Forest Fragmentation

Alberta GPI

Noteworthy:

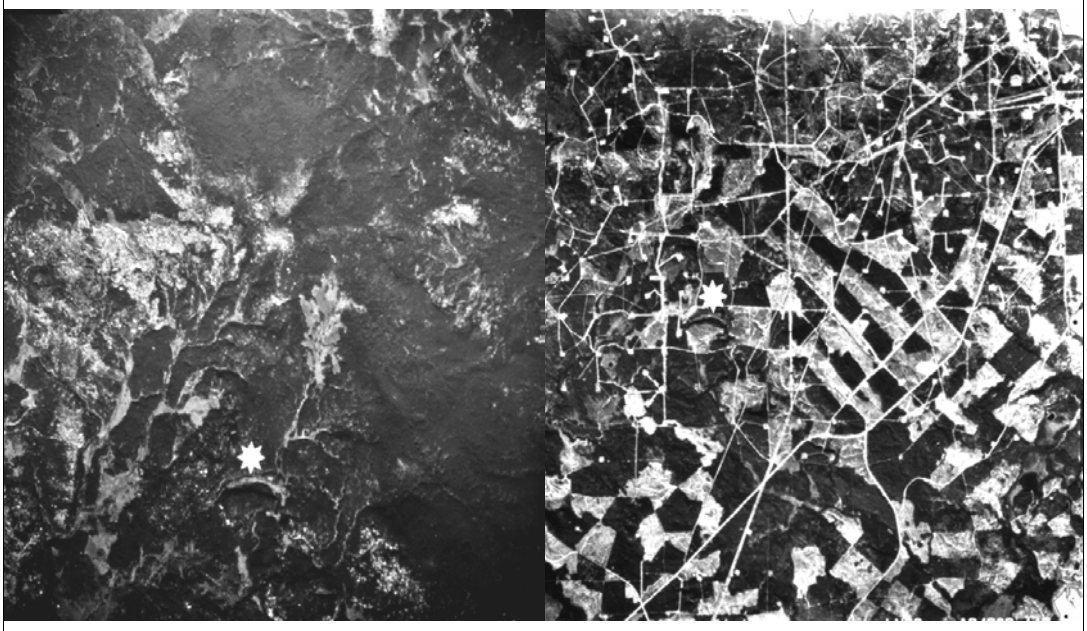
- The cumulative impact of human activity (agriculture, oil and gas exploration, forestry, settlement, roads, oilsands mining, power lines and other activities) has resulted in an ecological footprint so large that less than 9% of townships in the Boreal forests and 1% in the Foothills forest remain intact as wilderness (unfragmented).
- Up until 1999, the total Green Area (forest) affected by industrial and agricultural development was estimated at 1,482,430 hectares—roughly 115% of the total forest area havested between 1961 and 1999.
- A 1998 report for Alberta Environmental Protection, *The Boreal Forest Natural Region in Alberta,* found that only 23.4% of the boreal forest portion of Alberta's Green Area is not allocated to Forest Management Agreements.
- The rate of deforestation (1949-1995) in Alberta's southern Dry Mixedwood forests was found in one study to be proportionately higher than the annual rate of deforestation for the Amazon rain forest (1975-1988).
- Agriculture development is responsible for the largest area of wildlife habitat loss while oil and gas development has caused most of the habitat fragmentation.

Forest Fragmentation in Alberta: The condition of forest ecosystems

Alberta's forests are highly fragmented due to the impacts of timber harvesting, roads, wellsites, seismic lines, pipelines, powerlines, and other forms of linear disturbance. The extent of forest fragmentation can best be illustrated in aerial photographs. The images below show the same area of the Swan Hills forest in 1949 and 1991. Up until 1999, the total area affected by energy and other industrial development in Alberta's Green Area (forest) was estimated at 1,482,430 hectares—an area roughly 48% the size of Vancouver Island. Based on the Alberta GPI forest resource accounts, as of 2003 over 90% of Alberta's productive forest was fragmented.

A 1998 study for Alberta Environmental Protection found that the ecological integrity of Alberta's boreal forest ecosystem (the majority of the province's forest land) had been moderately to seriously compromised with only 12.8% of the area roadless and 14% that remains as viable core wildlife habitat. A previous study found that in Alberta's Foothills forest region, linear disturbance had left less than 1% of the forest unfragmented. Both studies concluded that cumulative impacts of human activity pose a threat to long-term biodiversity.

Alberta's Swan Hills Forest Ecosystem, 1949 (left) and 1991 (right)



Whether visual or numeric, measures of integrity of forest ecosystems tell us a great deal about our stewardship of the environment.

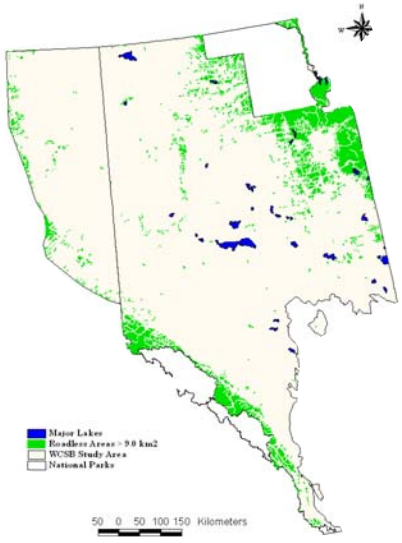
So What?

The visual and empirical evidence of fragmentation and loss of integrity of forest ecosystems is clear. The figure at the upper right shows that as Alberta's GDP has increased since 1961, so too has the amount of forest fragmentation. Satellite or aerial imagery of Alberta would reveal a "spider web" of linear disturbance that cuts up the provincial land base. Should we be concerned? The real, long-term impacts on ecological health, wildlife, climate and human health are as yet unknown. Understanding why forest ecosystem integrity matters to the well-being of present and future Albertans and to nature is a challenge. At the very least, Albertans should be shown the visual costs of developing these resources and exporting mostly non-renewable natural capital over the last 30 years.

The full ecological costs of these impacts are just beginning to be evaluated. In the meantime, more pipelines, wellsites, seismic lines and other corridors are being constructed to give access to smaller pools of natural gas and enable Alberta's natural capital to be exported. With demand for natural gas growing and oilsands development expanding, no corner of Alberta (outside of designated parks) will be left untouched by development. Ultimately, Albertans must decide if the benefits of an additional barrel of oil or cubic metre of gas exports outweigh the uncertain costs of loss of ecological integrity. Sustainable stewardship of natural capital requires careful management of all values, ensuring the maintenance of ecosystem health, diversity and resiliency.

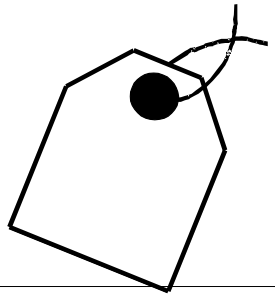
Forest Fragmentation Index: Where are we today?

Remaining Areas with Access Densities >9.0 km² in the Forests of Alberta and Northeastern British Columbia, 1997



The figure to the left shows a satellite image of Alberta in 1997. The blue areas are major lakes while the green areas are roadless areas of greater than 9 km², excluding parks (shown in white).

World Resources Institute



The forest fragmentation index stood at a mere 8 in 2003 on a scale where 100 represents zero fragmentation (see figure above).

Putting a price tag on the cost of loss of forest ecosystem integrity due to fragmentation is beyond the scope of this study. However, some researchers have begun to estimate the non-market values from the loss of ecosystem services, which might be considered in future GPI estimates.