Indicators for Sustainable Resource and Environmental Management for the Northern East Slopes Strategy

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Introduction

The vision of the Northern East Slopes Strategy is:

> "Integrated management of natural resources in a manner which ensures a healthy and sustainable environment, economy, and community that can be enjoyed by present and future generations"
> (Regional Steering Group for the NES Strategy 2001).

This vision will be achieved in the region (Fig. 1) by implementing a planning process (Fig. 2) in which indicators are selected, forecast, and measured, in order to assess progress towards specified goals.

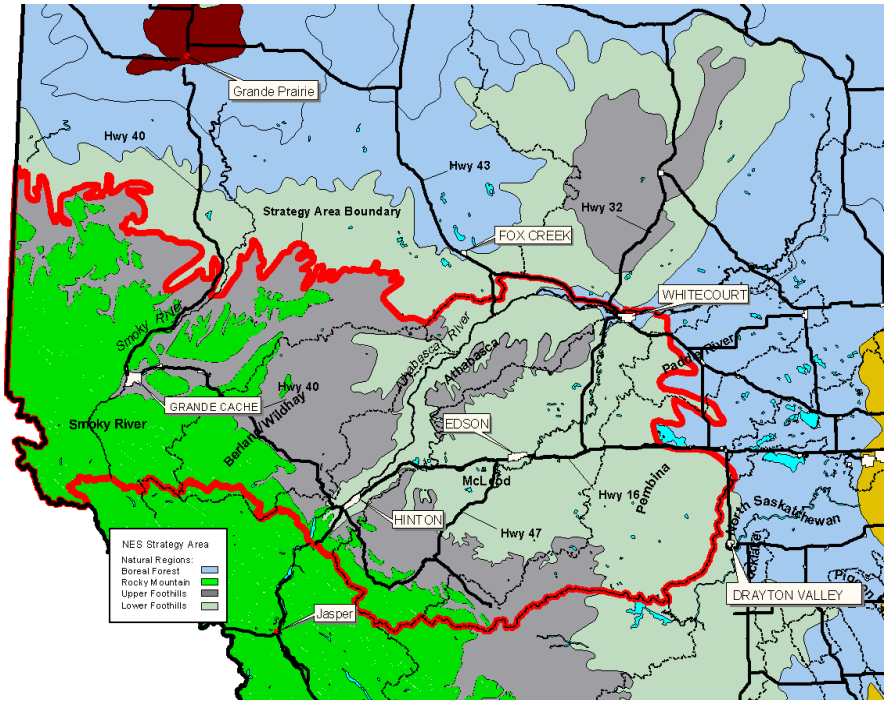

Figure 1. Boundary of the Northern East Slopes Strategy[1].
[1] Source: Regional Steering Group for the NES Strategy (2001)

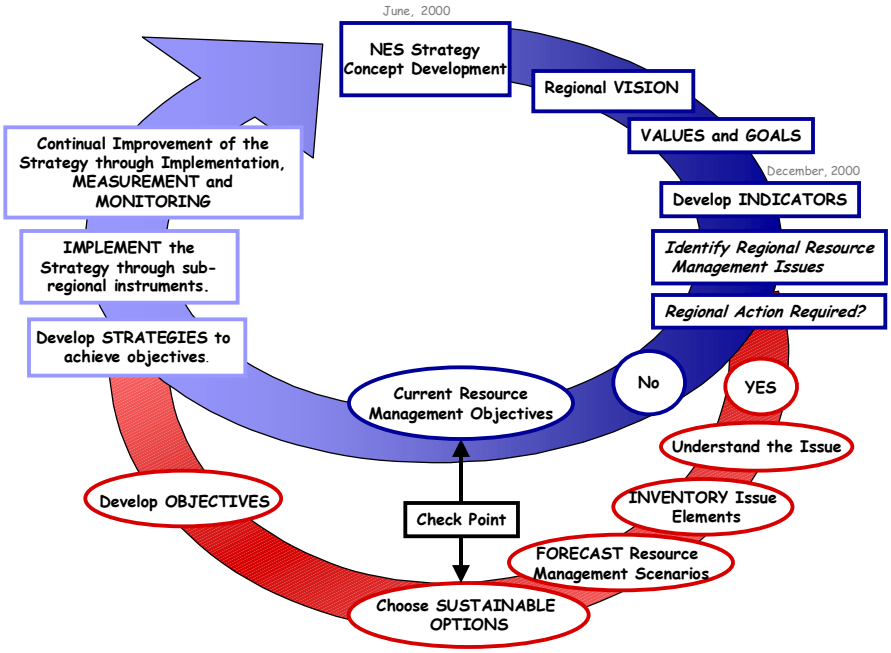

Figure 2. The NES Strategy Planning Process[1].
[1] Source: Regional Steering Group for the NES Strategy (2001)

This project is intended to support this planning process by meeting the following objectives:

1. Provide a complete overview of indicators related to sustainable resource and environmental management previously identified within the Northern East Slopes, or relevant to the Northern East Slopes.
2. Identify objectives and goals related to each indicator, and briefly describe how each indicator is reported.
3. Describe how each indicator is related to the values and goals that have been developed for the Northern East Slopes.
4. Assess the potential applicability of each indicator in the context of the planning process developed by the Northern East Slopes Strategy.

A systematic approach to meeting these objectives consisted of four steps:

1. Conduct a comprehensive search for all management documents prepared in the region that include indicators that may relate to the values and goals identified by the Regional Steering Group. Government, non-government, and industry representatives were contacted
2. Construct a database to record and organize the indicators and supplementary information in a way that permits queries and summaries.
3. Link the indicators to each value and goal of the NES Strategy, including a ranking of the indicator's potential applicability.
4. Consolidate all of the above information into an information package for the Regional Steering Group intended to assist in the final selection of indicators.

Summary of Materials Reviewed

A total of 25 sources were reviewed for potential indicators of sustainable resource and environmental management. The relevance of these sources to the NES Strategy area and planning process varied greatly, and emphasis was placed on sources containing indicators whose levels are, or could be, measured within the NES Strategy area.

Table 1. Potential sources of indicators of sustainability within the NES Strategy area. No. refers to number of indicators included in this report.

	Source	Organization	Date	No.
1	Indicators of Sustainable Forest Management for the Foothills Model Forest	Foothills Model Forest	1998	81
2	Defining Sustainable Forest Management: A Canadian Approach to Criteria and Indicators	Canadian Council of Forest Ministers	1995	69
3	Sustainable Forest Management Stewardship Report (2000)	Weldwood of Canada, Hinton Division	2001	47
4	Detailed Forest Management Plan (Draft)	Weyerhaeuser Canada (Edson)	2001	16
5	Detailed Forest Management Plan (1997-2006)	Millar Western Industries	2000	69
6	Forest Stewardship in Canada	Weyerhaeuser Canada	2000	24
7	Environment, Health and Safety Stewardship Progress Report	Canadian Association of Petroleum Producers	2000	8
8	Range Health Assessment Program	Public Lands Division, AB Agriculture, Food, and Rural Development	2000	8
9	West Central Airshed Society Annual Report	West Central Airshed Society	1999	6
10	Canadian Standards Association Proposal (Draft)	Weyerhaeuser Canada (Gr Cache / Gr Prairie)	2001	14
11	Park Management Plan	Jasper National Park	2000	19
12	Sustainable Forest Management Plan	Canadian Forest Products Grande Prairie	2000	54
13	Pacific and Yukon Environmental Indicators	Environment Canada, Pacific & Yukon Region	2000	3
14	Alberta Sustainability Trends 2000: The Genuine Progress Indicators Report (1961-	Pembina Institute for Appropriate	2001	39

	1999)	Development		
15	Provincial Sustainability Indicators Initiative (Manitoba)	Government of Manitoba	2001	36
16	Canada vs the OECD: An Environmental Comparison	Organization for Economic Cooperation and Development	2000	15
17	Environmental Trends in British Columbia	BC Min. of Environment, Lands and Parks	2000	13
18	Community Indicators Project	Redefining Progress's Community Indicators Project	2000	29
19	Sustainable Development in the United States: An Experimental Set of Indicators	US Interagency Working Group on Sustainable Development Indicators	1998	29
20	Sustainability Indicators for the Fraser Basin Workbook	Fraser Basin Council	2000	21
21	Obed Mountain Coal (unpubl.)	Obed Mountain Coal	2001	4
22	Detailed Forest Management Plan: Vol. 1	Sundance Forest Industries	1999	0
23	Management Strategy for the Little Smoky River Corridor	Alberta Newsprint Company	1996	0
24	Sustainable Forest Management: Fish and Wildlife Strategies	Blue Ridge Lumber Ltd.	1999	0
25	Whitehorse Wildland Park Management Plan	Alberta Natural Resources Service, Hinton	2000	0

A brief description of the sources listed in Table 1 follows:

1 Indicators of Sustainable Forest Management for the Foothills Model Forest
Foothills Model Forest, 1998
This report contains a preliminary list of approximately 95 indicators corresponding to six general goals and 27 specific goals that support sustainable forest management in the Foothills Model Forest. The indicators are organized according to the six criteria identified by the Canadian Council of Forest Ministers (1995, Table 2). FMF-specific goals were considered to be mandated by legislation, policy or public process. The indicator selection process was facilitated by a workshop, and the preliminary indicator set is currently under review.

2 Defining Sustainable Forest Management: A Canadian Approach to Criteria and Indicators
Canadian Council of Forest Ministers, 1995
This document contains 83 indicators developed for 6 general criteria and 22 specific criteria

for sustainable forest management in Canada. Some data required for these indicators are available, while other indicators will require new data, new techniques, or further research. The criteria and indicators were designed to be compatible with international efforts such as the Montreal Process (1997).

3 Sustainable Forest Management Stewardship Report (2000)

Weldwood of Canada, Hinton Division, 2001

This comprehensive report contains 48 indicators for sustainable forest management on Weldwood's Forest Management Agreement (FMA) area organized around the six criteria identified by the Canadian Council of Forest Ministers (Table 2). The report is designed to fulfill reporting requirements for Weldwood's CAN/CSA Z809 certification, ISO 14001 certification and the annual Stewardship report initiated in 1994. All three reports have been combined and renamed the Sustainable Forest Management Stewardship Report. Each indicator is associated with one or more objectives, and accompanying text provides a brief account of what has been completed and planned for the future. The performance status of 119 commitments specified in the 1999 Forest Management Plan will be reported in 2001.

4 Detailed Forest Management Plan (Draft)

Weyerhaeuser, Edson (2001)

This document is in draft form and thus only portions (chapters 5 and 9) were available for review. Approximately 35 indicators organized around eight general goals and 37 specific goals for sustainable forest management have been proposed for Weyerhauser's Edson FMA area. The eight general goals are:

1) Ensure facilities remain globally competitive with respect to fiber supply while recognizing other facilities share similar desires
2) Maintain forest diversity at the stand and landscape level in terms of structure, composition and function
3) Maintain the productive capacity of the forest ecosystem
4) Maintain the process and function of watersheds
5) Improve public acceptability of forest management activities
6) Integrate forest management activities with the needs of other resource users
7) Protect unique archeological and ecological sites
8) Increase the sustainable harvest level of deciduous and coniferous timber.

5 Detailed Forest Management Plan (1997-2006)

Millar Western Industries, 2000

This management plan contains 74 potential indicators for sustainable forest management on Millar Western's FMA area. Indicators are organized around the six criteria identified by the Canadian Council of Forest Ministers (Table 2). Each indicator is associated with a specific goal and objective.

6 Forest Stewardship in Canada

Weyerhaeuser Canada, 2000

Approximately 25 indicators associated with eight general themes are identified in this stewardship report. Indicators not considered to be measurable were not included in the database. The eight general themes are:

1) Products for people

2) Water resources and habitat protection
3) Soil productivity
4) Wildlife habitat
5) Visual impact and recreation
6) Aboriginal peoples
7) Community and stakeholders
8) Research and inventory

7 Environment, Health and Safety Stewardship Progress Report

Canadian Association of Petroleum Producers, 2000

Indicators in this document were quantified in terms that reflected industrial performance. Benchmarking results were presented for 24 measures covering operations, air and land quality, and workplace safety. Measures were presented under three themes: 1) Air (sulphur dioxide, flaring, greenhouse gasses, benzene), 2) Land and water (spills and emergency preparedness, well sites), and 3) People and safety. This is the first year that CAPP members have consolidated the data needed to assess their performance, and annual reporting of indicators is planned. Eight indicators considered relevant to the NES strategy were included here.

8 Range Health Assessment Program

Public Lands Division, Alberta Agriculture, Food, and Rural Development, 2000

Nine indicators of range health were identified in the Range Health Assessment Short Form, which is a field guide to guide range health assessments. A comprehensive database containing long-term data range monitoring results on selected sites is maintained by the Land and Forest Service (M. Willoughby, pers. comm.) Indicators were grouped under five elements:

1) Integrity and ecological status
2) Site stability
3) Hydrologic function and nutrient cycling
4) Community structure
5) Noxious weeds

9 West Central Airshed Society Annual Report

West Central Airshed Society, 1999

This document summarizes ambient air monitoring data collected in west central Alberta. Three of the seven WCAS monitoring sites are located within the NES Strategy area (Hightower Ridge, Steeper, Carrot Creek). In this report, monitoring results for several air quality measurements are compared with Alberta guidelines. Five direct and one indirect indicators of air quality were included in this report.

10 Canadian Standards Association Proposal (Draft)

Weyerhaeuser Grande Cache / Grande Prairie, 2001

Approximately 18 indicators were extracted from a table in this draft proposal. Some indicators were not measurable variables and therefore were not included in the database. The indicators were structured around the six CCFM categories (Table 2). This table is a work in progress and contained many ideas that merit further expansion.

11 Park Management Plan

Jasper National Park, 2000

Approximately 23 indicators of ecological integrity were extracted from this management plan. A target for each indicator is given, along with current levels.

12 Sustainable Forest Management Plan

Canadian Forest Products Grande Prairie, 2000

This report contains approximately 55 potential indicators for sustainable forest management on Canfor's Forest Management Area (FMA) created around the six general criteria developed by the CCFM (see 2 above). Each of the six general criteria is broken down into specific goals which have associated indicators proposed and objectives stated.

13 Pacific and Yukon Environmental Indicators

Environment Canada, Pacific and Yukon Region, 2000

Four indicators were extracted from this website. This website presents a set of environmental indicators for priority issues in which Environment Canada maintains monitoring programs. The indicators are described by answering the four state of the environment questions of what's happening, why is it happening, why is it significant and what is being done (From website www.ecoinfo.org/env_ind/default.htm).

14 Alberta Sustainability Trends 2000: The Genuine Progress Indicators Report (1961-1999)

Pembina Institute for Appropriate Development, 2001

This report outlines 51 indicators for economic, personal-societal and environmental well being. Using the 51 indicators, human, social, natural, produced and financial sustainability are tracked over 40 years (1961-1999). The 51 indicators are combined to give an index of societal well being and sustainability.

15 Provincial Sustainability Indicators Initiative (Manitoba)

Government of Manitoba, 2001

This website outlines the initiatives being taken by the Manitoba Government to determine a suite of sustainability indicators that can help establish provincial targets and policies for sustainable development, and measure performance. Approximately 50 indicators for the environment, economy and human health and social well being are described.

16 Canada vs the OECD: An Environmental Comparison

Organization for Economic Cooperation and Development, 2000

This study compares Canada's environmental record to the other industrialized nations in the Organization for Economic Cooperation and Development (OECD) and tracks Canada's progress on environmental issues over the past two decades. Twenty-five environmental indicators in ten categories – air, water, energy, biodiversity, waste, climate change, ozone depletion, agriculture, transportation and miscellaneous – are examined. The study provides accurate, independent information about Canada's track record in protecting the environment. All of the statistical information comes from data verified and published by the OECD (from http://www.environmentalindicators.com/execsum.htm).

17 Environmental Trends in British Columbia

BC Ministry of Environment, Lands and Parks, 2000

This report presents 15 indicators on the state of British Columbia's environment. The status and trends, importance and actions taken are presented for each indicator. Where feasible, the indicator is measured at a sub-regional level where the province is divided into ecological units based on ecoregions or watershed. A summary of sources of problems and threats and a comparison with other jurisdictions is also included. The choice of indicators involved consultation with groups of experts for each issue. Together the 15 indicators represent a balance between provincial, national and global issues.

18 Community Indicators Project

Redefining Progress's Community Indicators Project, 2000

Forty-two indicators were extracted from this web page. Redefining Progress's Community Indicators Project links existing and emerging projects and facilitates the development of community indicators initiatives nationwide. A list of commonly used indicators developed by over 200 community indicators projects around the United States is outlined.

19 Sustainable Development in the United States: An Experimental Set of Indicators

US Interagency Working Group on Sustainable Development Indicators, 1998

Approximately 40 indicators were extracted from this web page. The Sustainable Development Indicators Group (SDI Group) was put together and comprised government, non-government and the private sector. Its purpose was to develop national indicators of progress toward sustainable development. The Group drew on related efforts from around the world, including Canada. Indicators were grouped into Economic, Environmental and Social.

20 Sustainability Indicators for the Fraser Basin Workbook

Fraser Basin Council, 2000

Thirty-eight indicators were extracted from this document. Each indicator is described, including a summary of its importance to sustainability and data availability. The Fraser Basin Council is a not-for-profit, BC society who worked with a group of individuals to develop a draft set of indicators. The draft indicators were selected using the Charter for Sustainability as a framework and corresponded to the 26 goals of the Charter. Four directions of the Charter are:

1) Understanding sustainability
2) Caring for ecosystems
3) Strengthening communities
4) Improving decision making

21 Obed Mountain Coal

(Personal communication, M. Issard, May 11 2001)

Obed Mountain Coal monitors environmental indicators in selected creeks in the area of their Mineral Surface Lease. Indicators include the number and size of fish, creek habitat attributes, number of benthic invertebrates by taxa, and water quality, including measures of numerous elements including selenium, oil, and grease.

22 Detailed Forest Management Plan: Volume I
Sundance Forest Industries Ltd., 1999
This plan contains a comprehensive listing of goals for the Sundance FMA area, many of which are consistent with those of the NES Strategy. For each goal, one or more objectives, strategies, and monitoring criteria are also given. Annual monitoring reports, and a 5-year stewardship report, will summarize the results of performance monitoring activities. While indicators are implicit within this DFMP, they are not explicitly listed, and thus no indicators from this plan are included here.

23 Management Strategy for the Little Smoky River Corridor
Alberta Newsprint Company, 1996.
This lists several objectives for the Little Smoky River Corridor, along with key strategies for achieving these objectives. No formal identification of indicators was included.

24 Sustainable Forest Management: Fish and Wildlife Strategies
Blue Ridge Lumber Ltd. Detailed Forest Management Plan (1999)
This report focuses on the ecological aspects of sustainable forest management in the context of Blue Ridge Lumber's Whitecourt Forest area, and was prepared by Westworth Associates Environmental Ltd. A background document intended to support the development of a Detailed Forest Management Plan, it does not contain specific indicators.

25 Whitehorse Wildland Park Management Plan
Alberta Environment, Natural Resources Service (Hinton), 2000
This plan contains detailed management objectives, each accompanied by a description of one or more actions required. No specific indicators are given.

Table 2. Criteria for sustainable forest management identified by the Canadian Council of Forest Ministers (1995).

Conservation of Biological Diversity
Forest Ecosystem Condition and Productivity
Conservation of Soil and Water
Global Ecological Cycles
Multiple Benefits to Society
Society's Responsibility for Sustainable Development

Assessment methodology

Indicators from each of the sources reviewed were ranked according to their applicability to the planning process developed by the Northern East Slopes Strategy (Fig. 2). It is important to note that this ranking relates specifically to the NES Strategy, and is not meant to be an evaluation of indicators identified by each source organization. Indicators in each source document have been identified in the context of each organization's values, goals, data availability, and intended application.

Indicators were first assigned to one of the 18 goals of the NES Strategy (Appendix 1). Then, five considerations were applied to each indicator:

Relevance to the NES Strategy Goal

1 = Moderate to low relevance to the corresponding regional NES Strategy goal.

2 = High relevance to the corresponding regional NES Strategy goal.

Regional monitoring potential

1 = Moderate to low potential, generally because information required to quantify the indicator is not currently available over a significant part of the NES Strategy area.

2 = High potential, generally because much of the necessary information is currently available. Note that the effort required to assemble available information may vary considerably among indicators.

Availability of baseline information to support regional forecasting of future indicator levels

0 = Not applicable. Indicator is an "Activity" indicator and is not appropriate for use in scenario forecasting.

1 = Moderate to low availability over a significant part of the NES Strategy area.

2 = High availability over a significant part of the NES Strategy area.

Level of confidence in predictions of future forecasted indicator levels

0 = Not applicable. Indicator is an "Activity" indicator and is not appropriate for use in scenario forecasting.

1 = Moderate to low confidence, generally because of insufficient understanding of the relationships between land use and changes in indicator levels.

2 = High confidence, generally because sufficient understanding exists to relate land use to changes in indicator levels.

Simplicity

1 = Not simple; persons without specialized experience or training may have difficulty understanding or interpreting the indicator

2 = Simple; specialized experience or training is not necessary to understand or interpret the indicator.

For each indicator, the total of all values (0, 1, or 2) assigned for the five considerations were summed, giving an overall value of 10. This overall value is interpreted as follows:

10 - An excellent indicator, highly relevant to at least one goal of the NES Strategy, with high potential for monitoring and forecasting, and easily understood by persons without specialized experience or training.

9 - A very good indicator, worthy of strong consideration for the NES Strategy, provided the single weakness is recognized or accommodated.

8 - A good indicator, worthy of consideration for the NES Strategy, provided its weaknesses are recognized or accommodated.

7 - A fair indicator, worth considering for the NES Strategy, but significant weaknesses may compromise its utility.

0 - 6 - Unlikely to be a useful indicator for the NES Strategy unless the identified weaknesses are recognized or accommodated.

Summary of indicators applicable to the goals of the NES Strategy

History and historical resources: Table 3

1. *To ensure that historical resources are identified and respected in the decision-making process*
    - Only four indicators applicable to this goal were identified, all of which described some management activity related to historical or archaeological resources. Two indicators were referenced in sources within the NES Strategy area.
    - None of the indicators ranked highly, according to the assessment methodology applied, and it is recommended that progress towards this goal be assessed in a qualitative fashion only.

2. *To ensure that our history is understood and respected in the decision making process*
    - No indicators applicable to this goal were identified, and it is recommended that progress towards this goal be assessed in a qualitative fashion only.

Wise resource use: Table 4

1. *To optimize all value added opportunities from the resource*
    - No indicators applicable to this goal were identified.
    - It is recommended that a new indicator relating to the regional economic contribution of value added industries be developed using existing information available through Statistics Canada or Alberta government sources.

2. *To minimize waste*
    - A total of 34 indicators applicable to this goal were identified, all of which described the levels of some condition related to solid waste. Only 4 indicators were referenced in sources within the NES Strategy area.
    - Several excellent indicators were identified, which related primarily to the amount of solid waste generated.
    - It is recommended that the amount of solid waste generated within the NES Strategy is an appropriate indicator for this goal. Amounts could be quantified using existing information available from municipal and provincial government sources.

3. *To encourage sustainable use*
    - A total of 98 indicators applicable to this goal were identified, including activities and conditions related to sustainable use. Almost half (46) of the indicators were referenced in sources within the NES Strategy area.
    - Many excellent indicators were identified, which related to the volume or area of timber removed (14 indicators), and the availability of mineral resources (1 indicator). Many indicators were also considered very good, including those relating to grazing intensity, landbase composition, and road density.

- It is recommended that each of the above five indicators be considered to assess progress towards this goal, using information available from provincial government sources and Forest Management Agreement holders.

4. *To integrate activities among all stakeholders and governments*
    - A total of 14 indicators applicable to this goal were identified, all but three of which referred to activities related to integration among stakeholders and governments. Seven indicators were referenced in sources within the NES Strategy area.
    - While no excellent or very good indicators were identified, three state indicators rated good to fair are worthy of consideration. These related to the amount and area of timber or land lost to other industrial activities.
    - It is recommended that progress towards this goal be assessed in a qualitative fashion, but some consideration should be given to measuring the extent (area, resource value) to which one stakeholder may compromise another. Information needed to quantify this indicator may be available from provincial government sources and Forest Management Agreement holders.

Wilderness lands: Table 5

1. *To integrate management of designated protected areas within the regional landscape.*
    - A total of 12 indicators applicable to this goal were identified, all of which referred to the area of land designated as protected. Only one indicator was referenced in a source within the NES Strategy area.
    - All indicators were rated excellent, due to their strong relevance to this goal, and the relative ease with which future areas can be monitored and forecast.
    - It is recommended that progress towards this goal be assessed using an indicator of area designated as protected within the NES Strategy area, using information available from provincial government sources and Forest Management Agreement holders.

2. *To ensure wilderness lands are maintained.*
    - One indicator applicable to this goal was identified, which referred to the amount of land that was undisturbed by human activity.
    - This indicator was rated excellent, due to its strong relevance to this goal, and the relative ease with which future areas can be monitored and forecast.
    - It is recommended that progress towards this goal be assessed using an indicator of area undisturbed within the NES Strategy area. Information is available from provincial government sources and Forest Management Agreement holders, although it will be necessary to define "undisturbed" for the purpose of calculating total area.

Public enjoyment of the great outdoors: Table 6

1. *To provide opportunities for responsible enjoyment and appreciation of our natural environment.*
    - A total of 13 indicators applicable to this goal were identified, most of which referred to the availability or use of areas for recreational purposes.
    - Four indicators were rated excellent; these were related to the availability of recreational opportunities. Seven additional indicators were rated very good; these were somewhat more difficult to monitor and forecast because they required estimates of recreational use in addition to availability.
    - It is recommended that progress towards this goal be assessed using a single indicator that quantifies the range of recreational opportunities in the NES Strategy area. Information is available from provincial government sources and Forest Management Agreement holders, although it will be necessary to define recreational opportunities for the purpose of calculating total area and availability.

Healthy and sustainable communities: Table 7

1. *To understand, respect and protect a community's culture and sense of being.*
    - A total of 55 indicators applicable to this goal were identified, most of which referred to some condition related to community health or well-being. Only three indicators were referenced in a source within the NES Strategy area.
    - While no indicators were rated excellent, 12 were considered very good. These were related to several community conditions including crime, employment, population, and injury.
    - It is recommended that progress towards this goal be assessed using the above four indicators. Information is available from provincial government and municipal sources, but the effort required to assemble existing information may vary considerably among indicators.

2. *To encourage sustainable resource use and economic diversity through regional economic activities and cooperation.*
    - A total of nine indicators applicable to this goal were identified, three of which were referenced in a source within the NES Strategy area.
    - None of the indicators were considered excellent or very good, but seven were considered good. These included six measures of employment and economic diversity, and one related to regional cooperation.
    - It is recommended that progress towards this goal be assessed in a qualitative fashion only, unless sufficiently reliable information on economic diversity is available from existing sources.

Integrity and fairness in decision making: Table 8

1. *To assure that decision making process is timely, transparent, predictable, consistent, fair and equitable.*
    - A total of 34 indicators applicable to this goal were identified, of which over half (18) were referenced in a source within the NES Strategy area. They included indicators of activities and measures of condition related to decision making.
    - None of the indicators were considered excellent or very good, and only three were considered good. These were all measures of satisfaction with the decision-making process.
    - It is recommended that progress towards this goal be assessed in a qualitative fashion only, unless coordinated mechanisms such as opinion or attitude surveys become available to quantify levels of satisfaction.

2. *To ensure decisions are made and revisited in light of current science, technology and societal values.*
    - A total of 44 indicators applicable to this goal were identified, of which 17 were referenced in a source within the NES Strategy area.
    - None of the indicators were considered excellent or very good, and only three were considered good. All were measures of education, and their relevance to this goal was relatively low.
    - It is recommended that progress towards this goal be assessed in a qualitative fashion only.

Healthy and sustainable economy: Table 9

1. *To optimize economic benefits and economic stability through diversification.*
    - A total of 44 indicators applicable to this goal were identified, of which only 3 were referenced in a source within the NES Strategy area.
    - None of the indicators were considered excellent, but 14 were very good. These related to several aspects of the economy and economic diversity.
    - It is recommended that progress towards this goal be assessed using a simple index of economic diversity generated from information available from provincial and federal (e.g., Statistics Canada) government sources.

2. *To encourage conditions that maintain opportunities for resource development.*
    - Only two indicators applicable to this goal were identified, neither of which were referenced in a source within the NES Strategy area.
    - Both indicators were excellent or very good, one being a measure of petroleum reserves, the other a measure of the number of industries driving local economies.
    - It is recommended that progress towards this goal be assessed using both of the above indicators, using information available from provincial and federal government sources.

3. *To maintain our competitiveness (in the global market).*
    - Only three indicators applicable to this goal were identified, two of which were referenced in a source within the NES Strategy area.
    - None of the three indicators were considered excellent or very good.
    - It is recommended that progress towards this goal be assessed in a qualitative fashion only.

Healthy and sustainable environment: Table 10

1. *Conservation of biological diversity at the ecosystem, species and genetic levels within the region.*
    - A total of 139 indicators applicable to this goal were identified, of which just over half (71) were referenced in a source within the NES Strategy area. They included indicators of activities related to biodiversity conservation, and conditions describing biodiversity at one or more spatial scales and levels of biological organization.
    - None of the indicators were considered excellent, primarily due to the difficulty of reliably monitoring and forecasting future levels of most ecological attributes. Twelve indicators were considered very good, most of which described the age-class distribution of forests.
    - It is recommended that age-class distribution of forests be used as an indicator of progress towards this goal at the regional level, with additional consideration given to other measures of landscape diversity and habitat diversity measurable at finer spatial scales. Information describing forest age class distribution is readily available from provincial government sources and Forest Management Agreement holders.

2. *To ensure that the quality of air, water, and soil are at healthy levels.*
    - A total of 98 indicators applicable to this goal were identified, of which almost half (43) were referenced in a source within the NES Strategy area. They included indicators of activities and measures of condition related to the quality of air, water, and soil.
    - None of the indicators were considered excellent or very good, primarily due to the difficulty of reliably monitoring and forecasting the future levels of air, water and soil quality. A total of 16 indicators considered "good" were direct or indirect measures of air and water quality.
    - It is recommended that progress towards this goal be assessed in a qualitative fashion only, unless an improved monitoring capability becomes available to assess air and water quality.

Table 3. List of indicators that could support the assessment of progress towards NES Strategy goals related to History and historical resources. In the three columns to the left of each indicator, "+" means the indicator has been identified by a source within the NES Strategy area, numbers refer to sources listed in Table 1, "A" = Activity indicator, "S" = State indicator. See text for explanation of ranking.

	Goal		Indicator	**Overall Rank**	Relevance to NES Strategy goal	Regional monitoring potential	Regional forecasting - baseline	Regional forecasting - confidence	Simplicity
To ensure that historical resources are identified and respected in the decision-making process									
+	5	A	compliance with Historical Resources Act	**5**	1	2	0	0	2
+	5	A	validation of heritage potential values	**5**	1	2	0	0	2
	6	A	number of field assessments in which archeological resources at risk	**4**	1	1	0	0	2
	6	A	number of known archeological sites accommodated in plans	**4**	1	1	0	0	2
To ensure that our history is understood and respected in the decision making process									
			(no indicators found)						

Table 4. List of indicators that could support the assessment of progress towards NES Strategy goals related to Wise resource use. In the three columns to the left of each indicator, "+" means the indicator has been identified by a source within the NES Strategy area, numbers refer to sources listed in Table 1, "A" = Activity indicator, "S" = State indicator. See text for explanation of ranking.

Goal			Indicator	Overall Rank	Relevance to NES Strategy goal	Regional monitoring potential	Regional forecasting - baseline	Regional forecasting - confidence	Simplicity
To optimize all value added opportunities from the resource									
			(no indicators found)						
To minimize waste									
	17	S	domestic waste (kg/person/year solid waste generated)	**10**	2	2	2	2	2
	1	S	incidences & amount of human-caused pollution	**10**	2	2	2	2	2
	14	S	landfill waste	**10**	2	2	2	2	2
	16	S	municipal waste (kg/capita)	**10**	2	2	2	2	2
+	3	S	recycling rates as a percentage of consumption	**10**	2	2	2	2	2
	15	S	waste disposal per capita	**10**	2	2	2	2	2
	20	S	waste diverted from landfills	**10**	2	2	2	2	2
	14	S	hazardous waste	**9**	1	2	2	2	2
+	3	S	percent of blocks sampled with garbage from company operations	**8**	1	2	1	2	2
	6	S	wood waste as a percentage of delivered volume	**8**	1	2	1	2	2
	16	S	municipal sewage treatment (% of population served)	**8**	1	2	1	2	2
	20	S	alternative & total energy consumption	**7**	1	1	1	2	2
+	7	S	amount of energy needed to produce a unit of production	**7**	1	1	1	2	2
	19	S	energy consumption (per capita & per $ of GDP)	**7**	1	1	1	2	2
	16	S	energy consumption (tonnes of oil equivalent/capita)	**7**	1	1	1	2	2
	16	S	energy efficiency (tonnes of oil equivalent/$1000 GDP)	**7**	1	1	1	2	2
	18	S	energy use	**7**	1	1	1	2	2
	14	S	energy use	**7**	1	1	1	2	2
	17	S	green economy (the total & alternative energy consumption)	**7**	1	1	1	2	2
	1	S	percent of energy use from renewable vs fossil fuels	**7**	1	1	1	2	2
	2	S	percentage of forest sector energy from renewable sources rel. to total	**7**	1	1	2	1	2
+	3	S	use of non-renewable resources per m3 of harvest from the FMA	**7**	1	1	1	2	2
	19	S	ratio of renewable water supply to withdrawals	**7**	1	1	1	2	2
	15	S	water consumption	**7**	1	1	1	2	2
	20	S	water consumption	**7**	1	1	1	2	2
	16	S	water consumption (m3/capita)	**7**	1	1	1	2	2

			Goal	Indicator	Overall Rank	Relevance to NES Strategy goal	Regional monitoring potential	Regional forecasting - baseline	Regional forecasting - confidence	Simplicity
			To minimize waste (continued)							
	18	S		water usage	**7**	1	1	1	2	2
	17	S		water use (cumulative number of stream restrictions by decade)	**7**	1	1	1	2	2
	16	S		recycling (% of glass & paper recycled)	**7**	2	1	1	1	2
	2	S		recycling rate of forest wood products manufactured & used in Canada	**7**	2	1	1	1	2
	18	S		recycling rates	**7**	2	1	1	1	2
	15	S		energy efficiency	**6**	1	1	1	1	2
	15	S		ratio of renewable energy consumption to total energy consumption	**6**	1	1	1	1	2
	19	S		materials consumption per capita & per $ of GDP	**6**	1	1	1	2	1
			To encourage sustainable use							
	15	S		identified mineral reserves versus mineral extracted	**10**	2	2	2	2	2
+	12	S		amount of forest cover removed & its spatial distribution	**10**	2	2	2	2	2
+	5	S		annual harvest area (ha)	**10**	2	2	2	2	2
+	12	S		annual area harvested compared to total area reforested	**10**	2	2	2	2	2
+	12	S		amount harvested versus the approved AAC	**10**	2	2	2	2	2
+	3	S		annual allowable cut for the FMA	**10**	2	2	2	2	2
	15	S		annual allowable cut versus actual harvest	**10**	2	2	2	2	2
+	3	S		annual harvest as proportion of the available Annual Allowable Cut	**10**	2	2	2	2	2
	2	S		annual removal of forest products relative to sustainable volume	**10**	2	2	2	2	2
+	5	S		determine growing stock & annual harvest volume by age & species	**10**	2	2	2	2	2
	16	S		forests (volume of forests logged, in m3/capita)	**10**	2	2	2	2	2
+	5	S		harvest & growing stock yield (m3/ha)	**10**	2	2	2	2	2
	6	S		harvest as a percentage of Annual Allowable Cut	**10**	2	2	2	2	2
+	12	S		long-term harvest levels vs. actual extraction rates as per the DFMP	**10**	2	2	2	2	2
+	4	S		m3 per year & m3 per quadrant (AAC) for FMA	**10**	2	2	2	2	2
+	8	S		live plant/litter cover on rangeland	**9**	2	2	1	2	2
+	8	S		plant & litter cover distribution on rangeland	**9**	2	2	1	2	2
+	5	S		grazing use & carrying capacity	**9**	2	2	1	2	2
	18	S		acres of vacant land in the region	**9**	1	2	2	2	2
+	12	S		amount of area of lands excluded from harvest in the DFMP	**9**	1	2	2	2	2
+	12	S		amount of area under forest cover	**9**	1	2	2	2	2
+	10	S		amount of forest land loss	**9**	1	2	2	2	2
	1	S		area converted from or restored to forest land each year	**9**	1	2	2	2	2
	2	S		area of forest converted to non-forest land use e.g. urbanization	**9**	1	2	2	2	2
	2	S		area of forest depletion	**9**	1	2	2	2	2

	Goal		Indicator	Overall Rank	Relevance to NES Strategy goal	Regional monitoring potential	Regional forecasting - baseline	Regional forecasting - confidence	Simplicity
To encourage sustainable use (continued)									
	1	S	area of forest depletion (as it relates to loss of biomass & canopy cover)	**9**	1	2	2	2	2
	2	S	area of forest permanently converted to non-forest land use	**9**	1	2	2	2	2
	15	S	change in land use	**9**	1	2	2	2	2
	2	S	distribution of land base available for timber production	**9**	1	2	2	2	2
+	4	S	net loss of productive landbase	**9**	1	2	2	2	2
+	3	S	percent change to landbase area by major category	**9**	1	2	2	2	2
+	3	S	percent change to landuse area designations by category	**9**	1	2	2	2	2
+	7	S	percent of abandoned wells reclaimed	**9**	1	2	2	2	2
	2	S	percentage of biomass volume by general forest type	**9**	1	2	2	2	2
	2	S	semi-permanent or temporary loss or gain of forest ecosystems	**9**	1	2	2	2	2
+	12	S	amount of area in managed & rare physical environments	**9**	1	2	2	2	2
+	12	S	amount of productive area company utilizes for future permanent roads	**9**	1	2	2	2	2
	1	S	density of roads & watercourse crossings	**9**	1	2	2	2	2
+	3	S	length & use status of company roads by category	**9**	1	2	2	2	2
+	5	S	road density	**9**	1	2	2	2	2
+	5	S	road density & use indicators	**9**	1	2	2	2	2
	20	S	number of vehicles owned per household	**8**	1	1	2	2	2
	11	S	elk population demographics	**8**	2	2	1	1	2
	1	S	amounts of biological resources harvested	**8**	2	2	1	1	2
	1	S	exploitation rates of biological resources	**8**	2	2	1	1	2
	1	S	exploitation rates of consumable forest products relative to sustainable	**8**	2	2	1	1	2
+	5	S	trapping yield & success	**8**	2	2	1	1	2
	6	S	hectares of cutblock areas in roads, landings, & trails reclaimed	**8**	1	2	1	2	2
	1	S	number of known uses of the area in question	**8**	1	1	2	2	2
	15	S	number, size & type of farms	**8**	1	1	2	2	2
	6	S	percent of cutblock areas in roads, landings, & permanent skid trails	**8**	1	2	1	2	2
+	3	S	days between skid clearance & initiation of reforestation activities	**8**	1	2	1	2	2
+	12	S	amount of area in the regenerated yield group	**8**	1	2	1	2	2
+	12	S	amount of harvested area in the regenerated yield group	**8**	1	2	1	2	2
+	12	S	amount of productive area regenerated (excluding cut units)	**8**	1	2	1	2	2
+	1	S	forest regeneration performance	**8**	1	2	1	2	2
	6	S	percent of area free growing within committed time frames	**8**	1	2	1	2	2
+	3	S	percent of harvested area that is successfully reforested	**8**	1	2	1	2	2
+	10	S	percent of reforestation with pre-existing species	**8**	1	2	1	2	2
	6	S	percentage of area satisfactorily regenerated within committed time	**8**	1	2	1	2	2

	Goal		Indicator	Overall Rank	Relevance to NES Strategy goal	Regional monitoring potential	Regional forecasting - baseline	Regional forecasting - confidence	Simplicity
To encourage sustainable use (continued)									
	2	S	percentage of area successfully naturally & artificially regenerated	**8**	1	2	1	2	2
	6	S	percentage of harvested area reforested within one growing season	**8**	1	2	1	2	2
	6	S	percentage of harvested area reforested within two growing seasons	**8**	1	2	1	2	2
+	4	S	regeneration of species composition defined by management regulations	**8**	1	2	1	2	2
+	10	S	success rate of tree species regeneration	**8**	1	2	1	2	2
	1	S	road development indices	**8**	1	2	2	2	1
+	12	S	amount of area identified as low productive sites	**8**	1	2	1	2	2
	2	S	mean annual increment by forest type & age class	**8**	1	2	1	2	2
+	3	S	mean annual tree growth rate (increment) for contributing area on FMA	**8**	1	2	1	2	2
+	12	S	measurement of tree growth (site index) based on yield curves	**8**	1	2	1	2	2
+	4	S	non-productive area converted to productive (hectares by year)	**8**	1	2	1	2	2
	1	S	percentage of biomass or volume by forest type	**8**	1	2	1	2	2
+	10	S	rate of tree & vegetation growth	**8**	1	2	1	2	2
	19	S	timber growth to removals balance	**8**	1	2	1	2	2
+	5	S	timber productivity rating	**8**	1	2	1	2	2
	1	S	tree & stand growth rates	**8**	1	2	1	2	2
	2	S	tree biomass volumes	**8**	1	2	1	2	2
	1	S	tree mass or volume, & biomass of non-tree vegetation	**8**	1	2	1	2	2
	1	S	tree or stand growth rate	**8**	1	2	1	2	2
	16	S	fertilizer use (tonnes/capita)	**7**	1	1	1	2	2
	14	S	ecological footprint	**7**	2	1	2	1	1
	15	S	ecological footprint index	**7**	2	1	2	1	1
	2	S	animal population trends for selected species of economic importance	**7**	2	1	1	1	2
	1	S	population trends for species of commercial importance	**7**	2	1	1	1	2
+	5	S	linear features with respect to fire management	**7**	1	2	1	2	1
	18	S	ratio of land consumption to population growth	**6**	1	1	2	1	1
	16	S	road vehicles (number of road vehicles per capita)	**6**	1	1	1	1	2
+	3	S	use by category of company roads	**6**	1	1	1	1	2
	14	S	agricultural sustainability	**6**	2	1	1	1	1
	14	S	timber sustainability	**6**	2	1	1	1	1
	2	S	availability of habitat, selected wildlife species of economic importance	**5**	1	1	1	1	1
	1	S	habitat supply for species of commercial importance	**5**	1	1	1	1	1
	1	A	land use relative to that deemed to adversely affect biological resources	**5**	1	2	0	0	2
	6	A	percent of areas with site level mapping completed prior to operations	**5**	1	2	0	0	2
	6	A	percent of blocks on which forest health issues appropriately addressed	**5**	1	2	0	0	2

	Goal		Indicator	Overall Rank	Relevance to NES Strategy goal	Regional monitoring potential	Regional forecasting - baseline	Regional forecasting - confidence	Simplicity
To encourage sustainable use (continued)									
+	3	A	percent of the FMA covered by long term access plans	**5**	1	2	0	0	2
+	12	A	time frame for treating harvested areas	**4**	1	1	0	0	2
+	12	A	measurement of site quality (site index) based on ecological type	**4**	1	2	0	0	1
To integrate activities among all stakeholders and governments									
+	12	S	amount of area permanently lost to other industry activities	**8**	1	2	1	2	2
+	3	S	volume & area of merchantable timber salvaged relative to damaged	**8**	1	2	1	2	2
+	12	S	amount of accessible merchantable industrial wood salvaged	**7**	1	2	1	2	1
	1	A	number cooperative agreements regarding travel corridors	**5**	1	2	0	0	2
	1	A	number of joint use agreements in effect between companies/government	**5**	1	2	0	0	2
+	5	A	number of resource use agreements signed by the company	**5**	1	2	0	0	2
	1	A	number of active partners	**5**	1	2	0	0	2
	1	A	number of partners setting out objectives reflecting SFM	**5**	1	2	0	0	2
	1	A	number of person hours per year spent on cooperative SFM activities	**5**	1	2	0	0	2
	1	A	number of projects supported & associated financial expenditures	**5**	1	2	0	0	2
+	3	A	percent of high sensitivity compartments, visual impact assessments	**5**	1	2	0	0	2
	6	A	percent of visually sensitive cutblocks plans that were followed	**5**	1	2	0	0	2
+	3	A	percent company participation, regional resource management initiatives	**5**	1	2	0	0	2
+	12	A	degree of access integration	**4**	1	2	0	0	1

Table 5. List of indicators that could support the assessment of progress towards NES Strategy goals related to Wilderness lands. In the three columns to the left of each indicator, "+" means the indicator has been identified by a source within the NES Strategy area, numbers refer to sources listed in Table 1, "A" = Activity indicator, "S" = State indicator. See text for explanation of ranking.

	Goal		Indicator	Overall Rank	Relevance to NES Strategy goal	Regional monitoring potential	Regional forecasting - baseline	Regional forecasting - confidence	Simplicity
To integrate management of designated protected areas within the regional landscape									
	18	S	acres of open space	**10**	2	2	2	2	2
	18	S	acres of parks & protected green space per 1,000 residents	**10**	2	2	2	2	2
	18	S	acres of parks & protected green space per 1,000 residents	**10**	2	2	2	2	2
	2	S	area & percentage of protected forest by degree of protection	**10**	2	2	2	2	2
+	3	S	area of protected lands by category within the FMA perimeter	**10**	2	2	2	2	2
	2	S	area, percentage & representativeness of forest types in protected areas	**10**	2	2	2	2	2
	1	S	area, percentage & representativeness of forest types in protected areas	**10**	2	2	2	2	2
	14	S	parks & wilderness	**10**	2	2	2	2	2
	16	S	protected areas (% of land designated as protected)	**10**	2	2	2	2	2
	17	S	protected areas (the percentage of land base having protected area status)	**10**	2	2	2	2	2
	15	S	total designated & protected land	**10**	2	2	2	2	2
	1	S	withdrawals / additions to parks, wilderness areas, other protected areas	**10**	2	2	2	2	2
To ensure wilderness lands are maintained									
	1	S	number & area undisturbed/already disturbed by human activity	**10**	2	2	2	2	2

Table 6. List of indicators that could support the assessment of progress towards the NES Strategy goal related to Public enjoyment of the great outdoors. In the three columns to the left of each indicator, "+" means the indicator has been identified by a source within the NES Strategy area, numbers refer to sources listed in Table 1, "A" = Activity indicator, "S" = State indicator. See text for explanation of ranking.

	Goal		Indicator	Overall Rank	Relevance to NES Strategy goal	Regional monitoring potential	Regional forecasting - baseline	Regional forecasting - confidence	Simplicity
To provide opportunities for responsible enjoyment and appreciation of our natural environment									
+	3	S	amount of recreation infrastructure on the FMA	**10**	2	2	2	2	2
	19	S	outdoor recreational activities	**10**	2	2	2	2	2
	18	S	recreation & tourist-related business	**10**	2	2	2	2	2
+	12	S	recreational opportunities	**10**	2	2	2	2	2
+	3	S	amount of recreation participation	**8**	2	2	1	1	2
	2	S	availability & use of recreational opportunities	**8**	2	2	1	1	2
+	5	S	change in recreational use	**8**	2	2	1	1	2
+	5	S	number of recreational users	**8**	2	2	1	1	2
+	5	S	number of user days by recreational activity	**8**	2	2	1	1	2
	20	S	park use	**8**	2	2	1	1	2
+	5	S	regional expenditures on forest-based recreation	**8**	2	2	1	1	2
	2	A	membership & expenditures in forest recreation-oriented organizations	**5**	1	2	0	0	2
	6	A	number of operating areas where recreational values are mapped	**5**	1	2	0	0	2

Table 7. List of indicators that could support the assessment of progress towards NES Strategy goals related to Healthy and sustainable communities. In the three columns to the left of each indicator, "+" means the indicator has been identified by a source within the NES Strategy area, numbers refer to sources listed in Table 1, "A" = Activity indicator, "S" = State indicator. See text for explanation of ranking.

Goal			Indicator	Overall Rank	Relevance to NES Strategy goal	Regional monitoring potential	Regional forecasting - baseline	Regional forecasting - confidence	Simplicity
To understand, respect and protect a community's culture and sense of being									
	14	S	crime	**9**	2	2	2	1	2
	19	S	crime rate	**9**	2	2	2	1	2
	15	S	crime rate	**9**	2	2	2	1	2
	20	S	crime rate by type of crime	**9**	2	2	2	1	2
	15	S	labour force composition	**9**	2	2	2	1	2
	18	S	number of jobs/number of tourists	**9**	2	2	2	1	2
	20	S	rate of employment among aboriginal men & women of different ages	**9**	2	2	2	1	2
	16	S	population (% growth in number of people)	**9**	1	2	2	2	2
	18	S	population density & population growth	**9**	1	2	2	2	2
+	7	S	lost time injury frequency	**9**	1	2	2	2	2
+	3	S	number of safety incidents	**9**	1	2	2	2	2
	19	S	children living in families with only one parent present	**9**	2	2	2	1	2
	18	S	domestic violence calls to police	**8**	1	2	2	1	2
	18	S	incidences of child abuse	**8**	1	2	2	1	2
	15	S	re-offending rate	**8**	1	2	2	1	2
	15	S	satisfaction with the justice system	**8**	1	2	2	1	2
	19	S	births to single mothers	**8**	1	2	2	1	2
	18	S	childhood asthma hospitalization rate	**8**	1	2	2	1	2
	18	S	residents without health insurance	**8**	1	2	2	1	2
	14	S	suicide	**8**	1	2	2	1	2
	14	S	auto crashes	**8**	1	2	2	1	2
	14	S	infant mortality	**8**	1	2	2	1	2
	15	S	infant mortality rates	**8**	1	2	2	1	2
	14	S	premature mortality	**8**	1	2	2	1	2
	19	S	people in census tracts with 40% or greater poverty	**8**	1	1	2	2	2
	20	S	percentage of families below the "low income"cutoff	**8**	1	1	2	2	2
	18	S	teacher salaries	**8**	1	1	2	2	2
+	5	S	population demographics	**8**	1	2	2	1	2
	15	S	population index	**8**	1	1	2	2	2

	Goal		Indicator	Overall Rank	Relevance to NES Strategy goal	Regional monitoring potential	Regional forecasting - baseline	Regional forecasting - confidence	Simplicity
To understand, respect and protect a community's culture and sense of being (continued)									
	14	S	family breakdown	**8**	2	1	2	1	2
	14	S	free time	**8**	2	1	2	1	2
	14	S	household work	**8**	2	1	2	1	2
	19	S	percentage of households in problem housing	**8**	2	1	2	1	2
	15	S	perception of Manitoba as a good place to live, work & raise children	**8**	2	2	1	1	2
	15	S	psychological well-being	**8**	2	2	1	1	2
	15	S	perceived safety / fear of crime	**7**	1	1	2	1	2
	15	S	victimization	**7**	1	1	2	1	2
	15	S	level of satisfaction with employment	**7**	1	2	1	1	2
	14	S	drug use	**7**	1	1	2	1	2
	14	S	obesity	**7**	1	1	2	1	2
	15	S	satisfaction with the health system	**7**	1	2	1	1	2
	18	S	use of alcohol, tobacco, & other drugs among youth	**7**	1	1	2	1	2
	20	S	age & natural causes of death & life expectancy	**7**	1	1	2	1	2
	14	S	life expectancy	**7**	1	1	2	1	2
	19	S	life expectancy at birth	**7**	1	1	2	1	2
	14	S	volunteerism	**7**	1	1	2	1	2
	1	S	social pathology rates	**7**	2	1	1	1	2
	20	S	number & percent of residents that suffer from serious disease, by type	**6**	1	1	1	1	2
	15	S	access to health services	**6**	1	1	1	1	2
	19	S	contributing time & money to charities	**6**	1	1	1	1	2
	20	S	number & percent of residents, voluntary community organizations	**6**	1	1	1	1	2
	20	S	number of residents contributing to charitable organizations, & amount	**6**	1	1	1	1	2
	19	S	participation in the arts & recreation	**6**	1	1	1	1	2
	15	S	participation rates, community organizations, including volunteer work	**6**	1	1	1	1	2
	2	A	extent of Aboriginal participation, forest-based economic opportunities	**5**	1	2	0	0	2
To encourage sustainable resource use and economic diversity through regional economic activities and cooperation									
+	12	S	amount of coniferous timber available to locals	**8**	1	2	2	1	2
	2	S	area of forest land available for subsistence purposes	**8**	1	2	2	1	2
+	12	S	economic contribution, company to local communities & contractors	**8**	1	2	2	1	2
	18	S	employment diversity	**8**	2	2	2	1	1
	2	S	index of the diversity of the local industrial base	**8**	2	2	2	1	1
	2	S	number of communities, stewardship or co-management responsibilities	**8**	1	2	2	1	2
	2	S	utilization of forests, non-market goods & services, including subsistence	**8**	2	1	2	1	2

Goal			Indicator	Overall Rank	Relevance to NES Strategy goal	Regional monitoring potential	Regional forecasting - baseline	Regional forecasting - confidence	Simplicity
To encourage sustainable resource use and economic diversity through regional economic activities and cooperation (continued)									
+	3	S	contributions to society	**7**	1	2	1	2	1
	2	S	diversity of forest use at community level	**7**	2	1	2	1	1

Table 8. List of indicators that could support the assessment of progress towards NES Strategy goals related to Integrity and fairness in decision making. In the three columns to the left of each indicator, "+" means the indicator has been identified by a source within the NES Strategy area, numbers refer to sources listed in Table 1, "A" = Activity indicator, "S" = State indicator. See text for explanation of ranking.

Goal			Indicator	**Overall Rank**	Relevance to NES Strategy goal	Regional monitoring potential	Regional forecasting - baseline	Regional forecasting - confidence	Simplicity
To assure that decision making process is timely, transparent, predictable, consistent, fair and equitable									
+	3	S	degree of satisfaction with SFM as applied to FMA	**8**	2	2	1	1	2
+	5	S	number of complaints from other users	**8**	2	2	1	1	2
	15	S	perceived ability to influence decision-making	**8**	2	2	1	1	2
+	3	A	achievement & maintenance of certification status by the company	**5**	1	2	0	0	2
+	5	A	annual reports on change in practice	**5**	1	2	0	0	2
+	5	A	compliance with all provincial & municipal acts & by laws	**5**	1	2	0	0	2
+	3	A	existence of an annual SFM report & accompanying action plan	**5**	1	2	0	0	2
	1	A	number of databases that provide reliable information on indicator status	**5**	1	2	0	0	2
+	3	A	number of environmental incidents resulting from company operations	**5**	1	2	0	0	2
+	3	A	number of regulatory non-compliance incidents on an annual basis	**5**	1	2	0	0	2
	1	A	number of times revision of indicators are conducted	**5**	1	2	0	0	2
	1	A	number or times achieved levels of selected SFM indicators are reported	**5**	1	2	0	0	2
+	12	A	the degree to which the actual field performance aligns with the DFMP	**5**	1	2	0	0	2
	1	A	number of public recommendations & management actions in response to whether key policy decisions are timely, fair, open & equitable	**5**	1	2	0	0	2
	1	A	number of public recommendations & management actions in response to whether there is broad participation in decision making processes	**5**	1	2	0	0	2
+	12	A	the number of company responses to letters or public meeting issues	**5**	1	2	0	0	2
+	3	A	amount of consultation participation	**5**	1	2	0	0	2
+	12	A	types of public involvement opportunities incorporated into planning	**5**	1	2	0	0	2
+	5	A	attendance at public information sessions (number, backgrounds)	**5**	1	2	0	0	2
	2	A	degree of public participation in decision-making processes	**5**	1	2	0	0	2
	2	A	public participation in decisions & monitoring of progress toward SFM	**5**	1	2	0	0	2
	2	A	degree of public participation in the design of decision-making process	**5**	1	2	0	0	2
	1	A	participation of interested parties, integrated planning & decision making	**5**	1	2	0	0	2
	1	A	number of stakeholder groups invited to participate in decision making	**5**	1	2	0	0	2
	1	A	number of stakeholders participating in land-use & resource allocation	**5**	1	2	0	0	2
	1	A	number of stakeholders participating in monitoring & reviewing process	**5**	1	2	0	0	2
	1	A	number of stakeholders participating in planning & decision making	**5**	1	2	0	0	2
	6	A	number of stakeholders participating in management & planning process	**5**	1	2	0	0	2

Goal			Indicator	Overall Rank	Relevance to NES Strategy goal	Regional monitoring potential	Regional forecasting - baseline	Regional forecasting - confidence	Simplicity
To assure that decision making process is timely, transparent, predictable, consistent, fair and equitable (continued)									
+	12	A	amount of opportunity for input by Aboriginal peoples	**5**	1	2	0	0	2
+	3	A	opportunity provided & participation of Aboriginal peoples, input	**5**	1	2	0	0	2
	6	A	participation of local Aboriginal people invited in planning process	**5**	1	2	0	0	2
+	3	A	amount of consultation opportunity provided	**5**	1	2	0	0	2
+	12	A	communication with trappers impacted by harvest operations	**5**	1	2	0	0	2
+	5	A	number of meetings with stakeholders	**5**	1	2	0	0	2
To ensure decisions are made and revisited in light of current science, technology and societal values									
	19	S	educational achievement rates	**8**	1	2	2	1	2
	14	S	educational attainment	**8**	1	2	2	1	2
	19	S	educational attainment by level	**8**	1	2	2	1	2
	15	S	graduation rate	**8**	1	2	2	1	2
	18	S	high school drop-out rate	**8**	1	2	2	1	2
	1	S	number of schools that have SFM in curricula	**8**	1	2	2	1	2
	18	S	number of student/employees completing vocational training	**8**	1	2	2	1	2
	1	S	education statistics	**7**	1	2	1	1	2
	20	S	level of education attained	**7**	1	1	2	1	2
	15	S	literacy rate	**7**	1	2	1	1	2
	15	S	satisfaction with the public education system	**7**	1	2	1	1	2
	19	S	teacher training level & application of qualifications	**7**	1	2	1	1	2
	1	S	number of times SFM is in regional media	**6**	1	1	1	1	2
+	12	A	amount of school-based forest educational opportunities supported	**5**	1	2	0	0	2
+	3	A	amount of company public communication initiatives	**5**	1	2	0	0	2
	1	A	number of hours spent on public education	**5**	1	2	0	0	2
+	5	A	person years of staff time committed to public outreach	**5**	1	2	0	0	2
+	5	A	support of public education programs	**5**	1	2	0	0	2
	2	A	total effective expenditure on public forestry education	**5**	1	2	0	0	2
+	4	A	document training & changes in ground rules	**5**	1	2	0	0	2
	2	A	management & development expenditures	**5**	1	2	0	0	2
+	3	A	number of woods workers certified by an accreditation program	**5**	1	2	0	0	2
+	3	A	percent of employees & contractors, taken Stewardship Training	**5**	1	2	0	0	2
+	3	A	existence of & amount of resource information by category	**5**	1	2	0	0	2
	6	A	percent of areas that have a recognized ecosystem classification system	**5**	1	2	0	0	2
	6	A	percent of areas that have a riparian zone classification	**5**	1	2	0	0	2
	6	A	percent of areas that have forest inventories & ecological inventories	**5**	1	2	0	0	2

Goal			Indicator	Overall Rank	Relevance to NES Strategy goal	Regional monitoring potential	Regional forecasting - baseline	Regional forecasting - confidence	Simplicity
To ensure decisions are made and revisited in light of current science, technology and societal values (continued)									
+	3	A	percent of blocks with pre-harvest silvicultural prescriptions completed	**5**	1	2	0	0	2
+	3	A	percent of compartments with ecological classification & mapping	**5**	1	2	0	0	2
	6	A	% of streams, lakes, & wetlands assessed & classified prior to harvest	**5**	1	2	0	0	2
	2	A	percentage of area covered by multi-attribute resource inventories	**5**	1	2	0	0	2
+	5	A	annual funding levels for research projects	**5**	1	2	0	0	2
	1	A	dollars invested in relevant research	**5**	1	2	0	0	2
+	5	A	funding & participation levels for staff professional development	**5**	1	2	0	0	2
	19	A	investment in research & development as a percentage of GDP	**5**	1	2	0	0	2
	2	A	investments in forest-based research & development & information	**5**	1	2	0	0	2
	2	A	percent of forest area under completed management plans / programs / guidelines which have included public participation	**5**	1	2	0	0	2
	2	A	research & development expenditures in forest products technologies	**5**	1	2	0	0	2
+	12	A	use of experts to increase knowledge & understanding, forest ecosystems	**5**	1	2	0	0	2
+	3	A	company research & development expenditures by category	**5**	1	2	0	0	2
	2	A	mutual learning mechanisms & processes	**4**	1	1	0	0	2
+	5	A	head fire intensity maps based on fuel types, historic fire weather data	**4**	1	1	0	0	2
+	5	A	crowning susceptibility maps derived from AVI	**3**	1	1	0	0	1
+	5	A	FBP system fuel derived from AVI	**3**	1	1	0	0	1

Table 9. List of indicators that could support the assessment of progress towards NES Strategy goals related to Healthy and sustainable economy. In the three columns to the left of each indicator, "+" means the indicator has been identified by a source within the NES Strategy area, numbers refer to sources listed in Table 1, "A" = Activity indicator, "S" = State indicator. See text for explanation of ranking.

Goal			Indicator	**Overall Rank**	Relevance to NES Strategy goal	Regional monitoring potential	Regional forecasting - baseline	Regional forecasting - confidence	Simplicity
To optimize economic benefits and economic stability through diversification									
	19	S	capital assets	**9**	1	2	2	2	2
	2	S	number of Aboriginal communities with significant forestry economy	**9**	1	2	2	2	2
	2	S	total expenditures by individuals on activities related to non-timber use	**9**	2	2	2	1	2
+	5	S	employment levels	**9**	2	2	2	1	2
	1	S	employment statistics	**9**	2	2	2	1	2
	18	S	employment/unemployment	**9**	2	2	2	1	2
	20	S	number of jobs within different sectors	**9**	2	2	2	1	2
	18	S	number of jobs/number of tourists	**9**	2	2	2	1	2
	2	S	total employment in all forest-related sectors	**9**	2	2	2	1	2
	19	S	unemployment	**9**	2	2	2	1	2
	14	S	unemployment	**9**	2	2	2	1	2
	14	S	taxes	**9**	1	2	2	2	2
	2	S	net profitability	**9**	2	2	1	2	2
	14	S	disposable income	**9**	2	1	2	2	2
	19	S	domestic product	**8**	2	2	2	1	1
	14	S	economic diversity	**8**	2	2	2	1	1
	18	S	new business starts	**8**	1	2	2	1	2
	18	S	job growth	**8**	1	2	2	1	2
	18	S	job growth by economic clusters	**8**	1	2	2	1	2
	19	S	consumption expenditures per capita	**8**	1	1	2	2	2
	14	S	personal expenditures	**8**	1	1	2	2	2
	14	S	transportation expenditure	**8**	1	1	2	2	2
	1	S	assessment of income distribution	**8**	1	1	2	2	2
+	5	S	household income	**8**	1	1	2	2	2
	18	S	income & wage distribution (includes poverty levels)	**8**	1	1	2	2	2
	19	S	income distribution	**8**	1	1	2	2	2
	1	S	income distribution	**8**	1	1	2	2	2
	14	S	income distribution	**8**	1	1	2	2	2
	15	S	income distribution & dependency	**8**	1	1	2	2	2

	Goal		Indicator	Overall Rank	Relevance to NES Strategy goal	Regional monitoring potential	Regional forecasting - baseline	Regional forecasting - confidence	Simplicity
To optimize economic benefits and economic stability through diversification (continued)									
	14	S	paid work time	**8**	1	1	2	2	2
	14	S	poverty	**8**	1	1	2	2	2
	18	S	wage rate	**8**	1	1	2	2	2
	14	S	weekly wage rate	**8**	1	1	2	2	2
+	5	S	real estate values	**8**	1	2	2	1	2
	1	S	real estate values	**8**	1	2	2	1	2
	14	S	economic growth	**7**	1	2	2	1	1
	2	S	economic value of non-market goods & services	**7**	2	2	1	1	1
	19	S	home ownership rates	**7**	1	1	2	1	2
	14	S	household debt	**7**	1	1	2	1	2
	15	S	net farm income	**7**	1	1	1	2	2
	16	S	livestock (number of cattle, sheep, goats & pigs/capita)	**7**	1	1	1	2	2
	14	S	savings rate	**7**	1	1	2	1	2
	20	S	total amount of investment in public assets compared to GDP	**6**	1	1	2	1	1
	19	S	labor productivity	**5**	1	1	1	1	1
To encourage conditions that maintain opportunities for resource development									
	14	S	oil & gas reserve life	**10**	2	2	2	2	2
	20	S	number of industries driving local economies	**9**	2	2	2	1	2
To maintain our competitiveness (in the global market)									
+	5	S	planning & extraction costs	**8**	2	1	1	2	2
+	3	S	return on capital	**8**	2	1	1	2	2
	1	S	competitive cost analysis	**7**	2	1	1	1	2

Table 10. List of indicators that could support the assessment of progress towards NES Strategy goals related to Healthy and sustainable environment. In the three columns to the left of each indicator, "+" means the indicator has been identified by a source within the NES Strategy area, numbers refer to sources listed in Table 1, "A" = Activity indicator, "S" = State indicator. See text for explanation of ranking.

	Goal		Indicator	**Overall Rank**	Relevance to NES Strategy goal	Regional monitoring potential	Regional forecasting - baseline	Regional forecasting - confidence	Simplicity
Conservation of biological diversity at the ecosystem, species and genetic levels within the region									
	20	S	age & species composition of forests	**9**	2	2	2	1	2
+	12	S	amount of area in each seral stage at present & key points in time	**9**	2	2	2	1	2
+	12	S	amount of area in old seral stage at present & key points in time	**9**	2	2	2	1	2
	1	S	areas of forest types & age classes relative to total forest area	**9**	2	2	2	1	2
+	5	S	area-weighted age by tree species across FMA area	**9**	2	2	2	1	2
	15	S	forest type & age class	**9**	2	2	2	1	2
+	5	S	percent & extent of area by forest type & age class	**9**	2	2	2	1	2
	6	S	percent of areas that have retention of late seral stands	**9**	2	2	2	1	2
+	3	S	percent of seral stage for each major forest type	**9**	2	2	2	1	2
+	4	S	percentage & distribution by forest strata & age class	**9**	2	2	2	1	2
	2	S	percentage & extent of area by forest type & age class	**9**	2	2	2	1	2
	11	S	area of grassland in the montane ecoregion	**9**	1	2	2	2	2
	19	S	acres of major terrestrial ecosystems	**8**	1	2	2	1	2
+	5	S	percentage & extent, in area, of forest types	**8**	1	2	2	1	2
	2	S	percentage & extent, in area, of forest types	**8**	1	2	2	1	2
+	5	S	area of wetlands over time	**8**	1	2	2	1	2
	2	S	area & severity of fire damage	**8**	1	2	2	1	2
+	4	S	area damaged by fire (hectares per year)	**8**	1	2	2	1	2
+	5	S	fire incidence	**8**	1	2	2	1	2
	11	S	long-term average fire cycle	**8**	1	2	2	1	2
+	10	S	loss to fire	**8**	1	2	2	1	2
	11	S	presence of native fish species	**8**	1	2	1	2	2
+	12	S	amount of area planted with non-seed orchard stock	**7**	1	2	1	2	1
+	12	S	effective number of unrelated genotype (trees) in the breeding program	**7**	1	2	1	2	1
+	12	S	effective number of unrelated genotypes (trees) in the seed orchard	**7**	1	2	1	2	1
+	5	S	natural regeneration (area & number), trees that ingress into plantations	**7**	1	2	1	2	1
+	12	S	number of mother trees represented in the bulk seed collections	**7**	1	2	1	2	1
+	10	S	percent of cutblock planted with natural vs genetic stock	**7**	1	2	1	2	1
	6	S	percent of trees planted genetically improved	**7**	1	2	1	2	1

	Goal		Indicator	**Overall Rank**	Relevance to NES Strategy goal	Regional monitoring potential	Regional forecasting - baseline	Regional forecasting - confidence	Simplicity
Conservation of biological diversity at the ecosystem, species and genetic levels within the region (continued)									
	11	S	condition of aspen & riparian willow communities	**7**	1	2	1	1	2
+	5	S	contrast-weighted edge length (km)	**7**	1	2	1	2	1
	14	S	forest fragmentation	**7**	1	2	1	2	1
+	5	S	level of fragmentation & connectedness of forest ecosystem components	**7**	1	2	1	2	1
	2	S	level of fragmentation & connectedness, forest ecosystem components	**7**	1	2	1	2	1
	1	S	level of fragmentation & connectiveness, forest ecosystem components	**7**	1	2	1	2	1
+	5	S	mean edge contrast index compared with natural range of variation	**7**	1	2	1	2	1
+	5	S	mean patch area by forest type (ha)	**7**	1	2	1	2	1
+	5	S	nearest neighbour (m) compared with natural range of variation	**7**	1	2	1	2	1
+	5	S	patch shape compared with natural range of variation	**7**	1	2	1	2	1
+	12	S	number of ecosite phases distributed across the FMA area	**7**	1	2	1	1	2
	11	S	degree of naturally occurring connectivity, water bodies & wetlands	**7**	1	2	1	2	1
	1	S	rare ecological sites & special landscape features	**7**	1	1	1	2	2
+	3	S	annual area damaged by fire, insects, disease, other major disturbances	**7**	1	2	1	1	2
	1	S	fire occurrence & severity	**7**	1	2	1	1	2
+	10	S	incidents of disease	**7**	1	2	1	1	2
+	10	S	incidents of insects at endemic levels	**7**	1	2	1	1	2
+	12	S	occurrences & amount of area impacted by fire, insects, disease, etc.	**7**	1	2	1	1	2
+	4	S	timber losses (m3 per year, hectares per year) caused by biotic impacts	**7**	1	2	1	1	2
	11	S	distribution of non-native fish that compete with native fish	**7**	1	2	1	1	2
+	10	S	presence of marten across the FMA	**7**	1	2	1	2	1
	11	S	annual grizzly bear mortality	**7**	2	1	1	1	2
	11	S	caribou population status	**7**	2	1	1	1	2
+	4	S	listing of rare, endangered or threatened species, increases or decreases	**7**	2	1	1	1	2
	11	S	minimum grizzly bear population estimate	**7**	2	1	1	1	2
	2	S	number of forest-dependent species in small portion of former range	**7**	2	1	1	1	2
	11	S	viable resident wolf packs in the montane ecoregion	**7**	2	1	1	1	2
	17	S	percent of threatened or endangered forest-dependent species	**7**	2	1	1	1	2
	20	S	number of species at risk	**7**	2	1	1	1	2
+	12	S	presence of endangered or threatened wildlife species (red & blue list)	**7**	2	1	1	1	2
+	12	S	presence of rare & endangered plants on the FMA area	**7**	2	1	1	1	2
	6	S	presence of rare, endangered, or threatened species	**7**	2	1	1	1	2
	17	S	species at risk (% of known species)	**7**	2	1	1	1	2
	16	S	species at risk (number of species designated as at risk)	**7**	2	1	1	1	2
+	5	S	changes in stream channel geometry & substrates	**6**	2	1	1	1	1

			Goal	Indicator	**Overall Rank**	Relevance to NES Strategy goal	Regional monitoring potential	Regional forecasting - baseline	Regional forecasting - confidence	Simplicity
Conservation of biological diversity at the ecosystem, species and genetic levels within the region (continued)										
+	21	S		creek habitat attributes (fish habitat)	**6**	2	1	1	1	1
	1	S		watercourse structure indices	**6**	2	1	1	1	1
	11	S		extent of non-native plants that threaten native species & communities	**6**	1	1	1	1	2
+	8	S		infestation of noxious weeds on rangeland	**6**	1	1	1	1	2
+	5	S		population estimates of exotic species	**6**	1	1	1	1	2
+	5	S		direct measurements from floral genetic tests	**6**	2	1	1	1	1
+	10	S		range of tree genetic diversity	**6**	2	1	1	1	1
	1	S		percent trees regenerated naturally from in situ seed sources	**6**	1	1	1	2	1
+	12	S		amount of coarse & fine woody debris on site, post-harvesting	**6**	1	1	1	2	1
+	12	S		amount of merchantable wood (m3) left on site	**6**	1	1	1	2	1
+	4	S		amounts across the landscape of standing & down woody material	**6**	1	1	1	2	1
+	4	S		amounts across the landscape of standing & down woody material	**6**	1	1	1	2	1
	2	S		crown transparency in percentage by class	**6**	1	2	1	1	1
	17	S		riparian ecosystems on forest land (% riparian area on forest land logged)	**6**	1	1	1	1	2
+	4	S		patch size variation: historical & periodic (hectares)	**6**	1	1	1	2	1
	1	S		landscape composition & structure	**6**	1	2	1	1	1
+	12	S		landscape structure	**6**	1	2	1	1	1
	1	S		percent of canopy cover	**6**	1	2	1	1	1
	2	S		area & severity of disease infestation	**6**	1	1	1	1	2
	2	S		area & severity of insect attack	**6**	1	1	1	1	2
+	4	S		area & severity of insect attack (hectares per year)	**6**	1	1	1	1	2
	1	S		area & severity of insect attack, disease infestation	**6**	1	1	1	1	2
	1	S		extent of disturbance occurrences	**6**	1	1	1	1	2
+	5	S		frequency & size of forest pest outbreaks & fire events	**6**	1	1	1	1	2
	15	S		distribution of indicator & exotic nuisance species	**6**	1	1	1	1	2
+	4	S		plant & animal species diversity	**6**	1	2	1	1	1
	11	S		songbird diversity	**6**	1	2	1	1	1
+	5	S		abundance of suitable habitat	**6**	1	2	1	1	1
+	12	S		amount of company LOC access into the Caribou Area that is gated	**6**	1	2	1	1	1
+	12	S		amount of significant wildlife mineral licks	**6**	1	2	1	1	1
	1	S		aquatic habitat supply values	**6**	1	2	1	1	1
	11	S		habitat connectivity for large carnivores	**6**	1	2	1	1	1
+	10	S		number of spawning sites for bull trout	**6**	1	2	1	1	1
+	10	S		percent of caribou range that is 30 years & older that is maintained	**6**	1	2	1	1	1
	11	S		supply of winter habitat for caribou	**6**	1	2	1	1	1

	Goal		Indicator	**Overall Rank**	Relevance to NES Strategy goal	Regional monitoring potential	Regional forecasting - baseline	Regional forecasting - confidence	Simplicity
Conservation of biological diversity at the ecosystem, species and genetic levels within the region (continued)									
	1	S	wildlife habitat supply values	**6**	1	2	1	1	1
+	5	S	selected amphibians, invertebrates, microbes, forest health indicators	**6**	1	2	1	1	1
	2	A	number of threatened, endangered, rare, vulnerable species rel. to total	**6**	2	2	0	0	2
+	5	A	status of rare & endangered species by category of risk	**6**	2	2	0	0	2
	11	S	grizzly bear habitat effectiveness	**6**	2	1	1	1	1
	11	S	grizzly bear habitat security	**6**	2	1	1	1	1
	11	S	grizzly bear linkage zones	**6**	2	1	1	1	1
+	12	S	level of suitable habitat for species of special management concern	**6**	2	1	1	1	1
+	12	S	type, amount, & location of habitat for special management species	**6**	2	1	1	1	1
	17	S	percent of range no longer occupied or declining populations, 5 species	**6**	2	1	1	1	1
	2	S	area & severity of occurrence of detrimental exotic species	**5**	1	1	1	1	1
	19	S	invasive alien species	**5**	1	1	1	1	1
	1	S	effects on gene flow indicated by landscape & habitat configuration	**5**	1	1	1	1	1
+	5	S	habitat diversity index based on proportion of forest in each stage	**5**	1	1	1	1	1
+	8	S	number of life forms present on rangeland	**5**	1	1	1	1	1
+	8	S	plant community diversity & structure on rangeland	**5**	1	1	1	1	1
	1	S	stand composition & structure indices	**5**	1	1	1	1	1
	2	S	vegetation (non-tree) biomass estimates	**5**	1	1	1	1	1
+	5	S	mean core area (ha) compared with natural range of variation	**5**	1	1	1	1	1
	2	S	percentage of canopy cover	**5**	1	1	1	1	1
+	10	S	success rate of vegetation (other than trees) regeneration	**5**	1	1	1	1	1
	2	S	changes in distribution & abundance of aquatic fauna	**5**	1	1	1	1	1
+	5	S	effective population size of flora	**5**	1	1	1	1	1
	15	S	fish species diversity & populations	**5**	1	1	1	1	1
+	21	S	number of benthic invertebrates, by taxa	**5**	1	1	1	1	1
+	21	S	number of fish by species & size	**5**	1	1	1	1	1
+	8	S	percentage of native species growing on rangeland	**5**	1	1	1	1	1
+	5	S	population levels & changes over time of selected species & guilds	**5**	1	1	1	1	1
	2	S	population levels & changes over time of selected species & guilds	**5**	1	1	1	1	1
	1	S	population trends of selected species	**5**	1	1	1	1	1
	11	A	extirpated native fish species restored to native water	**5**	2	1	0	0	2
	2	A	no. of commercial & endangered vegetation species, genetic con. strategy	**5**	1	2	0	0	2
+	5	S	presence & diversity of aquatic species	**5**	1	1	1	1	1
	1	S	fish growth rates	**5**	1	1	1	1	1
	1	S	habitat supply	**5**	1	1	1	1	1

			Goal	Indicator	Overall Rank	Relevance to NES Strategy goal	Regional monitoring potential	Regional forecasting - baseline	Regional forecasting - confidence	Simplicity
Conservation of biological diversity at the ecosystem, species and genetic levels within the region (continued)										
+	3	S		long term habitat supply for selected species	**5**	1	1	1	1	1
	2	S		frequency of occurrence, indicator species (plants, birds, mammals, fish)	**5**	1	1	1	1	1
+	3	A		number of completed conservation strategies for species at risk	**5**	1	2	0	0	2
+	3	A		percent of watershed basins that are within acceptable impact thresholds	**4**	1	1	0	0	2
	1	A		number of species with assessments of population status & distribution	**4**	1	1	0	0	2
To ensure that the quality of air, water, and soil are at healthy levels										
+	9	S		ground-level ozone concentration	**8**	2	1	1	2	2
+	9	S		hydrocarbon concentration	**8**	2	1	1	2	2
+	9	S		inhalable particulate concentration	**8**	2	1	1	2	2
+	9	S		NOx concentration	**8**	2	1	1	2	2
+	9	S		SO2 concentration	**8**	2	1	1	2	2
	14	S		air quality	**8**	1	2	1	2	2
+	7	S		percentage of flared gas to the total gas production	**8**	1	2	2	2	1
	2	S		ozone concentrations in forested regions	**8**	1	2	1	2	2
	2	S		rates of pollutant deposition	**8**	1	2	1	2	2
+	12	S		amount of forest cover along watercourses to meet objectives	**8**	1	2	1	2	2
+	12	S		amount of siltation caused by road construction in forestry operations	**8**	1	2	1	2	2
	1	S		number of point sources	**8**	1	2	1	2	2
+	10	S		number of stream crossings	**8**	1	2	1	2	2
+	3	S		% of crossings, fish bearing streams, meet fish passage standards	**8**	1	1	2	2	2
+	7	S		spill volumes per unit of production	**8**	1	1	2	2	2
	2	S		surface area of water within forested area	**8**	1	2	1	2	2
	17	S		air quality impacts from fine particulates	**7**	1	1	1	2	2
+	9	S		plant growth, yield, & foliar damage (saskatoon, alfalfa, trees)	**7**	1	1	1	2	2
	19	S		contaminants in biota	**7**	1	1	1	2	2
	13	S		pesticide poisoning in raptors	**7**	1	1	1	2	2
	17	S		toxic contaminants (concentration of organochlorines in eggs)	**7**	1	1	1	2	2
	20	S		toxic contaminants in wildlife	**7**	1	1	1	2	2
	16	S		pesticide use (tonnes of active ingredients/capita)	**7**	1	1	1	2	2
+	12	S		presence of vascular plant species that indicate potential nitrogen levels	**7**	2	2	1	1	1
+	8	S		evidence of erosion or deposition at bottom of slopes on rangelands	**7**	1	2	1	1	2
+	12	S		no, of locations that have slumped on sensitive slopes due to harvesting	**7**	1	2	1	1	2
+	12	S		occurrence of slumping caused by road construction	**7**	1	2	1	1	2
+	8	S		percent of human caused bare ground on rangeland	**7**	1	2	1	1	2

			Goal	Indicator	**Overall Rank**	Relevance to NES Strategy goal	Regional monitoring potential	Regional forecasting - baseline	Regional forecasting - confidence	Simplicity
To ensure that the quality of air, water, and soil are at healthy levels (continued)										
+	5	S		direct measures of water quality	**7**	2	1	1	1	2
	1	S		monitor water quality & water quality changes	**7**	2	1	1	1	2
	13	S		nitrate levels in ground water	**7**	2	1	1	1	2
	19	S		surface water quality	**7**	2	1	1	1	2
	17	S		surface water quality (10 yr trends, 63 monitoring stations)	**7**	2	1	1	1	2
	18	S		water quality	**7**	2	1	1	1	2
	2	S		water quality as measured by water chemistry, turbidity, etc	**7**	2	1	1	1	2
	20	S		water quality index	**7**	2	1	1	1	2
	15	S		water quality index	**7**	2	1	1	1	2
+	21	S		water quality, several elements	**7**	2	1	1	1	2
+	3	S		number of sediment & pollution point sources occurrences	**7**	1	1	1	2	2
	17	S		ground water (percent of observation wells, declining water levels)	**7**	2	1	1	1	2
	1	S		water yields	**7**	2	1	1	1	2
	18	S		days exceeding federal air quality levels	**6**	1	1	1	1	2
+	5	S		annual emissions of carbon from fossil fuels in company operations	**6**	1	1	1	2	1
+	7	S		benzene emissions per glycol dehydrator measured in tonnes	**6**	1	1	1	2	1
	13	S		dioxin & furan concentration in sediments from mill discharge	**6**	1	1	1	2	1
	2	S		forest sector CO2 emissions	**6**	1	1	1	2	1
	2	S		fossil carbon products emissions	**6**	1	1	1	2	1
	2	S		fossil fuel emissions	**6**	1	1	1	2	1
	1	S		fossil fuel emissions by manufacturing & operating equipment	**6**	1	1	1	2	1
	15	S		greenhouse gas emissions	**6**	1	1	1	2	1
	14	S		greenhouse gas emissions	**6**	1	1	1	2	1
	19	S		greenhouse gas emissions	**6**	1	1	1	2	1
	16	S		greenhouse gas emissions (tonnes of CO2/capita)	**6**	1	1	1	2	1
+	7	S		greenhouse gas emissions per unit of production	**6**	1	1	1	2	1
	17	S		greenhouse gases (megatonnes of emissions, CO2 equivalents)	**6**	1	1	1	2	1
+	7	S		percentage of SO2 emissions recovered from operations	**6**	1	1	1	2	1
	20	S		total greenhouse gas emissions (CO2 equivalents)	**6**	1	1	1	2	1
	15	S		soil quality	**6**	2	1	1	1	1
+	5	S		nutrient status	**6**	2	1	1	1	1
	1	S		soil carbon pools & decay rates	**6**	1	2	1	1	1
	1	S		soil chemical nutrient status	**6**	2	1	1	1	1
	1	S		soil organic matter content & carbon:nitrogen ratio	**6**	2	1	1	1	1
+	12	S		site disturbance (compaction, erosion, soil chemical alteration)	**6**	1	2	1	1	1

Goal			Indicator	Overall Rank	Relevance to NES Strategy goal	Regional monitoring potential	Regional forecasting - baseline	Regional forecasting - confidence	Simplicity
To ensure that the quality of air, water, and soil are at healthy levels (continued)									
+	5	S	measures of disturbance such as rutting	**6**	1	1	1	1	2
	1	S	area of eroding or potential eroding surfaces	**6**	1	1	1	1	2
	1	S	frequency of chronic sediment sources associated with road networks	**6**	1	1	1	1	2
	1	S	sediment load	**6**	1	1	1	1	2
+	5	S	sources of erosion & sediment discharge into stream channels	**6**	1	1	1	1	2
+	5	S	changes in annual flow	**6**	2	1	1	1	1
+	5	S	changes in peak & low flows	**6**	2	1	1	1	1
	2	S	trends & timing of events in stream flows from forest catchments	**6**	2	1	1	1	1
	14	S	carbon budget deficit	**5**	1	1	1	1	1
	2	S	soil carbon pool decay rates	**5**	1	1	1	1	1
	2	S	soil carbon pools	**5**	1	1	1	1	1
+	5	S	annual net carbon flux from FMA (mass per area per time)	**5**	1	1	1	1	1
+	12	A	number of incidents of excursions of herbicide	**5**	1	2	0	0	2
+	5	S	microbial diversity	**5**	1	1	1	1	1
	1	S	soil micro-organism activity	**5**	1	1	1	1	1
+	5	S	organic content	**5**	1	1	1	1	1
	1	S	soil pH	**5**	1	1	1	1	1
	1	S	mass displacement	**5**	1	1	1	1	1
+	4	A	percentage of forest managed primarily for soil protection	**5**	1	2	0	0	2
	1	S	rate of hydrological recovery of a site following vegetative disturbance	**5**	1	1	1	1	1
+	3	A	percent compliance with the Alberta Soil Conservation Guidelines	**5**	1	2	0	0	2
	6	A	percent of soils verified prior to operations starting	**5**	1	2	0	0	2
	2	A	percentage of forest managed primarily for soil protection	**5**	1	2	0	0	2
+	5	S	bulk density/soil porosity	**5**	1	1	1	1	1
+	5	S	percent area of exposed mineral soil	**5**	1	1	1	1	1
	1	S	soil physical properties	**5**	1	1	1	1	1
+	12	A	level of response to identified problems regarding siltation	**5**	1	2	0	0	2
	2	A	percentage of forest area with road construction & crossing guidelines	**5**	1	2	0	0	2
	2	A	percentage of forest managed primarily for water protection	**5**	1	2	0	0	2
+	4	A	percentage of forest managed primarily for water protection	**5**	1	2	0	0	2
+	12	A	equipment in use & amount of technology with low emissions	**4**	1	1	0	0	2
	2	A	percent of harvested area with soil compaction, erosion, puddling, etc.	**4**	1	1	0	0	2
+	3	A	% application of water quality best mgt. practices, new roads, crossings	**4**	1	1	0	0	2
+	3	A	percent remediation of sediment & pollutant point sources	**4**	1	1	0	0	2
	14	A	water quality	**4**	1	1	0	0	2

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Glossary

Value: A principle, standard or quality considered worthwhile or desirable (Canadian Standards Association 1996).

Goal: A broad, general statement that describes a desired state or condition related to one or more values (Canadian Standards Association 1996).

Indicator: A measurable variable used to report progress toward the achievement of a goal (Canadian Standards Association 1996).

Appendix 1. Goals of the Northern East Slopes Strategy.

Goal[1]

History and historical resources

1.1 To ensure that historical resources are identified and respected in the decision-making process.

1.2 To ensure that our history is understood and respected in the decision making process.

Wise resource use

2.1 To optimize all value added opportunities from the resource.

2.2 To minimize waste.

2.3 To encourage sustainable use.

2.4 To integrate activities among all stakeholders and governments.

Wilderness lands

3.1 To integrate management of designated protected areas within the regional landscape.

3.2 To ensure wilderness lands are maintained.

Public enjoyment of the great outdoors

4.1 To provide opportunities for responsible enjoyment and appreciation of our natural environment.

Healthy and sustainable communities

5.1 To understand, respect and protect a community's culture and sense of being.

5.2 To encourage sustainable resource use and economic diversity through regional economic activities and cooperation.

Integrity and fairness in decision making

6.1 To assure that decision making process is timely, transparent, predictable, consistent, fair and equitable.

6.2 To ensure decisions are made and revisited in light of current science, technology and societal values.

Healthy and sustainable economy

7.1 To optimize economic benefits and economic stability through diversification.

7.2 To encourage conditions that maintain opportunities for resource development.

7.3 To maintain our competitiveness (in the global market).

Healthy and sustainable environment

8.1 Conservation of biological diversity at the ecosystem, species and genetic levels within the region.

8.2 To ensure that the quality of air, water, and soil are at healthy levels.

[1] Source: Regional Steering Group for the NES Strategy (2001)

Appendix 2. Summary of indicator categories referenced by FMA holders within the NES Strategy area.

		# FMA Indicators				
Indicator category	**Number of FMA's**	**Canfor**	**Millar-Western**	**Weldwood**	**Weyerhaeuser (Edson)**	**Weyerhaeuser (GC/GP)**
History and historical resources						
historical resources	1	-	2	-	-	-
Wise resource use						
energy consumption	1	-	-	1	-	-
waste - amount	1	-	-	2	-	-
economic species - harvest	1	-	1	-	-	-
grazing use	1	-	1	-	-	-
landbase - area by category	4	2	-	2	1	1
reforestation delay	2	1	-	1	-	-
reforestation success rate	4	3	-	1	1	2
roads - amount	3	1	3	2	-	-
roads - use	1	-	-	1	-	-
timber harvest - area	2	2	1	-	-	-
timber harvest - volume	4	2	2	2	1	-
tree growth - productivity	1	1	-	-	-	-
tree growth - volume	5	1	1	1	1	1
integration - agreements	1	-	1	-	-	-
integration - general	2	3	-	3	-	-
Wilderness lands						
protected areas - area	1	-	-	1	-	-
wilderness - area	1	1	-	-	-	-
Public enjoyment of the great outdoors						
recreation - level of use	2	-	4	1	-	-
recreation - opportunities	2	1	-	1	-	-

Indicator category	Number of FMA's	# FMA Indicators: Canfor	Millar-Western	Weldwood	Weyerhaeuser (Edson)	Weyerhaeuser (GC/GP)
Healthy and sustainable communities						
human population size	1	-	1	-	-	-
safety - incident rate	1	-	-	1	-	-
community - contribution	1	-	-	1	-	-
economic diversity	1	2	-	-	-	-
Integrity and fairness in decision making						
reporting performance	3	1	2	4	-	-
response rate to stakeholder input	1	1	-	-	-	-
stakeholder participation rate	3	1	1	1	-	-
stakeholder participation rate, aboriginal	2	1	-	1	-	-
stakeholder satisfaction rate	2	-	1	1	-	-
stakeholders, investment in	3	1	1	1	-	-
education - realized	1	1	-	-	-	-
education investment - public	2	-	2	1	-	-
education investment - worker	2	-	-	2	1	-
knowledge - inventory	3	1	3	3	-	-
knowledge - investment	3	1	2	1	-	-
Healthy and sustainable economy						
employment rate	1	-	1	-	-	-
income	1	-	1	-	-	-
real estate	1	-	1	-	-	-
competitiveness	2	-	1	1	-	-
Healthy and sustainable environment						
aquatic habitat diversity	1	-	1	-	-	-
exotic species - abundance	1	-	1	-	-	-
genetic diversity - direct measure	2	-	1	-	-	1
genetic diversity - indirect measure	3	4	1	-	-	1
habitat diversity	2	-	2	-	-	1
habitat diversity - deadwood	2	2	-	-	2	-
landscape diversity - age class	4	2	2	1	1	-

Indicator category	Number of FMA's	# FMA Indicators: Canfor	Millar-Western	Weldwood	Weyerhaeuser (Edson)	Weyerhaeuser (GC/GP)
landscape diversity - fragmentation	3	-	6	1	1	-
landscape diversity - general	2	2	1	-	-	-
landscape diversity - special cases	1	-	1	-	-	-
natural disturbance - area by category	5	1	2	1	3	3
selected species - abundance	1	-	2	-	-	-
selected species - diversity	2	-	1	-	1	-
selected species - habitat	5	1	1	1	1	1
selected species - presence	2	-	1	-	-	1
species at risk - abundance	1	-	-	-	1	-
species at risk - conservation strategies	2	-	1	1	-	-
species at risk - habitat	1	2	-	-	-	-
species at risk - presence	1	2	-	-	-	-
air quality - indirect	1	1	-	-	-	-
carbon budget	1	-	2	-	-	-
herbicide - excursions	1	1	-	-	-	-
soil quality - biological	1	-	1	-	-	-
soil quality - chemical	2	1	2	-	-	-
soil quality - disturbance	2	2	-	-	1	-
soil quality - indirect	1	-	-	1	-	-
soil quality - physical	2	1	3	-	-	-
water quality	4	3	2	3	1	-
water quantity	1	-	2	-	-	-
water quality - indirect	2	-	-	1	-	1