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Analysis of Conflict between Potential Resource Use and Wildlife Conservation in the Muskwa-Kechika Management Area
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The objective of this research at UNBC is to assess possible conflict between conservation of wildlife habitats and natural resource development. We created map layers of resource potential for oil and gas, minerals, forest products, and wind power from spatial data on topography, geology, resource inventory, and resource infrastructure. These layers were integrated into a multiple resource potential layer and a resource potential diversity layer. Overlapping projections of high-habitat value for wildlife and high resource potential (from single industry, multiple resources, or a diversity of resources) provide a heads-up for areas of possible conflict. The high-conflict areas for wildlife species can be mapped across the landscape to indicate risk, and to help minimize future industrial alterations to habitats that would compromise wildlife integrity. Depending on the spatial and temporal extent of the conflict, some areas may need to be avoided whenever possible to meet the intent of the MKMA and in other areas activities might be conducted with relatively low impacts on ecological integrity. Such visualization tools also could be expanded to assess possible loss of wilderness based on the values of different users. Hence, the mapping and analyses at this high level are useful for informing where conflicts might occur and thereby, providing guidance to minimize them.

Explanations for the 6 slides provided for the MK Board meeting in Victoria 24 Feb 2015.

Slide 1: **Title Page**. Possible conflicts between resource potential and wildlife habitat values may result in the Special Resource Management Zones and well as the few Wildland Special Management Zones (not shown).

Slide 2: Spatial Data Tools to Assess Levels of Conflict from Potential Natural Resource Development in Geographical Areas of Interest.
We created 6 GIS layers (Spatial Data Tools) to assess possible conflict between potential resource development and conservation of wildlife habitat. These layers also can be used to assess conflicts between different users on the same land base.

This slide shows the GIS layers for mineral, forestry, wind power, and oil and gas potential, as well as multiple resource potential and resource potential diversity. The Multiple Resource Potential Layer represents the total potential of 4 resources combined (mineral potential, forest potential, wind power potential, and oil and gas potential) in Special Resource Management Zones and the total potential of 3 resources combined (mineral, wind power, and oil and gas) in Wildland Special Management Zones, where forest harvesting is off limits.

The Resource Potential Diversity simultaneously measures the number of different types of resources and the potential level of each of these resources. The more resource types available at a higher level of potential for each resource results in a higher value of Resource Potential Diversity. Having a high resource potential for one particular resource with the absence of other resource potentials would not produce a high value of Resource Potential Diversity.

Slide 3: Multiple Resource Potential within High-Value Habitats outside Protected Areas.

This is an example of how the GIS layers can be used to assess overlap between resource potential and wildlife habitat. The multiple resource potential layer was overlaid on the high-value habitat for caribou (highly suitable habitat is the top 30% best habitat) outside of protected areas (provincial parks, ecological reserves, and other protected areas). By assessing the overlapping areas, we can determine the proportions (%) of high-value (highly suitable) caribou habitat in high, medium, or low resource potential areas in the growing season (spring and summer) and the winter (See next slide).

Slide 4: Caribou: High-Value Habitat in Potential Conflict with Resource Use.
Values of Multiple Resource Potential are shown as percentiles on the horizontal axis. For example, the top 70-100 percentiles of resource potential are considered high resource potential, whereas 0-30 percentiles are considered the lowest resource potential. The vertical axis shows how much area (%) in each of the 10 percentile classes of resource potential overlaps with the high-value caribou habitat outside the protected areas.

In the growing season, a large percentage of high-value caribou habitat is in the low resource potential areas and a very small percentage is in the high resource potential areas. This trend changes in winter, when there is more high-value caribou habitat in the high resource potential areas and less high-value habitat in low resource potential areas than in the growing season. Therefore, resource development would likely affect winter habitat of caribou more than their growing season habitat.

Slide 5: High-Value Habitat in Conflict with Resource Use (Moose and Elk)
High-value habitats of moose and elk (outside of protected areas) tend to overlap more with high resource potential areas than other species do. Therefore, resource development would likely alter their habitats more than habitats of other species. Because moose and elk tend to forage on early successional habitats, however, resource development may not have adverse effects in the long term for moose and elk.

Slide 6: % Area of High Resource Potential in High-Value Habitats (in SRMZ)
The GIS layers also can be used to assess the effects of development of different resource potentials on a particular wildlife species, or the effects of one type of resource use on numerous wildlife species.

The first chart shows that areas of high oil and gas potential and high forest potential overlap with high-value habitat for caribou more in winter than in the growing season (no overlap with high forest potential areas). Areas with high mineral potential overlap more with high-value caribou habitats in the growing season. Overlap with high-value caribou habitat is much lower for wind potential than other resources because the area for high wind potential in the MKMA is smaller.

The second chart shows the percent area of high forest potential in the high-value habitats for 7 species in the Special Resource Management Zones (SRMZ) Moose had the highest overlap in both seasons, indicating a relatively high likelihood that their habitat may be altered by forest management activities (although this could be a positive change in the long term). Caribou had the second highest overlap in winter, but no overlap between areas with high forest potential and high-value caribou habitat in the growing season. Unlike moose, habitat change due to forest management in their winter habitat may not be positive for caribou. There was no overlap with high forest potential areas for Stone's sheep and mountain goats