Structural Impediments to FSC Certification in Alberta:

Overcoming Barriers to Well-Managed Forests

A report by:
Alberta Wilderness Association,
Albertans for a Wild Chinchaga,
Canadian Parks and Wilderness Society—Edmonton Chapter,
and the
Federation of Alberta Naturalists

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Executive summary

The ecological integrity of Alberta's forests is being seriously impaired through progressive fragmentation and loss of habitat resulting from the activities of the forest and petroleum industries. Significant improvements in forest management policy at the provincial level are necessary if the Alberta forest industry is to stay abreast of market trends.

The world market for forest products is changing rapidly as major purchasers and consumers indicate their preference for wood products that can be independently certified as coming from well-managed forests. Forest Stewardship Council (FSC) certification is currently the only demonstrably independent system that has broad international support from indigenous people and other forest users, industry, retailers and conservation groups. Seven percent of the world's industrial wood consumption is now FSC certified. Three of the five largest wood buyers in the world—IKEA, The Home Depot and Lowes—actively support the FSC.

This report identifies two fundamental structural impediments to well-managed forests in general, and Forest Stewardship Council (FSC) certification in particular, that need to be addressed by the Alberta Provincial Government. These impediments are:

1) The lack of a scientifically-defensible protected areas network in Alberta;
2) The inability of Alberta's forest industry to manage forests for ecological sustainability due to the activities of Alberta's petroleum industry.

Structural impediments are considered barriers to the successful implementation of sustainable forestry that are beyond the ability of the forest industry to change, should it wish to meet the requirements of FSC certification. Given rapidly changing market forces, such impediments must be overcome to maintain access to world markets and to maintain market share.

The FSC has 10 Principles to evaluate whether forests are well-managed. Principle 6 of the FSC, for example, requires the conservation of biological diversity and the maintenance of ecological functions and integrity of the forest. It is well established that two forest management approaches are necessary to achieve these objectives—the establishment of a network of scientifically-defensible protected areas, and the implementation of ecologically-based management on the industrial land base. Protected areas must be designated to ensure representation of all ecoregions and to maintain natural processes (including natural disturbance regimes, which are responsible for much of the structure, pattern, and ultimately biodiversity of the boreal forest). Such a network of protected areas does not exist in Alberta.

Ecological forest management requires managers to maintain the forest structures and patterns characteristic of natural systems. This requires long-term planning that incorporates explicit ecological targets (for both stands and landscapes) and operational strategies to achieve those targets. To ensure that these plans can be successfully implemented, the FSC's Principle 2 and Principle 7 state that forest managers must hold adequate tenure and use rights to the land and be able to manage for the long-term.

In spite of tenure agreements, forestry companies in Alberta do not have complete control over the cutting of trees in their management areas. In particular, activities related to the exploration and development of oil and gas resources annually result in a total area of forest clearing that approaches that of the forest industry. These activities include the cutting of seismic lines, the clearing of well sites, and the construction of roads, pipelines, and power lines. Even though the activities of the petroleum industry have a tremendous impact on the structure and integrity of the forest, there are no regulatory nor policy limits on the annual rate of cutting, no requirements for reforestation, and no requirements for integrated long-term planning with the forest industry.

The inability of the forest industry to control or even predict profound changes in landscape structure that are occurring because of petroleum industry activities effectively precludes their ability to successfully implement plans for ecological forest management.

If sound forest management and FSC certification of forests is to be possible in Alberta, the two structural impediments must be addressed in the following manner:

a) The Alberta Government must establish a network of scientifically-determined representative protected areas for each ecoregion (Natural Subregion) that are capable of maintaining species and ecosystem biodiversity. These can serve as ecological benchmarks. Since these sites alone will not be able to capture all of the ecological diversity of northern Alberta, additional protected areas of smaller size will be needed to represent unique localized landscape features (e.g., sand dune complexes), areas of particularly high diversity (e.g., major river corridors), and the specialized habitat needs of rare or endangered species (e.g., peatlands and/or old-growth forest for caribou).
b) Until Alberta's network of protected areas is complete for all the ecoregions in which a forest company is operating, the government must allow the company to protect from all industrial use a representative ecological benchmark and locally-occurring habitat of rare, threatened or endangered species to enable FSC certification.
c) The Alberta Government must reform Alberta petroleum tenure and planning regulations to ensure that petroleum industry and forest industry collaborate to achieve long-term forest planning and sustainability.

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CANADIAN PARKS AND WILDERNESS SOCIETY
Edmonton Chapter

1. Introduction

Alberta conservation groups concerned about forest management in Alberta, and supportive of the goals of **Forest Stewardship Council** (FSC) certification, have combined to form an FSC Environment Chamber in Alberta. These groups are: **Alberta Wilderness Association**, **Albertans for a Wild Chinchaga, Canadian Parks and Wilderness Society —Edmonton Chapter**, and the **Federation of Alberta Naturalists**. Our intent is to promote the FSC in Alberta, build capacity of Albertans to engage in FSC processes, and overcome structural impediments in Alberta so that our forests, forest industry and forest dependent communities are well positioned to benefit from FSC certification of Alberta's forests in a changing world market.

This report identifies impediments to FSC certification in Alberta that are largely out of the ability of the forest industry itself to control, with a view to initiating progress in removing those impediments. A draft of this document went out for review to forest industry, retailers, certifiers, and others who have indicated an interest in better forest management in general, and FSC certification in particular.

2. Forestry in Alberta

2.1. Forests

The ecological integrity of Alberta's forests has been and continues to be seriously affected by the cumulative impacts of the forest and petroleum industries. Linear disturbances or access density associated with forestry and oil and gas activity, with the resulting habitat loss and fragmentation, have the most detrimental ecological impacts on the forest.(AEP, 1998b) At 83%, Alberta has one of the highest percentages of accessed forest in Canada.(World Resources Institute, 2000)

The boreal forests of Alberta as defined by Natural Resources Canada include all Natural Regions except the Grasslands and Rocky Mountains. The boreal forest has been divided into three natural regions and 13 subregions (ecoregions) based on vegetation, soil, geology and landform features (AEP, undated). A brief description of each ecoregion can be found in Appendix 1.

The boreal forest in Alberta is characterized by pine, white spruce and aspen poplar in the more productive sites, with black spruce often dominating the peatlands and pine the drier sites. Mixedwood forests composed of combinations of the above tree species are very common. Far from being a monotonous landscape the boreal forests are known for their diversity, caused by the variation in soil type, elevation, and topography, and natural disturbances such as insects, flooding and primarily fire. The result being a mosaic of forest patches of different sizes, ages and species composition resulting from a cycle of forest maturation and renewal that has developed and continued for thousands of years, since the retreat of the glaciers.

Wildlife common to parts of Alberta's boreal forests include grizzly and black bear, wolf, cougar, lynx, wolverine, fisher, marten, woodland caribou, elk, moose, deer, beaver, many neotropical migrant songbirds, woodpeckers and owls.

While fire continues to be a dominant disturbance in the boreal (Stelfox and Wynes, 1999), the activities of the forest and petroleum industries have added a level of disturbance to which species in the boreal are not adapted (Fig. 1). If the biodiversity of the boreal forests of Alberta is to be maintained, significant changes to the amount and character of industrial activities must be made.

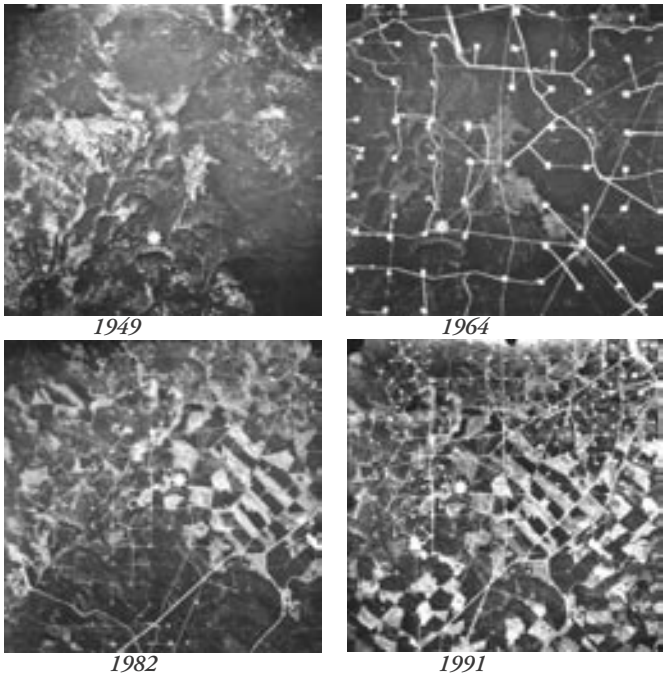


Fig. 1 . Time-lapse sequence of four aerial photographs. From 1949 to 1991, Alberta's Swan Hills changed from a roadless wilderness to an intensely fragmented landscape. The photo series shown here is at Imperial Tower, 35 kilometres north of Whitecourt. The stars indicate the same reference poin of 54° 27' N, 11°15' 36" (AEP, 1996b.)

2.2 Forest Industry

Since the early 1960s, forest harvesting in Alberta has been increasing at an exponential rate (Fig. 2). Since 1960, forest harvesting in Alberta has increased from 2,416,000 m^3 to 20,030,744 m^3 in 1996- a tenfold increase.(Stelfox and Wynes, 1999) The increase is attribut-

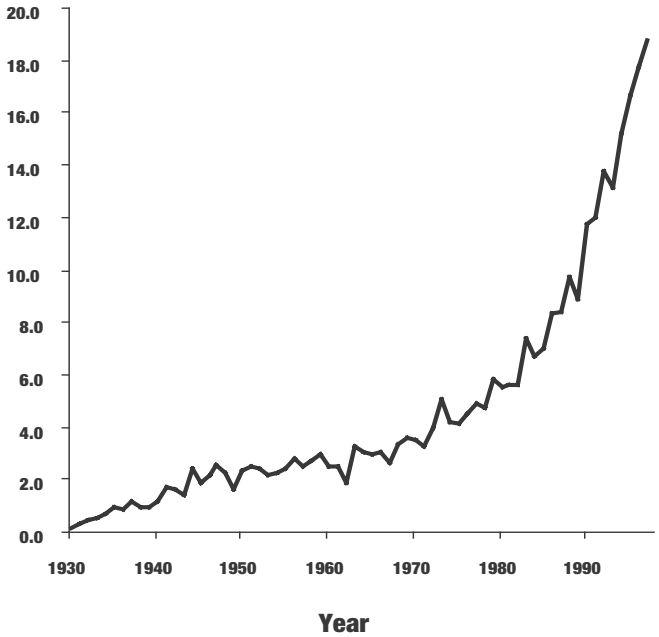


Fig. 2. Annual logging volume in Alberta from 1930 to 1997. Data source: Alberta Lands and Forest Service record (cf. Stelfox and Wynes. 1999).

able to government policies promoting expansion of the forest industry, to the progressive development of infrastructure (roads, mills, etc.), and to changing technology (e.g., the ability to use aspen for making pulp). In 1998, 61,222 ha of forest were harvested in Alberta, (CFS, 2000, p. 27) producing 18.7 million m^3 of timber.(AEP, 1999a, p. 28)

While provincial revenues from the oil and gas industry in Alberta vastly outweigh those of the forest industry (Fig. 3), the contribution of the forest industry to Alberta's economy is significant.

In 1999, the forest industry accounted for 24,300 direct jobs in Alberta (CFS, 2000, p. 27).

Wages and salaries paid in 1997 amounted to $704 million (CFS, 2000, p. 27). Revenue to the Government of Alberta, in the form timber royalties and fees, was $80.3 million for the fiscal year 1999 (AEP, 1999a, p.33). The major export products of the forest industry in Alberta are wood pulp and softwood lumber (Fig. 4). The U.S. is the major market for Alberta wood products (Fig. 5).

Ownership of the forest resource is: 87% provincial, 9% federal and 4% private (CFS, 2000,p. 27)

Forest type is: 44% softwood , 23% mixedwood and 33% hardwood (aspen poplar) (CFS, 2000, p.27).

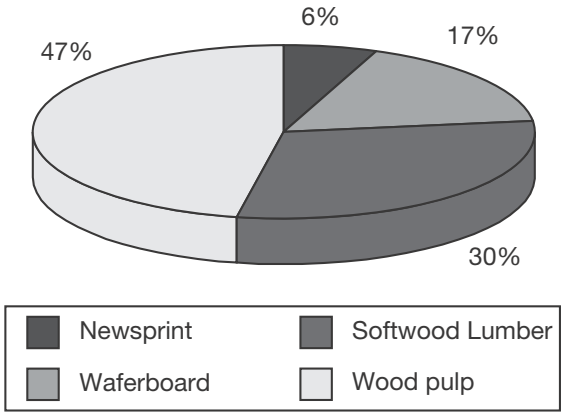


Fig. 4. Alberta wood product exports in 1999 by product type. Source: (CFS, 2000, p.27)

2.3 Forest Policy

The provincial Forests Act (1994) provides the legal framework for management of forests in Alberta.(GOA, 1999) It defines the basic rules governing forest tenure and provides the Minister and Cabinet with the power to set policies and regulations governing logging methods, wood utilization standards, and broader issues concerning use of forest land.(Moen, 1990, p. 8) The Act itself provides minimal guidance as to how the forests should be managed, except that the harvesting of timber should be designed to provide a perpetual sustained yield. (GOA, 1999, sec. 16-1)

The National Forest Strategy is meant to guide Canada's efforts in sustainable forest management as we enter a new millennium. It is a renewed plan of action to deal in a forthright manner with the connectedness among the ecological, economic, social and cultural aspects of forest use and conservation. The goal is to maintain and enhance the long-term health of our forest ecosystems, for the benefit of all living things

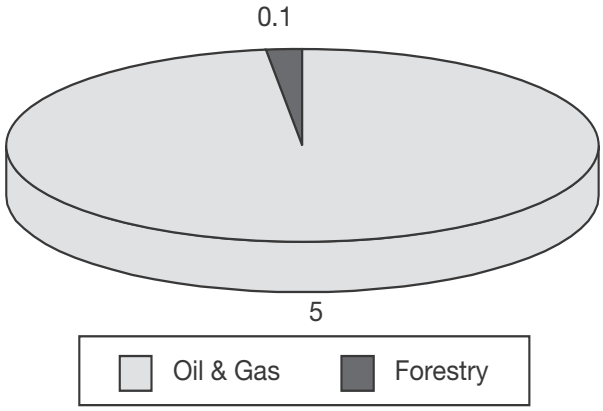


Fig. 3. Provincial revenues ($billions) from the oil and gas industry and forest industry in 1999/2000 (ARD, 2000a: 38).

both nationally and globally, with providing environmental, economic, social and cultural opportunities for the benefit of present and future generations.(NFS, 1998)

As a fulfilment of commitments made by the Government of Alberta under the National Forest Strategy in 1994, the Minister of Environmental Protection established a multi-stakeholder steering committee to consult with Albertans and develop a long-term vision and recommendations for sustaining Alberta's forests. The Alberta Forest Conservation Strategy (AFCS) was the product of over three years work by an 11-member multi-stakeholder steering committee, a stakeholder advisory group (representing over 60 stakeholder groups), urban and rural working groups, and strategic issues working groups. Over 800 Albertans participated in the development of the Strategy.(AFCSSC, 1997) Given this broad representation and concerted effort, the AFCS is the best available guide to the vision and goals held by Albertans regarding public forests.

A fundamental principle of the AFCS is that forest ecosystem health must be maintained if we are to continue to receive benefits from the forest in the future:

"The forest of Alberta will be appreciated as ecosystems and our activities managed in ways that conserve ecological integrity, biological diversity, long-term forest productivity and the forest landbase." (AFCSSC, 1997, p. 4)

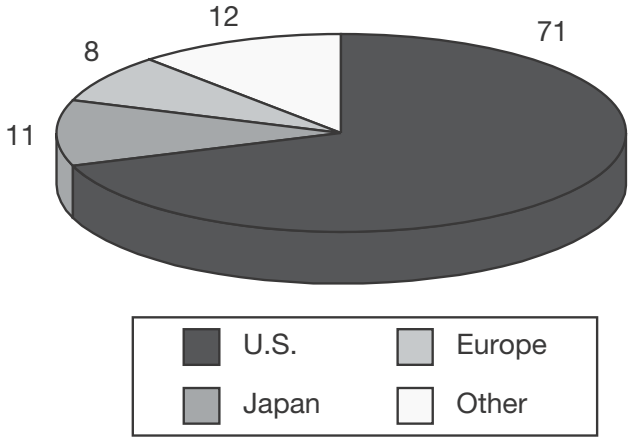


Fig. 5. Major export markets for Alberta wood products in 1999 (CFS, 2000, p.27)

The AFCS recommends "That the Government of Alberta and forest land users and owners adopt and implement ecological management for the management of forest areas…(p. 11)" More specifically (related to impediments to FSC certification in Alberta) it recommends "That the Government of Alberta… complete its system of protected areas to represent the full diversity of all the forested natural regions of Alberta…(p. 18)." and "That the Government of Alberta's land-use planning focus on setting broad objectives. Industries in cooperation with one another and with other users, should plan how these objectives can best be achieved (p.12)."

The Alberta Forest Legacy (AEP, 1998b) produced by the Alberta Government and built upon the recommendations provided in the AFCS, is the implementation framework for sustainable forest management. The Alberta Forest Legacy accepts the vision, goals, and principles of the AFCS.(AEP, 1998b, p. 7)

Because forests in Alberta are managed primarily through policy, and not law, major management decisions are not subject to legislative debate, nor can the government be held legally accountable for the implementation of its plans. Most significantly, although the government has accepted the goals and principles of the AFCS in its policy documents, legal requirements remain limited to sustained yield management. Consequently, the government's failure to ensure that ecological forest management is implemented in Alberta, as described in the AFCS document, cannot be legally challenged.(Moen, 1990, p. 94) This constitutes a serious breach in accountability, given that ecological forest management has been clearly identified as the public's desired approach to the management of forests in Alberta.

3. The Changing Market for Forest Products and the FSC

3.1 Shifting Demand

Recent analyses of the condition of the world's forest have caused growing global concern about their destruction and degradation. A 1997 World Resources Institute report (Bryant, et.al., 1997) found that only 1/5 of the Earth's original forests remain in a condition to sustain fully-functioning ecosystems. A recent United Nations report (UNEP, 2001) concludes that: Short of a miraculous transformation in the attitude of people and governments, the Earth's remaining closed-canopy forests (tree coverage >40%) and associated biodiversity are destined to disappear in the coming decades.

This global concern over forests is translating into market activity. Increasingly, consumers are shifting purchases of forest products away from endangered forests, and are demanding that forest products instead come from well-managed forests. High profile customers like Home Depot and Lowe's have committed to phase out purchases from endangered forest areas. Furthermore, a 1990 Market and Opinion Research International poll showed that 80% of consumers would buy 'green' products given the choice.(Forest Stewardship Council, 2001)

3.2 The Forest Stewardship Council (FSC)

The FSC is an international non-profit organization founded in 1993 to support environmentally appropriate, socially beneficial, and economically viable management of the world's forests.(Forest Stewardship Council, 2001) The FSC is funded by charitable foundations, government donors, membership subscriptions and accreditation fees.(Certified Forest Products Council, 2001)

The FSC is an association of members consisting of a diverse group of representatives from environmental and social groups, the timber trade and the forestry profession, indigenous people's organizations, community forestry groups and forest product certification organizations from around the world. Membership is open to all who are involved in forestry or forest products and share its aims and objectives.(Forest Stewardship Council, 2001)

The FSC has introduced an international labelling scheme for forest products, which provides a credible guarantee that the product comes from a well-managed forest. All forest products carrying the FSC logo have been independently certified as coming from forests that meet the internationally recognized FSC Principles and Criteria of Forest Stewardship. In this way the FSC provides an incentive in the market place for good forest stewardship. The forest inspections are carried out by a number of FSC accredited certification bodies, which are evaluated and monitored to ensure their competence and credibility.(Forest Stewardship Council, 2001)

The FSC also supports the development of national and local standards that implement the international Principles and Criteria of Forest Stewardship at the local level. These standards are developed by national and regional working groups, which work to achieve consensus amongst the wide range of people and organizations involved in forest management and conservation in each part of the world. The FSC has developed Guidelines for developing regional certification standards to guide

Table 1. FSC's 10 Principles

Principle 1:	Compliance With Laws And FSC Principles Forest management shall respect all applicable laws of the country in which they occur, and international treaties and agreements to which the country is a signatory, and comply with all FSC Principles and Criteria.
Principle 2	Tenure And Use Rights And Responsibilities Long-term tenure and use rights to the land and forest resources shall be clearly defined, documented and legally established.
Principle 3	Indigenous Peoples' Rights The legal and customary rights of indigenous peoples to own, use and manage their lands, territories, and resources shall be recognized and respected.
Principle 4	Community Relations And Worker's Rights Forest management operations shall maintain or enhance the long-term social and economic well-being of forest workers and local communities.
Principle 5	Benefits From The Forest Forest management operations shall encourage the efficient use of the forest's multiple products and services to ensure economic viability and a wide range of environmental and social benefits.
Principle 6	Environmental Impact Forest management shall conserve biological diversity and its associated values, water resources, soils, and unique and fragile ecosystems and landscapes, and, by so doing, maintain the ecological functions and the integrity of the forest.
Principle 7	Management Plan A management plan -- appropriate to the scale and intensity of the operations -- shall be written, implemented, and kept up to date. The long term objectives of management, and the means of achieving them, shall be clearly stated.
Principle 8	Monitoring And Assessment Monitoring shall be conducted -— appropriate to the scale and intensity of forest management -- to assess the condition of the forest, yields of forest products, chain of custody, management activities and their social and environmental impacts.
Principle 9	Maintenance Of High Conservation Value Forests Management activities in high conservation value forests shall maintain or enhance the attributes which define such forests. Decisions regarding high conservation value forests shall always be considered in the context of a precautionary approach.
Principle 10	Plantations Plantations shall be planned and managed in accordance with Principles and Criteria 1 - 9, and Principle 10 and its Criteria. While plantations can provide an array of social and economic benefits, and can contribute to satisfying the world's needs for forest products, they should complement the management of, reduce pressures on, and promote the restoration and conservation of natural forests.

working groups in this process. (Forest Stewardship Council, 2001) There is a Canadian FSC working group, and several regional processes are currently underway.

The FSC Principles (Table 1) not only have requirements for the environmental aspects of forestry, but also address Indigenous peoples' rights, and the economic well being of communities and workers. The full set of Principles and Criteria can be found in Appendix 2.

The Global Forest and Trade Network (GFTN) is a group of organizations around the world that share the common aim of promoting trade in independently certified forest products as a means of improving forest management practices. The FSC is currently the only forest certification system that satisfies the Global Forest and Trade Network's criteria for good forest management. Currently there are 15 organizations, or Forest and Trade Networks, within the GFTN, each serving a specific region of the world.(Certified Forests Products Council, 2001)

Nearly seven hundred companies with an annual turnover of $180 billion US support FSC as members of the Global Forest and Trade Network – either by producing FSC timber or goods or buying them whenever possible. Regional and national Forest and Trade Networks are now established in Europe, North America, South America and Australia. At the current rate of growth there will be 1,000 members by the end of 2001, with Japan and Hong Kong soon to join the Global Network.(Certified Forest Products Council, 2001)

The FSC is the only organization offering a credible worldwide timber certification scheme for all forest types and plantations, and as such has already received endorsement and active commitment from a wide range of Non-Governmental Organizations, including the World Wildlife Fund, Friends of the Earth, Greenpeace, and the Natural Resources Defence Council (NRDC).(Forest Stewardship Council, 2001)

To date more than 20 million hectares of forest in 35 countries have been independently certified under the FSC certification scheme and more than 20,000 products carry the FSC label. Seven per cent of the world's industrial wood consumption is FSC certified. Three of the five largest wood buyers in the world—Lowes, The Home Depot and IKEA—actively support FSC. AssiDomän, the world's largest private forest owner, has all its Swedish forests FSC certified. The percent-

age of Sweden's forested area certified by the FSC is 45%, the highest rate in the world.(World Wildlife Fund, 2001)

3.3. Other systems

Forest industry associations and governments around the world are responding to the FSC by creating their own systems. In Canada, the Canadian Standards Association (CSA) has been the principle response to the FSC, while in the US it has been the Sustainable Forestry Initiative (SFI). At present, however, only the FSC is widely accepted as a truly independent system with measurable performance standards for sound forest management.

According to the Standards Council of Canada, a standard is a published document that contains requirements, procedures or definitions for a specific activity.(SCC, 1992)

One of the most critical requirements of a standard is that as far as possible it is based on measurable terms:

All National Standards of Canada shall be based on requirements which are stated as far as possible in measurable terms, the basis for such measurements and the criteria against which they will be judged being set out or identified in the standard in terms which will permit one skilled in the art to determine conformance.(SCC, 1992)

Development of the standard must also be a consideration and the Standards Council of Canada's Criterion 1 states:

The significance, timeliness and suitability of a standard… shall be determined on the basis of a reasonable agreement among the views of a number of capable individuals whose collective interests provide a balance of representation of producers, consumers and others with relevant interests, as may be appropriate to the subject at hand.

Of the main standards for forest certification around the world, only FSC currently meets the criteria for measurable terms and a balance of representation in their development.

A recent report presents a summary of the most common standards for North America—FSC, CSA and SFI—comparing some of the main procedural and performance requirements.(Fern, 2001) The findings are presented below in Table 2.

Table 2. Comparison of certification schemes (modified from Fern, 2001).

	FSC	CSA	SFI
Certification of performance standards[1] with clear minimum environmental and social thresholds.	**Yes**	**No**	**No**
Allows for equitable and balanced participation and decision making.	**Yes**	**No[2]**	**No**
Includes a credible chain of custody as a basis for product labelling.	**Yes**	**Yes**	**No**
Requires independent third party assessment and annual field audits.	**Yes**	**Yes**	**No**
Is transparent to the public and the parties involved.	**Yes**	**No**	**No**
Requires forest management unit level certification.	**Yes**	**Yes**	**Yes[3]**
Requires a clear commitment from managers towards improving forest management.	**Yes**	**Yes**	**Yes**
Is a global system, applicable in all regions and all sorts of tenure systems.	**Yes**	**No**	**No**

1. Performance standards should specifically address a comprehensive range of key issues, including, at a minimum: old-growth or high conservation value forests,; protection of biological diversity,; use of chemicals and GMOs; recognition of indigenous people's rights; soil and water quality; and consistency with laws and international agreements (e.g. ILO standards on labour rights, Convention on Biological Diversity).

2. Public input is required via public advisory groups, but the final decision about performance objectives is made by the applicant.

3. SFI is largely systems based. The forestry organisation determines the scope of the assessment and it is unclear to what extent individual forest management audits are required.

4. Structural Impediments to FSC certification in Alberta

When forest managers live up to all 10 Principles and 56 Criteria of the FSC, the likely result will be well-managed forests. What happens, however, when forest managers are unable – possibly through no fault of their own – to meet key aspects of the FSC framework? This is currently the case in Alberta.

In Alberta, there are two fundamental barriers that forest managers face in achieving FSC certification:

1) The lack of a scientifically-defensible protected areas network in Alberta.
2) The inability of the Alberta forest industry to manage forests due to the tenure rights and activities of Alberta's oil and gas industry.

These barriers mean that Alberta forest companies are falling behind the market curve for producing sustainable forest products. They also represent two of the most significant reasons why Alberta's forests will not maintain the full range of values necessary for FSC certification: social (wilderness, aesthetic, recreation), economic (long term sustainability, diversification), ecological (maintenance of biodiversity). We now explore these two structural impediments in detail.

4.1 Protected Areas

The precise forest practices necessary to sustain biodiversity, and hence to maintain the ecological functions and the integrity of the forest, are uncertain. Therefore, to realistically hope to attain these objectives, it is necessary to have an approach to managing the forest that involves more than just logging. The long-term maintenance of biodiversity requires an approach that combines both protected areas and ecologically-based management of the industrial land base.(Franklin, 1993) The integration of these approaches, within an adaptive management framework, forms the basis of ecological forest management.(Grumbine, 1994; Environment Canada, 1995, p.22) The necessity for protected areas as an integral part of ecological management has been well recognized. Environment Canada states: "An ecological approach to resource management is central to achieving biodiversity conservation and the sustainable use of biological resources," and "The establishment and management of protected areas is the second element of the ecological management approach." (Environment Canada, 1995)

Protected areas maintain biodiversity by maintaining the habitat and ecosystem processes that species require for their existence.(Noss, 1992) As the habitat requirements of most species are not known (in fact, most species have not even been described), an individual-species approach to habitat conservation is unworkable.(Franklin, 1993) The alternative, termed the "coarse-filter" approach, attempts to meet the habitat requirements of the majority of species by ensuring that the full spectrum of ecosystem types is represented within the system of protected areas. (Noss, 1992; Kavanagh and Iacobelli, 1995, p. 10)

The distribution of major ecosystem types in Alberta is provided by the Natural Regions and Subregions classification developed by the provincial government. This system of classification delineates ecosystems on the basis of differences in geology, landforms, soils, hydrology, climate, and dominant vegetation patterns.(AEP, 1994b p. 2) For a system of protected areas to be fully representative, protected areas should be established within each Natural Subregion.(AEP, 1994c p.2)

In addition to broad-scale representation, protected areas need to provide representation of smaller-scale landscape features (e.g., riparian zones, bogs, etc.). An analysis conducted as part of the Special Places 2000 initiative identified the key landscape features that should be considered and summarized (by Natural Subregion) the area of each that is represented in existing protected areas.(AEP, 1994c p. 26)

Representation is also a factor in the selection of areas to be used as ecological benchmarks.(AFMSC, 1997, p. 11) To provide the greatest statistical power in detecting changes due to industrial practices, benchmark areas should be matched to major resource management units (e.g., FMAs) in terms of ecological composition and spatial proximity.(Schneider, 2000c)

Representation of ecosystems and landscape features is only the first step in protected area design. Representation alone cannot ensure that natural processes will be maintained or that native species will survive.(Noss, 1995, p. 6) Thus, a complementary goal to adequate representation is the maintenance of ecological integrity. Ecological integrity is defined as the degree to which all ecosystem components and their interactions are represented and functioning.(Quigley et al., 1996, p. 29)

A fundamental requirement for the maintenance of ecological integrity within protected areas is the maintenance of disturbance-renewal cycles.(Noss, 1992) Fire is the dominant disturbance agent in the boreal forest and is responsible for much of the structure, pattern, and ultimately biodiversity, present in boreal landscapes.(Johnson et al, 1998; Schneider, 2000a) It follows that a key design consideration for protected areas in northern Alberta is the maintenance of a natural fire regime.

Several researchers have suggested that protected areas must be substantially larger than the largest disturbance for the natural fire regime to be maintained. (Pickett and Thompson, 1978, White, 1987, Baker, 1992) In a computer simulation study using historical fire data from northern Alberta it was determined that protected areas of 5,000 km^2 had a high probability of maintaining stable rates of burning, with full representation of the natural range of fire sizes.(Schneider, 2000b) The implication is that all forest age classes and patch sizes will be continue to be represented over ecologically relevant periods of time (though not necessarily in a steady state). In contrast, burning in protected areas of 500 km^2 was highly variable, generally resulting in either inadequate or excessive amounts of burning relative to what is required to maintain full representation of forest age classes and patch sizes over ecologically-relevant periods of time.(Schneider, 2000b) These findings imply that in northern Alberta protected areas approaching or exceeding 5,000 km^2 are required for maintaining fire regimes and, by extension, ecological integrity.

Protected areas in the order of 4,000 km^2 and larger were recommended for complete biodiversity and wilderness protection by the Canadian Environment Advisory Council in 1991.(CEAC,1991)

4.1.1 FSC Principles and Criteria Relevant to Protected Areas

The FSC Principles and Criteria explicitly recognize the role of protected areas in sound forest management, with the following being most relevant:

Principle #6: Environmental Impact

Forest management shall conserve biological diversity and its associated values, water resources, soils, and unique and fragile ecosystems and landscapes, and, by so doing, maintain the ecological functions and the integrity of the forest.

Criterion 6.2 Safeguards shall exist which protect rare, threatened and endangered species and their habitats (e.g., nesting and feeding areas). Conservation zones and protection areas shall be established, appropriate to the scale and intensity of forest management and the uniqueness of the affected resources. Inappropriate hunting, fishing, trapping and collecting shall be controlled.

Criterion 6.4 Representative samples of existing ecosystems within the landscape shall be protected in their natural state and recorded on maps, appropriate to the scale and intensity of operations and the uniqueness of the affected resources.

Taken together as a package, these FSC Principles and Criteria constitute an obligation to establish a scientifically-defensible protected areas network that:

a) "Shall" conserve biodiversity (Principle 6)
b) "Shall" be representative of existing ecosystems at the necessary scale to achieve objectives (Criterion 6.4)
c) "Shall" establish protection areas tailored to safeguarding rare, threatened and endangered species and their habitats (Criterion 6.2)

Each of these qualities constitutes a performance measure of the adequacy of protected areas and must be met. As we see below, Alberta needs significant improvement in the amount and type of protected areas in order to meet these measures.

4.1.2 Existing situation in Alberta

The situation in Alberta was examined with respect to the status of protected areas required to meet FSC standards.

a) "Shall" conserve biodiversity (Principle 6) and
b) "Shall" be representative of existing ecosystems at the necessary scale to achieve objectives (Criterion 6.4)

The Alberta government has made various commitments to the establishment of representative protected areas as a strategy for conserving biodiversity by signing on to the National Forest Strategy, the Canadian Biodiversity Strategy, the Montreal Process, the Alberta Forest Conservation Strategy, and in the Alberta Forest Legacy- which is Alberta's implementation framework for sustainable forest management. See Appendix 3.

Table 3. Alberta Protected Area Analysis for Ecoregions in the Boreal Forest(AE, 2001b)

Natural Region	Natural Subregion (Ecoregion)	% of Subregion Protected	Subregion as % of Alberta
Boreal Forest	Boreal Highlands	14.1	3.2
	Central Mixedwood	14.3	23.3
	Dry Mixedwood	1.9	15.2
	Peace River Lowlands	75.1	1.5
	Sub-Arctic	30.4	3.2
	Wetland Mixedwood	22.0	5.8
Canadian Shield	Athabasca Plain	4.7	1.1
	Kazan Upland	11.8	1.4
Foothills	Lower Foothills	1.9	9.9
	Upper Foothills	1.8	4.4
Parkland	Central Parkland	0.9	8.1
	Foothills Parkland	2.1	0.7
	Peace River Parkland	1.0	0.7

In addition on March 11, 1992, His Royal Highness the Duke of Edinburgh in his capacity as the International President of the World Wildlife Fund (WWF), received a commitment from the Alberta provincial government to prepare a "made in Alberta" strategy for completing our component of Canada's Endangered Spaces program (government of AB fact sheet, undated). This program recommended the protection of at least 12% of each of Canada's natural regions. In Alberta that strategy came to be known as Special Places 2000.

The Special Places 2000 program ended summer 2001, however, adequate representative protected areas were not established for each of the forested ecoregions. (See Table 3, Fig. 6.) Two of the major ecoregions still containing commercial forest- the Foothills and Dry Mixedwood- have less than 2% of their area protected (Table 3). While the Peace River Lowlands have a high percentage of protection most of their commercial white spruce forests have already been logged.(AEP, 1998a) The Sub-Arctic, and the Canadian Shield ecoregions have no commercial forest, and the commercial forest of the Parkland ecoregions have been largely removed for agricultural purposes.(AEP, 1997a) The only ecoregions containing significant commercial forest with more than 14% protection are the Boreal Highlands, Wetland Mixedwood and Central Mixedwood. But the Central Mixedwood protected areas are located primarily in the far north, while this ecoregion extends considerably further south.

80% of Alberta's forested protected areas are in only two sites (Wood Buffalo National Park and Caribou Mountains Wildland Provincial Park) located in the extreme north of the province.

With the exception of northeast Alberta there are no protected areas in the boreal forest that exceed 1,000 km^2 in size, (whereas sites exceeding 4,000 km^2 are considered necessary for conservation of biodiversity.(CEAC, 1991)

Industrial activities are permitted, through legislation, in many protected areas in Alberta. In fact in some cases the wellsite density for 'protected areas' was higher than for the ecoregion as a whole. For example a 1998 study (AEP, 1998a) reported a wellsite density of 0.54 wells/km^2 in Dry Mixedwood natural areas, whereas the wellsite density of the Dry Mixedwood as a whole was 0.40 wells/km^2. The Lower Foothills ecoregion natural areas had a well density of 1.31 compared to 0.32 for the ecoregion as a whole. The accompanying roads, pipelines and seismic lines further contribute to the ecological degradation of these sites.

Currently only Wood Buffalo National Park contains representative forest ecosystems in the boreal at the necessary scale to achieve the objective of maintaining biodiversity.

c) "Shall" establish protection areas tailored to safeguarding rare, threatened and endangered species and their habitats (Criterion 6.2)

While few species in Alberta have had adequate study to indicate trends in their populations, many are considered "Sensitive," "May be at Risk," or "At Risk," according to the Status of Alberta Wildlife Species report.(AE, 2001a) The main reasons given to account for declines in the populations of these species

There are many other species of concern in the forested regions of Alberta, and most of those have requirements for mature or old-growth forest.(AE, 2001a) Grizzly bear, wolverine, northern myotis (bat), and the Canadian toad have been designated as **May Be At Risk** of extinction or extirpation. Several species are designated as **Sensitive**, which means they may require special attention or protection to prevent them from becoming at risk. Among these are several migrant birds such as the bay-breasted and black-throated green warblers, western tanager, and the broad-winged hawk. Some resident birds are also considered sensitive such as the great gray, northern pygmy and barred owl, the pileated and black-backed woodpecker, the northern goshawk. Lynx and fisher are two mammals also considered as "sensitive". More detailed information on all of these species can be found in Appendix 4.

are loss of old-growth habitat and forest fragmentation due to industrial use.(AE, 2001a) This indicates more must be done to conserve the biodiversity of Alberta's forests, both in terms of establishing protected areas, and in changing practices on the industrial landbase. (Appendix 4 provides information on the status of the forest-dependent species included in that report.)

In Alberta forests one of the best studied and main species of concern is the woodland caribou, which is considered At Risk and designated as Threatened under Alberta's Wildlife Act.

To date there is only one protected area (the Caribou Mountains Wildland Provincial Park) that contains a significant amount of caribou habitat. However, this site is largely wetlands (including peatlands), and the potential consequences of not protecting the currently disturbed commercial forested part of their habitat, adjacent to the site, remains to be seen. Five of the seven studied woodland caribou populations in the province, including the Caribou Mountain herd, are in decline (Dzus, 2001) due to the impacts of clearcut logging, seismic lines, roads and other linear disturbance.

Logging of old-growth forests not only removes useable caribou habitat, but creates the early seral forest stages attractive to moose and deer and therefore also wolves. The concentration of caribou due to less available habitat and avoidance of human

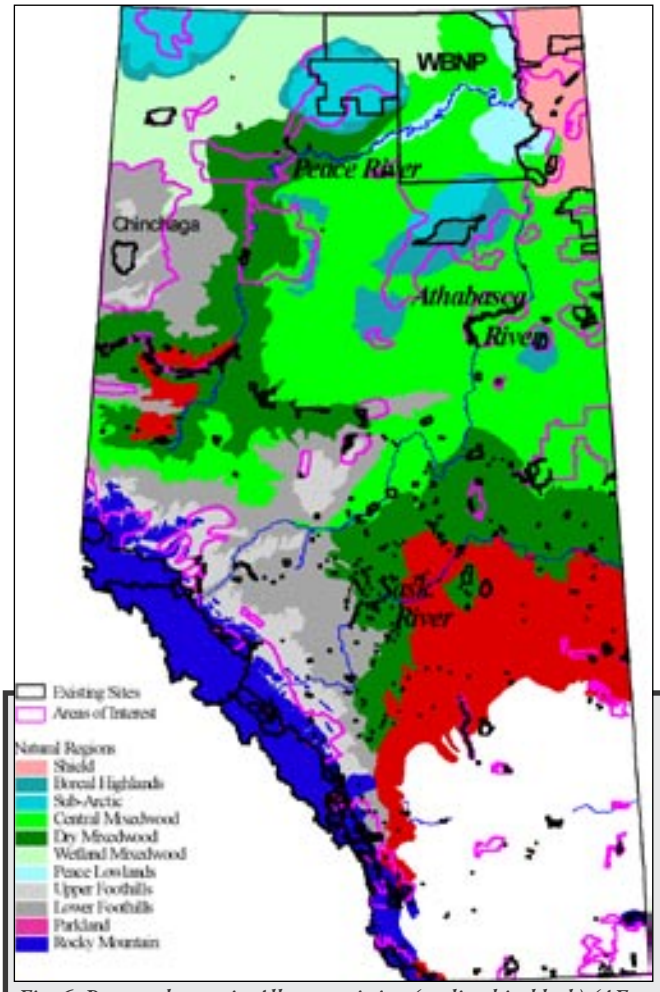


Fig. 6. Protected areas in Alberta: existing (outlined in black) (AE, 2001b) and areas of interest for further protected areas (outlined in purple). See text box in section 4.1.3 for more information on areas of interest.

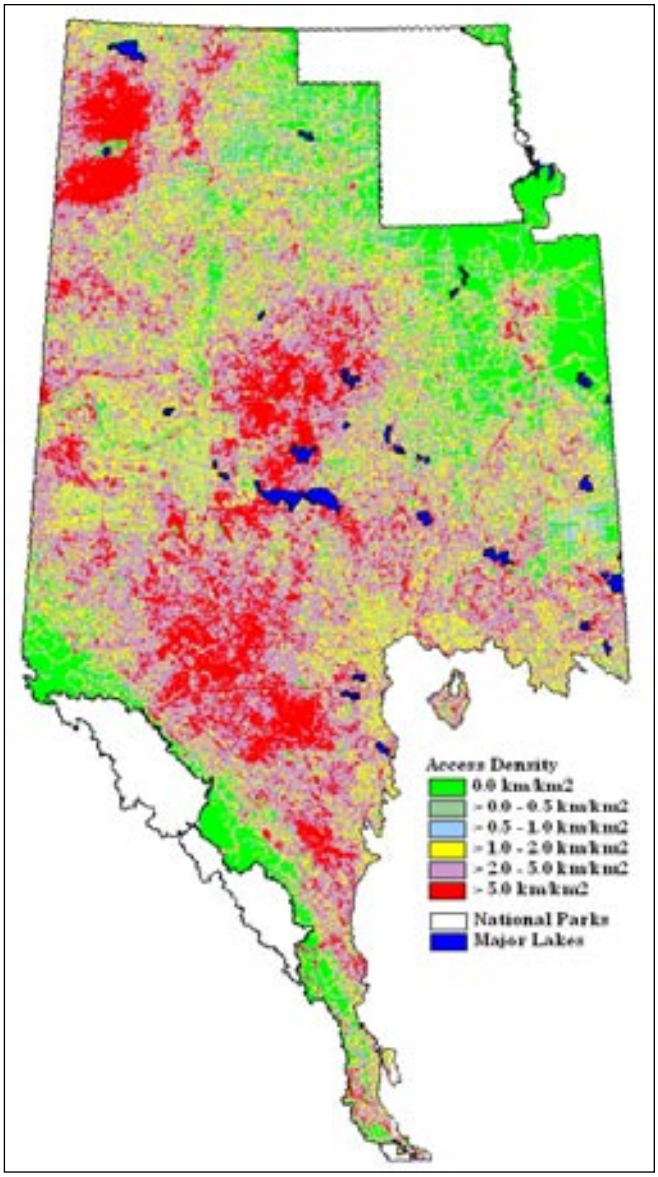


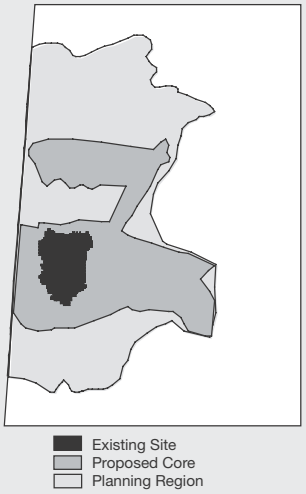
Fig. 7. Access densities in the Alberta portion of the Western Canadian Sedimentary Basin (based roads, seismic lines and other linear features) (World Resources Institute, 2000).

developments and activity, the increase in wolf populations due to higher prey availability, plus the increased ease of movement on the myriad of cleared seismic lines may cause increased wolf predation on caribou.(Dzus, 2001)

Clearcut logging and petroleum industry activity has fragmented old-growth forests throughout Alberta (Fig. 7).

Determining Areas of Interest for Further Protection

Suggested boundaries for areas of interest (Fig. 6) are based on best available information to date, and consider a number of ecological and biophysical factors, including: representation of natural sub-regions; Alberta government Environmentally Significant Areas studies; Special Places 2000 mapping; key wildlife habitat to help maintain viable populations; most intact areas. Consultation with local interests and First Nations is necessary to further study and refine boundaries.



Chinchaga Protected Area
Proposed Protected Areas Network for the Foothills

The Chinchaga area of interest (planning region) at >10,000 km^2 provides an opportunity for establishing a representative protected area capable of maintaining natural disturbance and the biodiversity of the Foothills Natural Region. One study has identified a core area of about 6,500 km^2, as the best remaining portion of the Northern Foothills area.(Walsh, 2000) It was selected as a minimum area based on the best available information to contain representative forest and avoid industrial disturbance and industrial areas of interest when possible. Consideration was also given to protection of key habitat for the caribou herd that uses the northern portion of the recommended site. More research is needed to determine the final boundaries of the site.

Smaller sites recommended for protection in the more southern parts of the Foothills would complete the network of protected areas required for the Foothills Natural Region and its two ecoregions (subregions). They include the Little Smoky, Bighorn and others.

4.1.3 Protected Areas Reforms Required for FSC certifications

What is needed is a scientifically-defensible network of protected areas that meets the 3 performance requirements, in order to achieve sustainable forest management and FSC certification.

In keeping with Principle 6 and its requirement for the maintenance of biodiversity, Criterion 6.2 and its requirement for protection zones for rare, threatened and endangered species, and Criterion 6.4 and its requirement for the protection of representative samples of existing ecosystems within the landscape it is necessary for the Alberta Government to establish a network of scientifically determined representative protected areas for each ecoregion (Natural Subregion) that are capable of maintaining species and ecosystem biodiversity. These will also serve as ecological benchmarks. Since these sites alone will not be able to capture all of the ecological diversity of northern Alberta, additional protected areas of smaller size will be needed to represent unique localized landscape features (e.g., sand dune complexes), areas of particularly high diversity (e.g., major river corridors), and the specialized habitat needs of rare or endangered species (e.g., peatlands and/or old-growth forest for caribou). Figure 6 (areas of interest) provides an indication of the best remaining portions of the ecoregions within which it is necessary to establish representative protected areas to complete the network.

Until Alberta's network of protected areas is complete for all the ecoregions in which a forest company is operating, the government must allow the company to protect from all industrial use a representative ecological benchmark and locally-occurring habitat of rare, threatened or endangered species to enable FSC certification.

4.2 Petroleum Industry

One cannot talk about the future of Alberta's forest without talking about the Alberta oil and gas industry, for the impacts of this industry are immense. In 2000, Alberta's oil and gas infrastructure consisted of 91,816 operating wells, 276,531 km of pipelines, and 659 gas plants.(ARD, 2000a: 31)

In 1999, Alberta produced 69% of the energy in Canada: 65% of Canada's conventional oil, 80% of natural gas, and 100% of bitumen and synthetic crude oil (ARD, 2000b: 5).

In 1999, Alberta exported more than 18.7 billion dollars of oil, gas, and petroleum by-products, representing 51% of all provincial exports.(PCF, 2000) Disposition of Alberta's oil production in 1999 was 58% to the United States, 14% to the rest of Canada, and 27% for use within Alberta.(ARD, 2000b: 2) Disposition of Alberta's natural gas in 1999 was 47% to the United States, 31% to the rest of Canada, and 22% within Alberta.(ARD, 2000b: 3) Alberta currently supplies approximately 12% of U.S. gas consumption.(PCF, 2000)

There are approximately 950 active oil and gas companies in Alberta.(ARD, 2000: 31) Although large integrated companies and senior producers only account for about 5% of the companies (NRC, 1995), they produce the majority of the oil and gas in the province.(Table 4; Fig. 8) Consequently, they are responsible for the majority of the environmental impacts associated with oil and gas activities. But, the impacts of junior producers may be disproportionately high relative to their production rates. This is because junior companies lack the resources of larger companies for implementing the highest standard of environmental practices and they are less exposed to public and regulatory scrutiny.(Marr-Laing and Severson-Baker, 1999)

Table 4. Proved petroleum reserves in 2000 of the largest oil and gas companies operating in Alberta[1].

Company	BOE[2] (millions)
Imperial	1,919
Can. Nat. Res.	1,035
PanCanadian	1,017
Shell	817
Husky Energy	799
Petro Canada	763
Gulf	753
Alberta Energy	596
Suncor	585
Exon Mobile	No data for Alberta alone

[1]Data from company annual reports (Canadian operations). International and off-shore reserves were excluded.

[2]BOE = Barrel of oil equivalent.

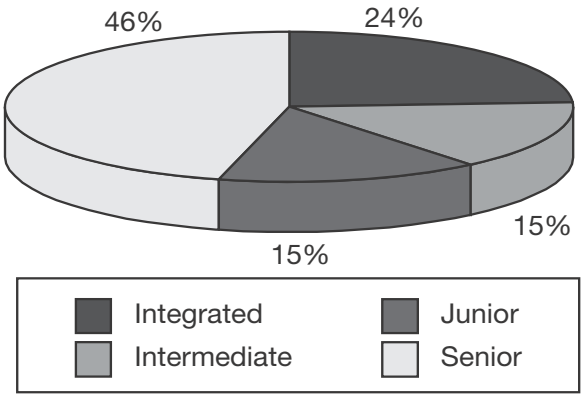


Fig. 8. Oil and gas production in Canada in 1994 by company category. Junior <0.5; Intermediate = 0.5–1.5; Senior >1.5 (mm^3/ year). Source: NRC, 1995.

In the fiscal year 1999/2000, provincial revenues from oil and gas royalties, tenure sales, and fees totalled $5.0 billion, representing 25% of total provincial revenues.(ARD, 2000a: 39) Although this revenue stream is substantial, a study by the Parkland Institute(1999: 4) demonstrated that oil and gas companies provide considerably less government revenue per barrel of oil in Alberta than in other international benchmark countries (Alberta = $2.41; Alaska = $3.74; Norway = $6.41, per barrel of oil equivalent). Ostensibly, the rationale for the low petroleum rents in Alberta is that they are necessary to stimulate industry interest in developing Alberta's oil and gas resources, particularly the oil sands. But, the approval of $25 billion in new oil sands projects in 2000,(ARD, 2000a: 16) the housing and labour shortages now evident in Fort McMurray, and the extensive environmental damage that has occurred as a result of petroleum exploration and development in the absence of controls on cumulative impacts,(AEP, 1998a: 75) suggest that rate of development is in fact far too rapid. The authors of the Parkland Institute report suggest that the environmental and social costs associated with rapid development, and the loss of potential royalty revenue, are not consistent with policy that is in the public interest.(Parkland Institute, 1999: 8)

4.2.1 FSC Principles & Criteria Relevant to Petroleum Industry Impacts

Traditionally, forest management is generally thought to be the domain of the forest industry. Indeed, systems like the FSC are intended to provide a label that is put on forest products that tells consumers that those products come from well-managed forests. In the case of Alberta, however, it is clear that the petroleum industry has a massive impact on forests, and by extension has a massive impact on forest management. The fact that the forest industry has no control over the petroleum industry's forest activities is a fundamental structural barrier to sound forest management and to FSC certification.

As the foundation for sound forest management, the FSC lays out Principles and Criteria that establish the ability of the forest manager to effect objectives on the land over the appropriate time period. The most relevant are:

Principle #2: Tenure And Use Rights & Responsibilities

Long-term tenure and use rights to the land and forest resources shall be clearly defined, documented and legally established.

Criterion 2.1 Clear evidence of long-term forest use rights to the land (e.g. land title, customary rights, or lease agreements) shall be demonstrated.

Principle #7: Management Plan

A management plan—appropriate to the scale and intensity of the operations—shall be written, implemented, and kept up to date. The long term objectives of management, and the means of achieving them, shall be clearly stated.

7.1 The management plan and supporting documents shall provide:

a) Management objectives.
b) Description of the forest resources to be managed, environmental limitations, land use and ownership status, socio-economic conditions, and a profile of adjacent lands.
c) Description of silvicultural and/or other management system, based on the ecology of the forest in question and information gathered through resource inventories.
d) Rationale for rate of annual harvest and species selection.

Industry Recognizes Need for Change

(Selected quotes from Dec. 6, 1998 Edmonton Journal article by Bob Weber, Canadian Press)

Alberta, in a drive to make the most out of its land, oil and trees, is following policies that will harm both environmental and economic prospects for the future, says an industry scientist.

"There are limits to growth," says Shawn Wasel, a biologist with Alberta-Pacific Forest Industries. Wasel, with consultant Brad Stelfox, has finished an 18-month study on the future cumulative effects of the expanding energy, agriculture and forestry sectors.

"Can everyone continue going on the way they are with current practices?" he asked. "The answer is clearly no."

"We have multiple land-use practices and they all have growth mandates," says Stelfox. "There's a really acute competitive position between these different land-use practices."

Stelfox says Al-Pac has had about 15,000 well sites cleared on its forestry management area. At about one hectare per well, that has already removed an area equivalent to an entire year's production. As well, Alberta-Pacific's area alone has 87,000 km of seismic lines. That number is expected to keep increasing as the energy industry moves toward new techniques that require more, but narrower, lines.

And Stelfox points out that Agriculture Department officials have suggested another nine million acres (3.6 million hectares) are required to come into production, mostly for forage crops, as the province strives to double farm sales and triple the food processing industry.

Over the years, Alberta's forests will shrink and become younger and more fragmented, Stelfox says. Stelfox likens sustainable resource policy to balancing the fiscal books.

"Ralph Klein said government shouldn't spend more than it earns.—Why shouldn't we do that with resource management?"

e) Provisions for monitoring of forest growth and dynamics.
f) Environmental safeguards based on environmental assessments.
g) Plans for the identification and protection of rare, threatened and endangered species.
h) Maps describing the forest resource base including protected areas, planned management activities and land ownership.
i) Description and justification of harvesting techniques and equipment to be used.

Taken together, these Principles and Criteria require that the forestry company not only has the necessary long-term time planning horizon, but also has the ability to effect planning outcomes over a geographically-distinct area through effective use rights to that area. An inability to actually effect the planning outcomes is the same as the negation of the use rights in the first place. To put it another way, the FSC requirements are:

a) That the forestry company has effective use rights to the forest (Principle 2 and Criterion 2.1)
b) The forest industry has the ability to implement a management plan with long-term forest objectives, including such factors as volume of harvesting, silviculture outcomes, and controls over environmental impacts (Principle 7)

In Alberta, because of the activities of the petroleum industry, the forest industry cannot meet these requirements.

4.2.2 Existing Situation in Alberta

Requirement a. The forestry company has effective use rights to the forest (Principle 2 and Criterion 2.1)

The Alberta forest industry is awarded tenures on public land by the provincial government. There are three types of timber allocation in Alberta: timber permits, timber quotas, and Forest Management Areas (FMAs). Timber permits involve relatively small volumes intended for smaller operators and community use. Timber quotas are intended to provide small to medium-sized operators with a long-term secure wood supply. As of

Table 5. Size of FMAs, annual production, products and markets for the largest companies in Alberta in 2000. (Sources: Forest Watch Alberta digital archive (FWA, 2001), Alberta Forest Products Association (2001), Company's website, other.)

Company	Size of Forest Management Area (km^2)	Annual production	Products	Markets
Alberta Pacific (Alpac)	58,000	571,000 ADMT*	Kraft pulp*	North America, Asia, Europe*
Tolko	40,000	525 mm sq.ft. OSB 240 mm FBM	OSB, lumber, boards	Canada, U.S., Japan, Europe
Weyerhaeuser	30,000	900 mm sq. ft. OSB 310,000 ADMT pulp 310 mm FBM	Kraft pulp, lumber, OSB	**OSB**, North America, Asia **Pulp**-Europe, SE Asia and North America
Daishowa-Marubeni International (DMI)	29,000	365 ADMT	Kraft pulp	Pacific Rim, US, Europe
International Paper (Weldwood, Sunpine)	17,000	270 mm FBM 420,000 ADMT	Kraft pulp, lumber, boards, treated wood, veneer	**Pulp**- North America, South America, Far East, Europe. **Lumber**-North America, Japan
West Fraser Mills	8,700	136 mm sq.ft.	Fiberboard, moldings, plywood	U.S., Canada
Canadian Forest Products	6,500	175 mm FBM	Lumber, boards	U.S., Canada, Europe, Pacific Rim
Alberta Newsprint Company	4,000	250,000 metric tonnes	Standard newsprint	Canada, U.S.
Millar Western Forest Products	3,000	280 mm FBM 280,000 ADMT	Lumber, shakes, pulp	North America, Europe, Pacific Rim, Latin America
Sundance Forest Industries	2,500	80 mm FBM	Dimension lumber and boards, rough/ semi-finished blanks for furniture, pre-fab and traditional componaents and laminating	North America, Pacific Rim, Europe
Ainsworth	No FMA	500 mm sq.ft.	OSB	U.S. Canada, Asia

* ***From Alpac, 2001***: **ADMT**- Air dried metric tonnes, **mmFBM**-thousand board feet, **OSB**- Oriented Strand Board

1996 there were approximately 50 registered quota holders in Alberta (AEP, 1996, p. 9). Forest management planning for quota holders is primarily the responsibility of the government. Instead of a fixed land base they are allocated a specific volume of timber.

The majority of timber in Alberta is awarded under FMAs. An FMA is a long-term contractual agreement between the province and a company to establish, grow, and harvest timber on a defined land area.(AEP, 1996, p. 9) As of 2000, 11 companies held one or more FMAs in Alberta (Table 5) and two other FMAs were pending. FMA holders must develop and follow a management plan that is approved by the government. They are also responsible for their own inventory studies, road development, and forest regeneration.

While FMAs provide forestry companies access to timber relative to other forestry companies, they provide no control by their holders over oil and gas exploration and extraction within the tenures.

Oil and gas deposits are found throughout Alberta except in the shield region in the northeast corner of the province (Fig. 9). Most petroleum resources in Alberta, particularly in forested regions, are owned by the Crown. Private companies are able to extract these resources through their own tenure agreements with the government, authorized under the Mines and Minerals Act. These tenure agreements, known as sub-surface mineral rights, give companies the exclusive right to drill for and extract oil and gas in a specific area.(GOA, 2000, sec. 4) Companies also separately obtain licenses and approvals for surface activities such as seismic exploration, drilling, pipeline development, and road construction. There is no relationship between the awarding of forestry tenures and the awarding of these licenses and approvals for surface activities.

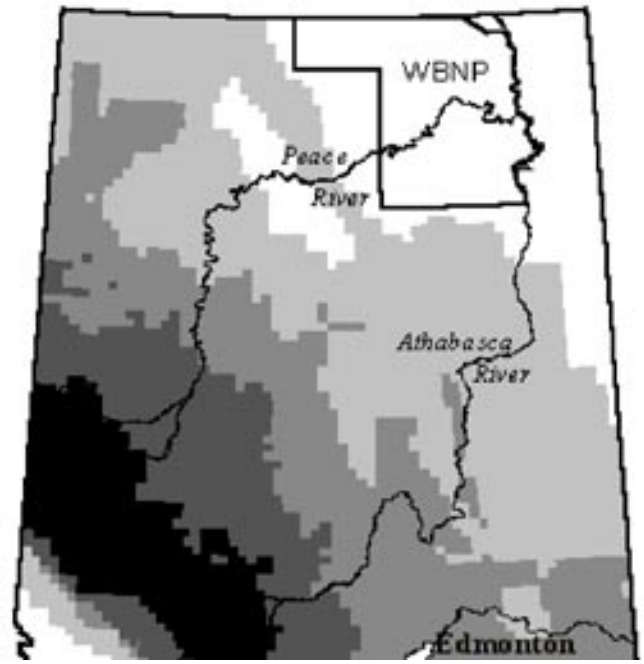


Fig. 9. Oil and gas deposits in northern Alberta. Darker shades of gray indicate increasing number of recoverable deposits. Source: ERCB, 1992.

Mineral rights are generally awarded through an open competitive bidding process termed a "land sale". By government regulation, parcels of land offered at land sales cannot exceed one township in size, and in practice most offerings are less than this maximum.(GOA, 2000, sec. 7) Consequently, regional landscapes are typically composed of a patchwork of tenure holdings of many different companies (Fig. 10). This creates a situation in which there are multiple actors within a forest landscape, with no forest planning coordination between them. As we shall see below, the presence of petroleum tenures within FMAs are not some minor factor in forestry, but are in fact a major impediment to sound management.

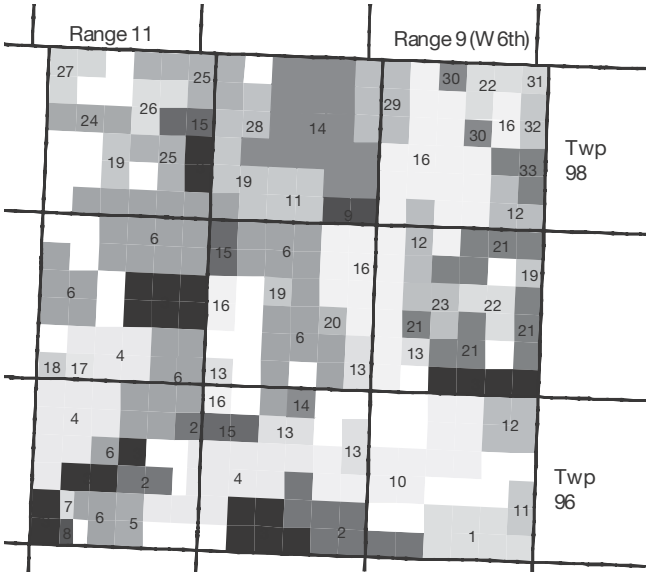


Fig. 10. Typical distribution of oil and gas leases in northern Alberta. The numbers indicate the ownership of different companies (data current to 1997). Alberta Energy records.

Requirement b) The forest industry has the ability to implement a management plan with long-term forest objectives, including such factors as volume of harvesting, silviculture outcomes, and controls over environmental impacts (Principle 7).

Because of the lack of control that forestry companies have over activities associated with petroleum tenures, long-term forest objectives cannot be established or met. The proportional impacts of petroleum industry activity in parts of Alberta's forest is similar to that of the forest industry. For example, on the Weyerhaeuser Edson FMA the annual average harvest from 1997-2001 was 1,400 ha by the forest industry and 1,083 ha by the petroleum industry.(Varty, 2001) On the Alpac FMA the current rate of harvest is 16,000 ha/year by the forest industry and 11,000 ha/year by the petroleum industry.(Pope, 2001)

The forest industry currently has no rights to implement a management plan that includes planning the activities of the petroleum industry either on a short or long-term basis. The activities of the petroleum industry are currently not included in the annual allowable cut calculations. Furthermore, the petroleum industry currently has no requirements for reforestation of the areas they disturb.

The environmental impacts of the petroleum industry on Alberta's forests are massive. The impacts are due to both seismic activity and drilling and production.

Conventional seismic operations in forested regions involve the clearing of a long linear corridor, six to eight meters in width, using a bulldozer.(GOA, 1998, sec. 43) From 1979-1995 an average of 57,750 km/year of seismic lines were approved in the Green Zone of Alberta,(AEP, 1998a: 75) enough to circle the globe 1.5 times. (The Green Zone is the 53% of Alberta that is predominantly forested and owned by the province.(AEP, 1996a, p.4) The total length of seismic lines approved in the Green Zone as of 1995 was approximately 1.4 million km.(AEP, 1998a: 75) This is more than three times the distance to the moon. Given conservative estimates of line widths, the area of forest harvested by seismic operations in the Green Zone from the start of operations in the 1950s to 1976 was 234,700 ha.(ECA, 1979: 28) This compares with a harvest of 255,692 ha by the forest industry in the same region from 1956-1976.(ECA, 1979: 28) Because only a small proportion of the wood from seismic operations is salvaged (being of the wrong species or age class, or impractical to haul out), the impact of seismic is mostly additive to that of the forest industry. Furthermore, studies indicate failure of trees to regenerate on seismic lines.(MacFarlane, 1999, Revel et al., 1984)

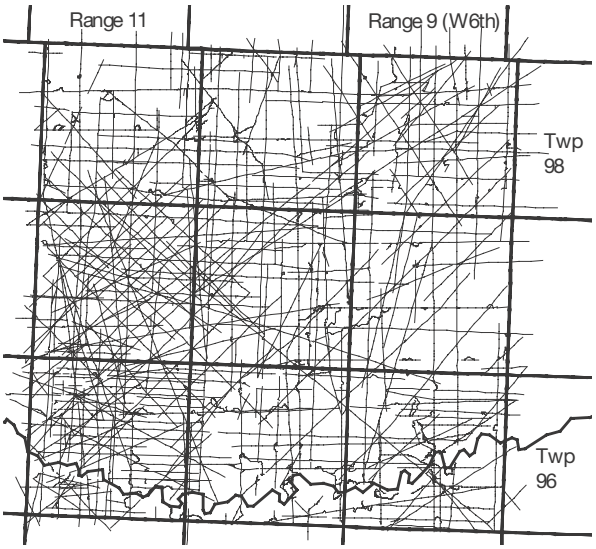


Fig. 11. Typical distribution of seismic lines in northern Alberta. The boundaries of nine townships and the Chinchaga river (bottom) are shown. Seismic line width is not to scale.l

Given the high rates of seismic activity in the Green Zone, the cumulative loss of habitat is substantial. These direct losses are magnified by the avoidance of habitat in the vicinity of seismic lines by some species, such as caribou.(Dyer et al., 2001) Habitat effectiveness is further reduced by the extensive fragmentation of forest stands that results from seismic activity (Fig. 11). Fragmentation reduces the abundance of large contiguous patches of forest that are required by forest-interior species,(Bender et al., 1998) and increases reproductive failure in birds due to nest predation and cowbird parasitism.(Burke and Nol, 2000)

Seismic activities have several additional ecological impacts:

1. Increased access.(CAPP, 1999a: E-3)
2. Damage to aquatic systems.(CAPP, 1999a: D-13)
3. Alteration in predator-prey interactions.(James, 1999)
4. Damage to soil.(CAPP, 1999a: F-3)
5. Disturbance of wildlife.
   (CAPP, 1999a: D-3, Bradshaw, et al., 1998)
6. Introduction of aggressive weed species into the forest.(CAPP, 1999a: F-15)

Currently in Alberta, so-called "low-impact seismic" is becoming widely adopted for use in forested areas with the intent of reducing timber loss and minimizing disturbance to soil and groundcover.(AEP, 1999b: 14) And although "low-impact seismic" represents an improvement over conventional seismic, the meandering five-meter lines still result in a significant industrial footprint, and they still provide access into the forest with its associated impacts.

As for drilling and production, the first step is the construction of an access road capable of handling large volumes of heavy truck traffic and the clearing of a well site. Once a well has been brought into production it is generally tied into a pipeline system to transport the product to processing plants of various types (Fig. 12). Forest growth along pipeline right-of-ways is prevented for the life of the pipeline through mechanical or chemical means.(CAPP, 1999b: E-14) Wellsites are not generally reforested after use is terminated. In 2000 alone, 11,898 new wells were drilled in Alberta.(AE, 2001c)

Whereas oil is generally transported in raw form to refineries near major population centers for processing, most processing of natural gas is done at gas plants located near production areas.(PCF, 1999: 60) Consequently, a large proportion of the 659 gas plants in Alberta are located within forested areas.

In the past, all-weather roads to well sites had to be maintained to provide access for well monitoring, maintenance, and repairs. However, through advances in automation and telemetry it is now possible to monitor wells remotely.(PCF, 1996: 6) Consequently, gas wells, which require minimal maintenance, can now be serviced by helicopter, and access roads removed.(BCC, 2001: 25) However, this is not yet a common practice. Because oil wells generally have pumps and other equipment that require regular maintenance, remote service of oil wells is expensive and is not yet being implemented.

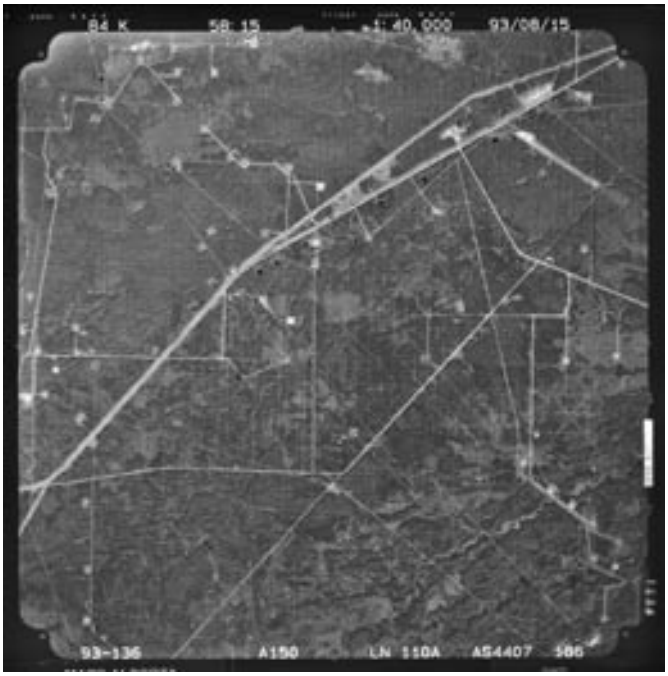


Fig. 13 Aerial photograph showing intense habitat fragmentation due to linear disturbances resulting from oil and gas industry explorations and development activity. Location: Twp. 109/110, Rage. 7/8, W6M, Wetland Mixedwood forest, just east of town of Rainbow Lake. Date taken = 15/08/93 Narrow, straight, gray/white lines = cutlines; white/gray squares = wellsites. medium width white and gray lines = roads and pipeline corridors; wide gray lines = transmission line and pipeline corridors: Photo. No. = AS4407-186; Top of page = north. Source: AEP 1998, The Boreal Forest Natural Region of Alberta

The clearing of trees associated with well pads, access roads, and pipelines is associated with the same list of ecological impacts described for seismic lines.(CAPP, 1999c: D-3) Although the total amount of clearing is less than that associated with seismic exploration, the local impact is substantially greater. For example, caribou avoid wells to a distance of 1,000 m, which is four times the avoidance distance for seismic lines.(Dyer et al., 2001) Roads provide faster access for more types of vehicles and cause greater disruption of drainage patterns. Finally, well pads, roads, and pipeline right-of-ways are essentially permanent features of the landscape, given their prolonged use and slow regeneration after decommissioning.

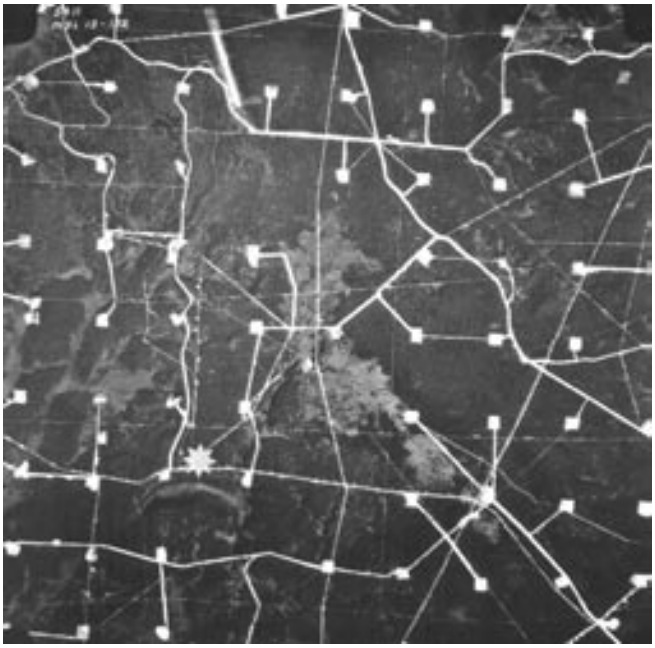


Fig. 12. Aerial photograph illustrating the distribution of well pads and access roads in a mature oil field in the Swan Hills. Image size = 7.2 x 7.2 km. Source: Alberta Air Photo (AEP, 1996b.)

In addition to general landscape impacts associated with deforestation there are ecological impacts related to the contamination of soil and water.(AEUB, 1996: App. 7.4)

In sum, the impacts of the oil and gas industry on Alberta's forests clearly negates the ability of the forest industry to set long-term objectives, or to achieve basic forest planning functions. This is a fundamental barrier to sound forest management and to FSC certification.

4.2.3 Petroleum Industry Reforms Required for FSC certifications

In keeping with Principle 2 and 7 and Criterion 2.1 and their requirements for long-term tenure and use rights to the land, and a management plan for the forest area the government must reform Alberta petroleum tenure and planning regulations to ensure that petroleum industry and forest industry collaborate to achieve long-term forest planning and sustainability.

Integrated planning based on ecological forest management is a fundamental requirement for FSC certification. To maintain the integrity of the forest, planning must be done at the level of the forest landscape- not just forest stands, timber volumes, or other subcomponents. This implies the need for binding regional plans that integrate the activities of all users within an over-arching framework of maintaining forest health.

The natural disturbance model (Appendix 5) provides the appropriate framework for integrated planning of industrial activities under ecological forest management. The natural disturbance model provides explicit targets, based on natural disturbance processes, for forest structure and pattern (e.g., age class distribution, patch size distribution, etc.). These targets are regional in nature and apply to all industrial users in the planning region. This approach helps to change the focus from generating a wood supply volume to a much broader focus on maintaining forest health.

The Alberta Government has a critical role in integrated planning because it is responsible for regulating surface activities of both the forest industry and the petroleum industry. Modifications of current regulations will be required because the current rate of industrial activity in many regions exceeds what is appropriate under the natural disturbance model.

The correspondence between oil and gas activities and natural disturbances is less clear than between forestry operations and fire, but the following are some examples of what can be done:

- Well pad construction should be coordinated with logging, so that these petroleum disturbances are not additive to those of the forest industry.
- Industrial activities that have no natural disturbance correlate, such as road building, are incorporated into ecological forest management planning through explicit limits on cumulative impacts. These limits are defined on the basis of best-available scientific knowledge regarding the impact of the specified activity on the ecological integrity of the forest.
- The impact of seismic lines must be sufficiently reduced that they are ecologically not perceived as a landscape feature. Instead, they should be transitory stand-level features, similar in ecological impact to the clearings produced by mature trees when they die and fall down, bringing down other trees in the vicinity with them. The key features of seismic lines that emulate natural stand clearings are:
  - average width less than 2 m.
  - meandering course
  - intermittent blockage that precludes a linear corridor effect
  - reforested within a specified (short) period of time
  - specified limits on cumulative area that is impacted

5. Conclusion

We support FSC certification as a tool to help achieve a healthy forest industry that maintains the ecological integrity of our forests. While there are impediments to FSC certification in Alberta, strategies for removing them are available. The Alberta Forest Conservation Strategy provides the vision for how Albertans want their forests managed, with recommendations for implementation. Consistent with the Alberta Forest Conservation Strategy, landuse planning initiatives in Alberta can provide opportunities to establish the necessary protected areas. Already some volunteer forestry/petroleum industry initiatives are underway to better coordinate planning and reduce impacts to the forest. Government can provide the leadership to ensure the impediments to Forest Stewardship Council certification and well-managed forests are removed for the benefit of our forests, forest industry and forest dependent communities.

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Appendix 1. Forested Regions of Alberta—a brief description.

Canadian Shield

(including Athabasca Plain and Kazan Upland ecoregions)

This region covers about 16,000 sq. km. or 2.42% of the province in the extreme northeast corner. It is characterized by outcroppings of bedrock and sand deposits. Sandy uplands and rocky hills have pine forest with black spruce forests in the wet depressional peatlands (AEP, undated).

Parkland Natural Region

(including Central, Peace River and Foothills ecoregions)

This region covers about 62,780 sq. km. or about 9.5% of Alberta and forms a broad transition between the grasslands to the south and the forests to the north. There is a continuum from south to north of grassland with groves of aspen, to aspen Parkland to closed aspen forest. Estimates range from 85-95% of lands have been lost through cultivation, roads, urbanization and other factors. This has had significant impacts on Parkland species, populations and ecosystems. (AEP, 1997a).

Foothills Natural Region

(including the Upper and Lower Foothills ecoregions)

This region covers about 94,790 sq. km. or about 14.3% of the province. Originally, the vast majority of the Foothills was forested, and forests and wetlands (particularly peatlands and riparian areas) are its most characteristic and important ecosystems. Key Foothill's animal species include woodland caribou, and trumpeter swan (both listed as endangered in Alberta) grizzly bear, elk bull trout, arctic grayling, Cooper's hawk, great gray and Boreal owl. The Foothills has been ranked third most altered of Alberta's Natural Regions after Parkland and Grassland. (AEP, 1998a) An analysis of habitat loss and fragmentation for the Foothills Natural Region (AEP, 1998a) concluded that the ecological integrity of remaining natural habitat within the region as a whole has, on average, been moderately to seriously compromised.

Boreal Forest Natural Region (BFNR)

(The following information is taken from AEP 1998a.)

This region covers about 346,964 sq. km., or about 52% of Alberta. It is very diverse in terms of topography, climate and biology (Achuff and Wallis, 1992) and based on vegetational, geological and landform characteristics six sub-regions have been recognized (Achuff, 1994, AEP 1997a) and are described in more detail below.

According to the World Resources Institute, the only "frontier forests" remaining in the Boreal Forest Natural Region of Alberta are located in Wood Buffalo National Park (Bryant et. al., 1997, p.23). Creation of an extensive network of access corridors throughout the BFNR- principally by the oil and gas and forestry industries is considered to be the single most significant factor contributing to the Region's on-going loss of ecological integrity. The pace and scale of human activity and development is continuing to accelerate.

Central Mixedwood occupies 23% of the province. Aspen in both pure and mixed stands is the most characteristic forest species. Successionally white spruce and eventually balsam fir will increase or replace aspen. However, due to frequent fires pure aspen stands are common in the southern part of the sub-region. Further north, coniferous species are more common with mixed stands of aspen and with spruce being widespread. Coniferous-dominated, spruce or spruce-fir forests are not common. Dry, sandy upland sites are typically occupied by pine forests. Peatlands are common and extensive covering 31% of the sub-region. The wildlife of the Central Mixedwood is the most diverse and varied of the Boreal Forest Natural Region. Typical widespread mammals include beaver, moose, black bear, wolf, and lynx. Others such as fisher, wolverine, river otter and woodland caribou are less common and locally distributed.

Dry Mixedwood occupies 15.2% of the province. This area represents a transition zone between the Central Parkland and the Central Mixedwood. Vegetation is similar to the Central Mixedwood although different in proportion. This subregion is considered the most productive for wildlife with species. It is also the most intensely altered sub-region, for example deforestation rates between 1961-1986 in the northern Dry Mixedwood and between 1949/50-1994/95 in the southern Dry Mixedwood, almost match and exceed (respectively) those reported from Amazonia from 1975-1988.

Wetland Mixedwood occupies 5.8% of the province and is restricted to its northern portions. Deciduous and mixedwood forests are relatively scarce, while peatlands are common and extensive and cover 38% of the region. Dry sites typically have pine forests, while moist upland sites have black spruce or mixed black and white spruce closed forests. Compared with the Central Mixedwood both in species and numbers this region is relatively depauperate.

Sub-Arctic occupies 3.3% of the province and occurs on the tops of hill systems that are erosional remnants rising above the surrounding plain as fairly flat-topped hills with escarpments that are dissected by numerous small streams. Peatlands predominate forming over 75% of the land surface of the sub-region. The most widespread vegetation is open forest of black spruce. Less common are mixed forests of white spruce- aspen or white spruce-paper birch. Wildlife diversity is lower than any other Boreal forest sub-region because of the harsh environment, limited vegetational diversity and lack of deciduous communities. Woodland caribou occur in the two most northern of the three sites.

Peace River Lowlands occupy 1.5% of the province and occurs along the lower Peace, Birch and Athabasca rivers, including the Peace-Athabasca Delta. White spruce forests containing large trees occur along major rivers. These forests have been heavily logged and little remains . Drier upland sites have pine forest, and moister sites have mixedwood forests of aspen, balsam poplar and white spruce. Peatlands occupy 11% of this sub-region, while non-peat forming wetlands cover 22%. Overall diversity of wildlife is lower than the Central mixedwood, however the wetlands provide important habitat for fish, waterfowl, muskrats and bison.

Boreal Highlands occupy 3.2% of the province on the sides and tops of plateaux and hill masses within the Central and Mixedwood subregions. Vegetation is similar to the Central mixedwood with mixedwood forests of aspen and white spruce being characteristic. Black spruce occurs more frequently in upland sites and coniferous forest occupy a larger proportion of the landscape than in the CMW. Peatlands are common and extensive, and permafrost is frequent. Woodland caribou also occur here, otherwise wildlife is similar to the CMW although somewhat reduced.

Appendix 2. Forest Stewardship Council Principles and Criteria

Principle #1: Compliance With Laws And FSC Principles

Forest management shall respect all applicable laws of the country in which they occur, and international treaties and agreements to which the country is a signatory, and comply with all FSC Principles and Criteria.

1.1 Forest management shall respect all national and local laws and administrative requirements.

1.2 All applicable and legally prescribed fees, royalties, taxes and other charges shall be paid.

1.3 In signatory countries, the provisions of all binding international agreements such as CITES, ILO Conventions, ITTA, and Convention on Biological Diversity, shall be respected.

1.4 Conflicts between laws, regulations and the FSC Principles and Criteria shall be evaluated for the purposes of certification, on a case by case basis, by the certifiers and the involved or affected parties.

1.5 Forest management areas should be protected from illegal harvesting, settlement and other unauthorized activities.

1.6 Forest managers shall demonstrate a long-term commitment to adhere to the FSC Principles and Criteria.

Principle #2: Tenure And Use Rights And Responsibilities

Long-term tenure and use rights to the land and forest resources shall be clearly defined, documented and legally established.

2.1 Clear evidence of long-term forest use rights to the land (e.g. land title, customary rights, or lease agreements) shall be demonstrated.

2.2 Local communities with legal or customary tenure or use rights shall maintain control, to the extent necessary to protect their rights or resources, over forest operations unless they delegate control with free and informed consent to other agencies.

2.3 Appropriate mechanisms shall be employed to resolve disputes over tenure claims and use rights. The circumstances and status of any outstanding disputes will be explicitly considered in the certification evaluation. Disputes of substantial magnitude involving a significant number of interests will normally disqualify an operation from being certified.

Principle #3: Indigenous Peoples' Rights

The legal and customary rights of indigenous peoples to own, use and manage their lands, territories, and resources shall be recognized and respected.

3.1 Indigenous peoples shall control forest management on their lands and territories unless they delegate control with free and informed consent to other agencies.

3.2 Forest management shall not threaten or diminish, either directly or indirectly, the resources or tenure rights of indigenous peoples.

3.3 Sites of special cultural, ecological, economic or religious significance to indigenous peoples shall be clearly identified in cooperation with such peoples, and recognized and protected by forest managers.

3.4 Indigenous peoples shall be compensated for the application of their traditional knowledge regarding the use of forest species or management systems in forest operations. This compensation shall be formally agreed upon with their free and informed consent before forest operations commence.

Principle #4: Community Relations And Worker's Rights

Forest management operations shall maintain or enhance the long-term social and economic well-being of forest workers and local communities.

4.1 The communities within, or adjacent to, the forest management area should be given opportunities for employment, training, and other services.

4.2 Forest management should meet or exceed all applicable laws and/or regulations covering health and safety of employees and their families.

4.3 The rights of workers to organize and voluntarily negotiate with their employers shall be guaranteed as outlined in Conventions 87 and 98 of the International Labour Organisation (ILO).

4.4 Management planning and operations shall incorporate the results of evaluations of social impact. Consultations shall be maintained with people and groups directly affected by management operations.

4.5 Appropriate mechanisms shall be employed for resolving grievances and for providing fair compensation in the case of loss or damage affecting the legal or customary rights, property, resources, or livelihoods of local peoples. Measures shall be taken to avoid such loss or damage.

Principle # 5: Benefits From The Forest

Forest management operations shall encourage the efficient use of the forest's multiple products and services to ensure economic viability and a wide range of environmental and social benefits.

5.1 Forest management should strive toward economic viability, while taking into account the full environmental, social, and operational costs of production, and ensuring the investments necessary to maintain the ecological productivity of the forest.

5.2 Forest management and marketing operations should encourage the optimal use and local processing of the forest's diversity of products.

5.3 Forest management should minimize waste associated with harvesting and on-site processing operations and avoid damage to other forest resources.

5.4 Forest management should strive to strengthen and diversify the local economy, avoiding dependence on a single forest product.

5.5 Forest management operations shall recognize, maintain, and, where appropriate, enhance the value of forest services and resources such as watersheds and fisheries.

5.6 The rate of harvest of forest products shall not exceed levels which can be permanently sustained.

Principle #6: Environmental Impact

Forest management shall conserve biological diversity and its associated values, water resources, soils, and unique and fragile ecosystems and landscapes, and, by so doing, maintain the ecological functions and the integrity of the forest.

6.1 Assessment of environmental impacts shall be completed—appropriate to the scale, intensity of forest management and the uniqueness of the affected resources—and adequately integrated into management systems. Assessments shall include landscape level considerations as well as the impacts of on-site processing facilities. Environmental impacts shall be assessed prior to commencement of site-disturbing operations.

6.2 Safeguards shall exist which protect rare, threatened and endangered species and their habitats (e.g., nesting and feeding areas). Conservation zones and protection areas shall be established, appropriate to the scale and intensity of forest management and the uniqueness of the affected resources. Inappropriate hunting, fishing, trapping and collecting shall be controlled.

6.3 Ecological functions and values shall be maintained intact, enhanced, or restored, including:

a) Forest regeneration and succession.
b) Genetic, species, and ecosystem diversity.
c) Natural cycles that affect the productivity of the forest ecosystem.

6.4 Representative samples of existing ecosystems within the landscape shall be protected in their natural state and recorded on maps, appropriate to the scale and intensity of operations and the uniqueness of the affected resources.

6.5 Written guidelines shall be prepared and implemented to: control erosion; minimize forest damage during harvesting, road construction, and all other mechanical disturbances; and protect water resources.

6.6 Management systems shall promote the development and adoption of environmentally friendly non-chemical methods of pest management and strive to avoid the use of chemical pesticides. World Health Organization Type 1A and 1B and chlorinated hydrocarbon pesticides; pesticides that are persistent, toxic or whose derivatives remain biologically active and accumulate in the food chain beyond their intended use; as well as any pesticides banned by international agreement, shall be prohibited. If chemicals are used, proper equipment and training shall be provided to minimize health and environmental risks.

6.7 Chemicals, containers, liquid and solid non-organic wastes including fuel and oil shall be disposed of in an environmentally appropriate manner at off-site locations.

6.8 Use of biological control agents shall be documented, minimized, monitored and strictly controlled in accordance with national laws and internationally accepted scientific protocols. Use of genetically modified organisms shall be prohibited.

6.9 The use of exotic species shall be carefully controlled and actively monitored to avoid adverse ecological impacts.

6.10 Forest conversion to plantations or non-forest land uses shall not occur, except in circumstances where conversion:

a) entails a very limited portion of the forest management unit; and
b) does not occur on high conservation value forest areas; and
c) will enable clear, substantial, additional, secure, long term conservation benefits across the forest management unit.

Principle #7: Management Plan

A management plan -- appropriate to the scale and intensity of the operations -- shall be written, implemented, and kept up to date. The long term objectives of management, and the means of achieving them, shall be clearly stated.

7.1 The management plan and supporting documents shall provide:

a) Management objectives.
b) Description of the forest resources to be managed, environmental limitations, land use and ownership status, socio-economic conditions, and a profile of adjacent lands.
c) Description of silvicultural and/or other management system, based on the ecology of the forest in question and information gathered through resource inventories.
d) Rationale for rate of annual harvest and species selection.
e) Provisions for monitoring of forest growth and dynamics.
f) Environmental safeguards based on environmental assessments.
g) Plans for the identification and protection of rare, threatened and endangered species.
h) Maps describing the forest resource base including protected areas, planned management activities and land ownership.
i) Description and justification of harvesting techniques and equipment to be used.

7.2 The management plan shall be periodically revised to incorporate the results of monitoring or new scientific and technical information, as well as to respond to changing environmental, social and economic circumstances.

7.3 Forest workers shall receive adequate training and supervision to ensure proper implementation of the management plan.

7.4 While respecting the confidentiality of information, forest managers shall make publicly available a summary of the primary elements of the management plan, including those listed in Criterion 7.1.

Principle #8: Monitoring And Assessment

Monitoring shall be conducted -- appropriate to the scale and intensity of forest management -- to assess the condition of the forest, yields of forest products, chain of custody, management activities and their social and environmental impacts.

8.1 The frequency and intensity of monitoring should be determined by the scale and intensity of forest management operations as well as the relative complexity and fragility of the affected environment. Monitoring procedures should be consistent and replicable over time to allow comparison of results and assessment of change.

8.2 Forest management should include the research and data collection needed to monitor, at a minimum, the following indicators:

a) Yield of all forest products harvested.
b) Growth rates, regeneration and condition of the forest.
c) Composition and observed changes in the flora and fauna.
d) Environmental and social impacts of harvesting and other operations.
e) Costs, productivity, and efficiency of forest management.

8.3 Documentation shall be provided by the forest manager to enable monitoring and certifying organizations to trace each forest product from its origin, a process known as the "chain of custody."

8.4 The results of monitoring shall be incorporated into the implementation and revision of the management plan.

8.5 While respecting the confidentiality of information, forest managers shall make publicly available a summary of the results of monitoring indicators, including those listed in Criterion 8.2.

Principle # 9: Maintenance Of High Conservation Value Forests

Management activities in high conservation value forests shall maintain or enhance the attributes which define such forests. Decisions regarding high conservation value forests shall always be considered in the context of a precautionary approach.

9.1 Assessment to determine the presence of the attributes consistent with High Conservation Value Forests will be completed, appropriate to scale and intensity of forest management.

9.2 The consultative portion of the certification process must place emphasis on the identified conservation attributes, and options for the maintenance thereof.

9.3 The management plan shall include and implement specific measures that ensure the maintenance and/or enhancement of the applicable conservation attributes consistent with the precautionary approach. These measures shall be specifically included in the publicly available management plan summary.

9.4 Annual monitoring shall be conducted to assess the effectiveness of the measures employed to maintain or enhance the applicable conservation attributes.

Principle # 10: Plantations

Plantations shall be planned and managed in accordance with Principles and Criteria 1 - 9, and Principle 10 and its Criteria. While plantations can provide an array of social and economic benefits, and can contribute to satisfying the world's needs for forest products, they should complement the management of, reduce pressures on, and promote the restoration and conservation of natural forests.

10.1 The management objectives of the plantation, including natural forest conservation and restoration objectives, shall be explicitly stated in the management plan, and clearly demonstrated in the implementation of the plan.

10.2 The design and layout of plantations should promote the protection, restoration and conservation of natural forests, and not increase pressures on natural forests. Wildlife corridors, streamside zones and a mosaic of stands of different ages and rotation periods, shall be used in the layout of the plantation, consistent with the scale of the operation. The scale and layout of plantation blocks shall be consistent with the patterns of forest stands found within the natural landscape.

10.3 Diversity in the composition of plantations is preferred, so as to enhance economic, ecological and social stability. Such diversity may include the size and spatial distribution of management units within the landscape, number and genetic composition of species, age classes and structures.

10.4 The selection of species for planting shall be based on their overall suitability for the site and their appropriateness to the management objectives. In order to enhance the conservation of biological diversity, native species are preferred over exotic species in the establishment of plantations and the restoration of degraded ecosystems. Exotic species, which shall be used only when their performance is greater than that of native species, shall be carefully monitored to detect unusual mortality, disease, or insect outbreaks and adverse ecological impacts.

10.5 A proportion of the overall forest management area, appropriate to the scale of the plantation and to be determined in regional standards, shall be managed so as to restore the site to a natural forest cover.

10.6 Measures shall be taken to maintain or improve soil structure, fertility, and biological activity. The techniques and rate of harvesting, road and trail construction and maintenance, and the choice of species shall not result in long term soil degradation or adverse impacts on water quality, quantity or substantial deviation from stream course drainage patterns.

10.7 Measures shall be taken to prevent and minimize outbreaks of pests, diseases, fire and invasive plant introductions. Integrated pest management shall form an essential part of the management plan, with primary reliance on prevention and biological control methods rather than chemical pesticides and fertilizers. Plantation management should make every effort to move away from chemical pesticides and fertilizers, including their use in nurseries. The use of chemicals is also covered in Criteria 6.6 and 6.7.

10.8 Appropriate to the scale and diversity of the operation, monitoring of plantations shall include regular assessment of potential on-site and off-site ecological and social impacts, (e.g. natural regeneration, effects on water resources and soil fertility, and impacts on local welfare and social well-being), in addition

to those elements addressed in principles 8, 6 and 4. No species should be planted on a large scale until local trials and/or experience have shown that they are ecologically well-adapted to the site, are not invasive, and do not have significant negative ecological impacts on other ecosystems. Special attention will be paid to social issues of land acquisition for plantations, especially the protection of local rights of ownership, use or access.

10.9 Plantations established in areas converted from natural forests after November 1994 normally shall not qualify for certification. Certification may be allowed in circumstances where sufficient evidence is submitted to the certification body that the manager/owner is not responsible directly or indirectly of such conversion.

The FSC Founding Members and Board of Directors ratified principles 1-9 in September 1994.

The FSC Members and Board of Directors ratified principle 10 in February 1996.

The revision of Principle 9 and the addition of Criteria 6.10 and 10.9 were ratified by the FSC Members and Board of Directors in January 1999.

The definition of Precautionary Approach was ratified during the 1999 FSC General Assembly in June 1999.

GLOSSARY

Words in this document are used as defined in most standard English language dictionaries. The precise meaning and local interpretation of certain phrases (such as local communities) should be decided in the local context by forest managers and certifiers. In this document, the words below are understood as follows:

Biological diversity: The variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are a part; this includes diversity within species, between species and of ecosystems. (see ***Convention on Biological Diversity, 1992***)

Biological diversity values: The intrinsic, ecological, genetic, social, economic, scientific, educational, cultural, recreational and aesthetic values of biological diversity and its components. (see ***Convention on Biological Diversity, 1992***)

Biological control agents: Living organisms used to eliminate or regulate the population of other living organisms.

Chain of custody: The channel through which products are distributed from their origin in the forest to their end-use.

Chemicals: The range of fertilizers, insecticides, fungicides, and hormones which are used in forest management.

Criterion (pl. Criteria): A means of judging whether or not a Principle (of forest stewardship) has been fulfilled.

Customary rights: Rights which result from a long series of habitual or customary actions, constantly repeated, which have, by such repetition and by uninterrupted acquiescence, acquired the force of a law within a geographical or sociological unit.

Ecosystem: A community of all plants and animals and their physical environment, functioning together as an interdependent unit.

Endangered species: Any species which is in danger of extinction throughout all or a significant portion of its range.

Exotic species: An introduced species not native or endemic to the area in question.

Forest integrity: The composition, dynamics, functions and structural attributes of a natural forest.

Forest management/manager: The people responsible for the operational management of the forest resource and of the enterprise, as well as the management system and structure, and the planning and field operations.

Genetically modified organisms: Biological organisms which have been induced by various means to consist of genetic structural changes.

Indigenous lands and territories: The total environment of the lands, air, water, sea, sea-ice, flora and fauna, and other resources which indigenous peoples have traditionally owned or otherwise occupied or used. (Draft Declaration of the Rights of Indigenous Peoples: Part VI)

Indigenous peoples: "The existing descendants of the peoples who inhabited the present territory of a country wholly or partially at the time when persons of a different culture or ethnic origin arrived there from other parts of the world, overcame them and, by conquest, settlement, or other means reduced them to a non-dominant or colonial situation; who today live more in conformity with their particular social, economic and cultural customs and traditions than with the institutions of the country of which they now form a part, under State structure which incorporates mainly the national, social and cultural characteristics of other segments of the population which are predominant." (Working definition adopted by the UN Working Group on Indigenous Peoples).

High Conservation Value Forests: High Conservation Value Forests are those that possess one or more of the following attributes:

a) forest areas containing globally, regionally or nationally significant : concentrations of biodiversity values (e.g. endemism, endangered species, refugia); and/or large landscape level forests, contained within, or containing the management unit, where viable populations of most if not all naturally occurring species exist in natural patterns of distribution and abundance
b) forest areas that are in or contain rare, threatened or endangered ecosystems
c) forest areas that provide basic services of nature in critical situations (e.g. watershed protection, erosion control)
d) forest areas fundamental to meeting basic needs of local communities (e.g. subsistence, health) and/or critical to local communities' traditional cultural identity (areas of cultural, ecological, economic or religious significance identified in cooperation with such local communities).

Landscape: A geographical mosaic composed of interacting ecosystems resulting from the influence of geological, topographical, soil, climatic, biotic and human interactions in a given area.

Local laws: Includes all legal norms given by organisms of government whose jurisdiction is less than the national level, such as departmental, municipal and customary norms.

Long term: The time-scale of the forest owner or manager as manifested by the objectives of the management plan, the rate of harvesting, and the commitment to maintain permanent forest cover. The length of time involved will vary according to the context and ecological conditions, and will be a function of how long it takes a given ecosystem to recover its natural structure and composition following harvesting or disturbance, or to produce mature or primary conditions.

Native species: A species that occurs naturally in the region; endemic to the area.

Natural cycles: Nutrient and mineral cycling as a result of interactions between soils, water, plants, and animals in forest environments that affect the ecological productivity of a given site.

Natural Forest: Forest areas where many of the principal characteristics and key elements of native ecosystems such as complexity, structure and diversity are present, as defined by FSC approved national and regional standards of forest management.

Non-timber forest products: All forest products except timber, including other materials obtained from trees such as resins and leaves, as well as any other plant and animal products.

Other forest types: Forest areas that do not fit the criteria for plantation or natural forests and which are defined more specifically by FSC-approved national and regional standards of forest stewardship.

Plantation: Forest areas lacking most of the principal characteristics and key elements of native ecosystems as defined by FSC-approved national and regional standards of forest stewardship, which result from the human activities of either planting, sowing or intensive silvicultural treatments.

Precautionary approach: Tool for the implementation of the precautionary principle.

Principle: An essential rule or element; in FSC's case, of forest stewardship.

Silviculture: The art of producing and tending a forest by manipulating its establishment, composition and growth to best fulfil the objectives of the owner. This may, or may not, include timber production.

Succession: Progressive changes in species composition and forest community structure caused by natural processes (nonhuman) over time.

Tenure: Socially defined agreements held by individuals or groups, recognized by legal statutes or customary practice, regarding the "bundle of rights and duties" of ownership, holding, access and/or usage of a particular land unit or the associated resources there within (such as individual trees, plant species, water, minerals, etc).

Threatened species: Any species which is likely to become endangered within the foreseeable future throughout all or a significant portion of its range.

Use rights: Rights for the use of forest resources that can be defined by local custom, mutual agreements, or prescribed by other entities holding access rights. These rights may restrict the use of particular resources to specific levels of consumption or particular harvesting techniques.

Appendix 3. Alberta Government Commitments to Protected Areas

A. The National Forest Strategy (revised 1998) (NFS, 1998)

- We will enhance our capacity to ensure that our forest management activities maintain the biological diversity of our forests:

1.6 By working toward completing, by the year 2000, a network of protected areas representative of Canada's forest ecosystem classification categories, to provide ecological benchmarks, protect areas of unique biological value and manage for the continuation of old-growth forest landscapes as natural heritage.

B. The Canadian Biodiversity Strategy (Environment Canada, 1995)

- Make every effort to complete Canada's networks of protected areas, representative of land-based natural regions, by the year 2000 and accelerate the protection of areas representative of marine and freshwater natural regions.
- Use open and meaningful public and stakeholder participation processes and sound scientific information and traditional knowledge, to ensure that social, economic, cultural and ecological factors are considered in the establishment of protected areas.
- Establish protected areas to conserve representative, and other critical forest ecosystems, as part of the overall network of protected areas.

C. Criteria and Indicators for the Conservation and Sustainable Management of Temperate and Boreal Forests in Canada. (Montreal Process, 1999)

Criteria 1. Conserving biological diversity

Area of representative forest

Representative protected areas serve as ecological benchmarks for assessing the impact of forest management on biodiversity. They also maintain habitat for rare and endangered species and, ideally, allow natural processes to continue unimpeded. Additionally, they provide wilderness experiences and other recreational benefits.

D. The Alberta Forest Conservation Strategy (AFCSSC, 1997)

The Alberta Forest Conservation Strategy calls for protection of a network of representative areas within the forest ecosystems. The need to establish protected areas is born out of recognition that ecological management is a different approach. We do not completely understand forest ecosystems, and protected areas are needed as storehouses of information and scientific controls. They are also vital to the realization of other values, such as recreation, tourism, culture, and wildlife habitat.

Representative Protected Areas

"Representative Protected Areas," containing ecosystems typical of the natural regions and sub- regions of Alberta. They should be selected on the basis of scientific criteria to provide:

- baseline or benchmark natural history data for the region or sub-region;
- opportunities to observe natural processes;
- preservation of biodiversity.

The size of representative protected areas should be related to the type and size of natural disturbance as defined by sound science, and must be suitable for use as a benchmark or scientific control with which to assess the impact of human activity. Scientific research may suggest that while some areas can be relatively small, others may need to be large. Representative areas in support of the Strategy should include existing protected areas and new ones designated under the Special Places program.

E. The Alberta Forest Legacy Implementation Framework for Sustainable Forest Management (AEP, 1998b)

- Reference areas will be established to allow interpretation of research and monitoring of results. The reference areas will be of a size and longevity appropriate to the experiment, as well as benchmark information about unrelated or "background" ecosystem changes that occur. More detail on the practical approach to ecological management and adaptive management is provided in the report of the Alberta Forest Management Science Council, written in response to the Government of Alberta's request for advice on the implementation of sustainable forest management.

Maintenance of heritage areas in support of forest conservation will be achieved as necessary through the Government of Alberta's Special Places 2000 policy. This policy will complete a network of areas representing the environmental diversity of the province, including representative landscapes.

Appendix 4. Status of Alberta Wildlife Species of Concern in the Boreal

Species	Population Notes	Background
Woodland Caribou **At risk.**	Population stable to declining. Population estimates range from 3,600 to 6,700 individuals in the province.	**Concern over maintenance of old-growth forest to provide critical winter habitat.** Improved population monitoring and habitat protection are being addressed. Designated as "Threatened" under the Wildlife Act.
Grizzly Bear **May be at risk.**	Numbers appear stable outside the national parks since 1980	Found in the mountains, foothills and boreal forests of Alberta. Currently sustaining its population under a very restrictive sport hunting regime**. Greatest threat is loss and degradation of wilderness habitats through resource extraction and recreational development.**
Northern myotis (bat) **May be at risk.**	Population unknown. Uncommon over known range.	Poorly known species that relies on large, early decay trees for roosting. **Need to incorporate habitat requirements into forest management.**
Wolverine **May be at risk.**	Population unknown.	Harvest of wolverine is reduced from 1985 level, but population status remains unknown. Subject of intensified esearch in province over the last two years. *The naturally low population density of wolverines, coupled with low reproductive potential makes the species susceptible to population* ***declines resulting from human activities that fragment and supplant habitat such as human settlement, extensive logging, oil and gas development, recreational developments and the accompanying access****. With an ever-expanding human population, there may be a time when most wolverine populations will be restricted to large protected areas- those large enough to protect viable populations of species, like* wolverines, *which require large areas of wilderness (Petersen, 1997).*
Canadian Toad **May be at risk.**	Once common in boreal and parkland habitats.	Dramatic decline in parkland distribution. Monitoring of apparent decline ongoing.`
Canada lynx **Sensitive.**	Cyclic species. Estimate less than 8,000 individuals at bottom of cycle.	Population decreasing in recent years, and **some concern exists over habitat loss**. Harvest now set by quota.
Fisher **Sensitive.**	Perhaps fewer than 10,000 breeding individuals. Population status is unknown.	Fisher harvest has continued to declines since 1985.
Barred Owl **Sensitive**	Uncommon; probably fewer than 1,000 breeding pairs in Alberta.	**This interior forest species requires larger blocks of mature dense woodland. Forest fragmentation is detrimental. Forest management plans need to ensure breeding habitat is retained.**
Bay-breasted Warbler **Sensitive.**	Unknown. Declining over parts of North American Range	**Dependent on old-growth forest. Forest management plans need to ensure retention of breeding habitat.** *Silvicultural practices and government policy currently promote harvesting of older stands, and an "unmixing" of mixed-wood stands. Exploration and development for oil and gas further contributes to habitat loss and dissects large areas of forest with extensive linear disturbances (Norton, 1999a)*
Black-backed Woodpecker **Sensitive.**	Unknown	**Maintenance of mature coniferous forests important. Standing dead trees (snags) required for nesting.**
Blackburnian Warbler **Sensitive.**	Unknown; 6-20 breeding occurrences known in the province. Species never was common in Alberta.	Considered peripheral with a very restricted distribution in Alberta. **Preference for mature mixedwood forest suggests it may be vulnerable to forestry operations.**

Black-throated Green Warbler **Sensitive.**	Uncommon.	**Dependent on old coniferous forest; the maintenance of breeding habitat in forest harvest areas will be challenging. Recommended as a "Species of Concern" in Alberta.** *The principal limiting factor for the Black-throated Green Warbler in Alberta is the loss and degradation of its breeding habitat.* ***Forestry and energy sector activities are causing habitat loss and fragmentation and silvicultural practices and government policy currently promote the harvesting of older stands, and an 'unmixing' of mixedwood stands*** *(Norton, 1999b).*
Broad-winged Hawk **Sensitive.**	Uncommon. Decline noted through parkland zone, particularly around urban areas.	**Requires large stands of mature to old-growth forest in the parkland and southern boreal forest. Careful woodlot management by agriculture and forest operations required to maintain breeding habitat.**
Canada Warbler **Sensitive.**	Unknown.	**Requires old mixedwood staneds with very dense understory, often adjacent to riparian areas.**
Cape May Warbler **Sensitive.**	Unknown.	**Dependent on old-growth forest for breeding.** Serious loss of neotropical wintering habitat. ***Activities of the forestry and energy sectors are causing habitat loss and fragmentation. Exploration and development for oil and gas further contribute to habitat loss and dissects large areas of forest with extensive linear disturbances*** *(Norton, 1999c).*
Great Gray Owl **Sensitive.**	Unknown.	A naturally scarce species, widely distributed in foothill and boreal habitats. **Requires stands of mature forest for nesting.**
Northern Goshawk **Sensitive.**	Unknown.	**Maintenance of mature forest breeding habitat needs to be incorporated into forest planning on both public and private lands.**
Northern Pygmy Owl **Sensitive.**	Uncommon species. More information needed on population size. Estimated there are 21-100 breeding occurrences in Alberta.	Local populations in boreal forest, foothills and Rocky Mountains. **Forest management plans need to ensure breeding habitat is maintained.**
Pileated Woodpecker **Sensitive.**	Probably stable.	**Requires mature to old-growth trees for nesting. Abandoned nest cavities provide essential habitat for several other forest species. Maintenance of breeding habitat needs to be incorporated into forest management on both public and private land.**
Western Tanager **Sensitive.**	Unknown. Declines observed in other parts of North American range.	**Prefers old coniferous and mixedwood forest.** Obligate neotropical migrant.

Information excerpted from The General Status of Alberta Wild Species 2000(AE, 2001a) unless otherwise indicated by italics (bold added).

Appendix 5. The Natural Disturbance Model of Forest Harvesting (Adapted from Schneider, 2000d)

Concept:

Through natural selection the species inhabiting the boreal forest have developed adaptations for maintaining viability in the face of catastrophic disturbances such as fire.

Based on the above observation, it has been hypothesized that that biodiversity can be maintained in the presence of industrial use if industrial practices are made to approximate natural disturbances. This hypothesis forms the basis of the Natural Disturbance Model (NDM) of forest harvesting.

In practice, it is not the actual disturbance process that the NDM seeks to approximate, but the forest structure and pattern resulting from disturbance and subsequent forest regeneration. The operational goal is to maintain forest structure and pattern, along with ecological processes, within the typical range of natural variation.

The assumption (and hope) is that the key to maintaining biodiversity is not necessarily the strict emulation of fire (or other disturbances) but the maintenance of habitat diversity, however that may be achieved.

NDM targets:

The ability of forestry companies to replicate the forest structures and patterns produced by natural disturbances is dependent on how well these structures and patterns can be described.

Because historical landscapes cannot be adequately characterized, using the current landscape for primary guidance is the only realistic option available.

For companies to implement the NDM they must first develop a series of targets, appropriate for their management area, that can be incorporated into the planning process. To do this, key attributes that characterize forest structure and pattern are selected (see below), and estimates are made of their average level and range of variation under natural conditions. Economic and logistic constraints may influence the definition of the actual operational targets in some cases.

Attributes related to stand structure:

- Quantity and distribution of residual live trees after harvest
- Quantity and distribution of standing dead trees after harvest
- Quantity and distribution of downed woody material after harvest
- Soil nutrient levels
- Amount of disturbance and compaction of the forest floor

Attributes related to landscape pattern:

- Distribution of stand age (including the proportion of old-growth)
- Distribution of stand type (including the proportion of mixedwood stands)
- Distribution of stand size (including the proportion of large unfragmented stands)
- Patch shape and spatial arrangement of patches on the landscape

Implementation:

Implementation of the NDM involves the integration of NDM targets into forest management planning. This generally involves changes in harvest planning procedures and in operational practices. The future landscape should resemble the reference landscape at all points in time and at no time should the value of structure or pattern attributes exceed the range of natural variation.

The target distributions for size, shape, and spatial arrangement of forest stands can best be achieved by defining harvest blocks on the basis of existing stand boundaries.

In order to maintain mixedwood stands the current dual land base system (coniferous and deciduous) must be abandoned and mixedwood management techniques need to be employed in place of clear-cut harvesting and plantation management.

The maintenance of old-growth stands will require a change in the current policy of preferentially targeting older stands, and a reduction in the overall rate of harvest.