landscape?
Focus on Grizzly Bear Recovery to date has been on open road densities.

Note that this has moved from Routes to Roads.
Management actions = road density thresholds (SURROGATES)
Survival and Road Densities

Survival rate

access density (km/km²)

But risk is different dependent on population size.
**Are Road Densities enough?**

<table>
<thead>
<tr>
<th>Year</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aboriginal (subsistence harvest)</td>
<td>2</td>
<td>3</td>
<td>2</td>
<td>7</td>
</tr>
<tr>
<td>Illegal kill</td>
<td>1</td>
<td>6</td>
<td>6</td>
<td>13</td>
</tr>
<tr>
<td>Mistaken for black bear</td>
<td>0</td>
<td>3</td>
<td>3</td>
<td>6</td>
</tr>
<tr>
<td>Self defence</td>
<td>6</td>
<td>0</td>
<td>1</td>
<td>7</td>
</tr>
<tr>
<td>Accidental (human-related e.g. road kills)</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>15</td>
</tr>
<tr>
<td>Research-related</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Destroyed - problem bears</td>
<td>6</td>
<td>0</td>
<td>1</td>
<td>7</td>
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<tr>
<td>Killed by predation</td>
<td>0</td>
<td>3</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>Unknown</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Total known human-caused grizzly mortalities</td>
<td>19</td>
<td>17</td>
<td>19</td>
<td>55</td>
</tr>
<tr>
<td>Total mortalities</td>
<td>20</td>
<td>21</td>
<td>21</td>
<td>62</td>
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</table>

Research shows that what is found and what the true number of dead bears might be is considered to be 1.5-2 times the known mortalities.
To date the strategy of focusing on road densities alone is not achieving our objectives

- We have also been increasing education and enforcement

- The approach to road density thresholds is good and has been shown to work elsewhere

- However we need to look at other actions to supplement this approach
REALITY:

We will continue to explore and develop the resources that society demands. The expectation is that we will do this in a way that minimizes or reduces impacts on other resource values (e.g. air, water, species at risk).
Habitat

1. Understanding grizzly bear habitat needs.

2. Projecting habitat needs into the future along with landscape change and climate influences.

3. Using our current knowledge to create new planning tools to assist with mitigation.
New spatially explicit food models created for 16 key bear foods
Grizzly Bear Energetics in Space and time

Allows the establishment of recovery targets and the setting of habitat goals for grizzly bear conservation areas over time.

Manage and maintain habitat for grizzly bears.
So what are things that can be done relative to access?

Avoid Best Habitat

Evaluate Mortality Risk

Legend
Grizzly Bear RSF
- High
- Low

Human-caused mortality risk
- low
- moderate
- high
- very high
Watershed 213 (Upper Cutbank River), core conservation area, has area of 681 sq km

Example: Evaluating Road Deactivation

What can we do once road density threshold is reached?
New Tools in Development

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Watershed 213 (Upper Cutbank River), has 381 km of ASRD IAM routes (pink) (v.29jun11), or 0.56 km/km². Some roads in the GBP road layer are not included in the ASRD IAM routes.
Current RSF (fall)
Current mortality risk (roads in yellow)
Other measures of habitat security:

Mean distance to road is 614m
Scenario 1: 23.4 km of road selected for removal/reclamation (blue).
Scenario 1: Road length is reduced from 488 km to 464 km, road density for watershed is reduced from 0.71 km/km² to 0.68 km/km².

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Scenario 1: Euclidean distance to road is recalculated with new road configuration. In this scenario, mean distance to road has increased from 614m to 750m.
Scenario 1: The difference between the 2 surfaces defines an area of safe harbour that has been created by road removal. (5486 ha)

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Scenario 1: Similarly, a new cost distance surface to roads can be calculated. Mean cost distance to road has increased from 4405 to 5262.

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Scenario 1: the difference between the current and cost distance surfaces defines an area of safe harbor (6284 ha).

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Scenario 2: 22.2 km of road selected for removal/reclamation (blue).
Scenario 2: Road length is reduced from 488 km to 465 km, road density for watershed is reduced from 0.71 km/km² to 0.68 km/km².

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Scenario 2: Euclidean distance to road is recalculated with new road configuration. In this scenario, mean distance to road has increased from 614m to 704m.

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Scenario 2: The difference between the 2 surfaces defines an area of safe harbor that has been created by road removal. (4143 ha)
Scenario 2: Mean cost distance to road has increased from 4405 to 4900.

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Scenario 2: The difference between the 2 cost distance surfaces defines an area of safe harbor that has been created by road removal. (3896 ha)

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New Tools - focus on access and GB Mortality Reduction

Using new Lidar data to support grizzly bear conservation and recovery in Alberta?

1. Determining sightability from roadsides
Grizzly bears prefer to occupy openings in the forest. One way of reducing the probability of bear-human encounters is to leave vegetation screens between roads and open habitats.

A bear 50m from a road, but hidden by forest, is at less risk of being seen by a poacher than a bear 100m from a road but exposed in a meadow.
Lidar Full Feature Digital Surface Model (DSM) is 1m resolution and can be updated with planned openings. Which include wellsites, facilities, pipelines and cutblocks.
Consider a traditional harvest design that is bounded by the roadside.
The DSM is replaced with the DEM within the boundary of the cutblock. Post-harvest, the trees would not impede visibility into the opening.
The amount of area visible from the roadside (dashed line)....
... is only limited by the terrain (visible areas in green)
Consider an alternate harvest design that leaves buffers of trees along the road, to be harvested later, once the rest of the block has greened up.
The trees are “subtracted” from the canopy surface within the cut area.
The amount of area in the block visible from the roadside (green areas) is greatly reduced, with no long-term loss of cut (only a temporary deferral of harvest of trees next to the road).
Program Sponsors

- Ainsworth Lumber
- Alberta Conservation Association
- Alberta Upstream Oil and Gas Research Fund
- Alberta SRD
- Alberta Fish and Game
- Alberta Newsprint
- Alberta Advanced Education and Technology (Innovation and Science)
- Alberta Upstream Oil and Gas Research Fund
- Anadarko
- Anderson Exploration Ltd.
- Anderson Resources Ltd.
- AVID Canada
- BP Canada Energy Company
- Banff National Park
- BC Oil & Gas Commission
- Buchanan Lumber-Tolko
- Burlington Resources Ltd.
- Canada Centre for Remote Sensing
- Canadian Hunter
- Canadian Wildlife Service
- Canfor
- Cardinal River Operations
- Canadian Forest Service
- Conoco Phillips Ltd.
- Conservation Biology Institute
- Devon Canada Corp.
- DMI
- Elk Valley Coal
- Enbridge Inc.
- EnCana Corp.
- Environment Canada –HSP
- Foothills Research Institute
- Fording Coal
- FRIAA
- GeoAnalytic Ltd.
- Gregg River Resources
- Grande Cache Coal
- Husky Energy
- Jasper National Park
- Komex International Ltd.
- Lehigh Inland Cement
- Luscar Ltd.-Coal Valley
- Manning Forestry Research
- Millar Western Ltd.
- Mountain Equipment Co-op
- Nexen
- Natural Resources Service
- Northrock Resources Ltd.
- NSERC
- Parks Canada
- Petro Canada
- Peyto Exploration
- Precision Drilling Ltd.
- PTAC (CAPP)
- Rocky Mountain Elk Foundation
- Shell Canada
- Spray Lake Sawmills
- Suncor Energy
- Sundance Forest Industries
- Talisman Energy Ltd.
- Telemetry Solutions
- Trans Canada Pipelines
- University of BC
- University of Calgary
- University of Lethbridge
- University of Saskatchewan
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- University of Victoria
- Veritas
- West Fraser
- Hinton Wood Products
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- Sundre Forest Products
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- World Wildlife Fund