Roads:
More than lines on a map

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Place: Northeastern Alberta

Case study #1

Road: Logging, oil-and-gas roads and seismic lines in Alpac FMP area

Issues: Cumulative impact of high-density linear disturbances; impact on woodland caribou and other sensitive species; lack of integrated planning leading to severe economic and ecological impacts.

Using a computer program (ALCES - Alberta Landscape Cumulative Effects Simulator) to simulate the cumulative landscape impacts of the many overlapping resource uses in northern Alberta, including forestry, oil and gas and agriculture, biologists from the University of Alberta are painting a bleak picture of the potential future condition of the region's boreal forests if the province continues with a business-as-usual approach to resource planning.

The area used in the study was the 59,054 square kilometre Forest Management Agreement Area controlled by Alberta-Pacific Forest Industries (Alpac). This area, which lies south of Wood Buffalo National Park in the province's northeast, is one of the more intact boreal forest areas in a province that has the lowest proportion (16%) of large, intact forest landscapes in its boreal ecozones of any jurisdiction in North America (most other provinces and territories average 50%).

Using conservative estimates of growth in industry activity in the region, the simulation found that the degree of forest fragmentation in the area would rapidly increase over the next 20-30 years, mostly due to road building and seismic line clearing. The study found, for example, that the total length of roads in the study area will rise from 17,764 km today to 162,000 km over the next 50 years. As the study notes, "In addition to the loss and fragmentation of habitat, roads cause soil erosion, disruption of water and fish movements, changes in animal movement patterns, and increased access by humans, which leads to more hunting and poaching."

Commenting on the results of the simulation, the study authors concluded that "Due to the combined effects of industries, the boreal forest landbase will significantly shrink, change in composition, and become younger and more fragmented. The model predicts that old-growth forest will be entirely eliminated from the study area: softwood old- growth disappears within 20 years and hardwood within 65 years. Furthermore, results predict that using current rates of development, the cumulative industrial footprint on this study area in terms of landscape fragmentation and total area disturbed will quadruple over the next 20-30 years. Extinctions of key boreal species may occur, as they have in Europe, where industrial forestry and settlement have been practiced for much longer."

The study found that forest "edge" created by industrial activities would increase from 1.8 km/km^2 to a maximum of 8.0 km/km^2 This finding points to a major increase in the fragmentation of the forest into smaller, less useful habitat blocks that are more accessible to hunters and predators and more prone to disturbance. This in turn, will lead to a decline in species, such as woodland caribou, that require large intact forest areas. The study found, for example, that habitat availability for woodland caribou in the area would decline from 43% to 6% under a business-as-usual scenario.

The study notes that "Woodland caribou populations

are known to be declining in northern Alberta for a number of reasons, including increased hunting mortality facilitated by roads, higher rates of predation by wolves that follow moose to the vegetation at clear-cut edges, and also the fact that caribou exhibit a significant avoidance of industrial features, which reduces the quality of remaining habitat for this species."

Wellsite, road and seismic line in Alberta's boreal.

S. Bayley

Unfortunately, piecemeal approval of new resource developments remains the norm in Alberta. Resource companies generally plan their activities independently, even if they operate on the same land base. For example, the planning and construction of road networks by petroleum companies and forestry companies is usually done independently and without any assessment of cumulative road densities. Similarly, the authors point out that despite many regulations covering the conduct of seismic exploration, there is no limit on the cumulative density of lines in a given area.

The study also found that there will be significant socio-economic impacts from a business-as- usual approach. The most obvious of these would be a major shortage of softwood available to the forestry industry within 60 years because annual harvest rates currently do not take into account losses from fire and the activities of the petroleum sector (which clears almost as much forest for seismic lines and wellsites as the forest industry does in cutblocks – 11,000 ha. vs. 16,000 ha. per year. The petroleum clearances also tend to remain unforested for much longer than forestry cutblocks.)

However, the study concluded that some relatively modest changes in planning approaches could dramatically lessen the fragmentation impact of roads and seismic lines on the region. Changes such as increasing the overlap between petroleum and forestry road networks from 10% to 50%, narrowing seismic lines to one metre, using existing corridors for pipelines and reducing roads and landing areas within forestry operations, could increase the retention of old-growth forests and reduce forest fragmentation significantly (for example, reducing the maximum edge effect from 8.0 km/km^2 to 3.2 km/km^2). These changes would be particularly valuable for retaining habitat for caribou, the authors point out. The authors also suggest there could be major economic gains from such an approach, by reducing road construction costs, increasing wood supply for the forestry industry and reducing the timber-damage charges the petroleum industry must pay when it clears forested areas.

As the area within the oil and gas-rich Western Canadian Sedimentary Basin (WCSB) where industrial development is the most advanced, Alberta essentially serves as an example – and a warning — of what the future may hold for the other provinces and territories that include portions of the WCSB.

Fundamentally, the study makes it clear that there is a pressing need to change resource management planning to dramatically lessen the cumulative impact of linear disturbances, such as roads and seismic lines, on forest systems. The authors call for the adoption of three new features in forest management planning: meaningful stakeholder involvement, integrated planning between resource sectors, and an assessment of how current management decisions will affect the forest of the future.

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