

FOREST MANAGEMENT PLAN FIVE YEAR OPERATING PLAN

FOREST MANAGEMENT DISTRICT 21 (CHARLOTTETOWN TO LANSE AU CLAIR)



OPERATING PERIOD
JANUARY 01, 2012 – DECEMBER 31, 2016



DEPARTMENT OF NATURAL RESOURCES

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EXECUTIVE SUMMARY

Forest management planning sessions were initiated within the District in 2001. Over time many stakeholders including local residents have contributed both scientific and local knowledge, which was used in part to develop this and previous.

Results from the most current process started in 2011 of which the process yielded a five year operating plan covering the time period from 2012-2016. This plan outlines the various management activities which are to take place in the district during the outlined planning period. Further refinements are made to operational activities in the annual work schedule, which is subject to further review.

District 21 is 1.9 million hectares of boreal forest, situated on the south coast of Labrador. It is comprised of approximately 70% in the mature to over mature age classes of mainly dominant black spruce forest. It is generally bound to the north by Hawke River, to the west by the Paradise and St. Pauls Rivers and the Quebec-Labrador border, to the east and south by the Labrador Coast.

Commercial activity in the district was fairly active in the past; however has since decreased with the down turn in the industry globally. Domestic activities though have remained relatively consistent. Residents of the numerous communities harvest fuelwood and sawlogs for domestic use.

The calculated annual allowable cut for the district has been determined to be **48,600 m³** for a total harvest of **243,000 m³** over the next five year period. An annual allowable allocation has also been calculated for the district. Approximately **43,200 m³** will be available for allocation to operators with the remaining volume (approx. 5,400 m³) available subject to performance.

Access to the majority of this timber will require the construction of 14.0 kilometers of Crown and operator built forest access roads. Due to the lack of disturbed area (fire or harvesting), silviculture prescriptions will focus mainly on monitoring and research activities.

Twenty-seven commercial operating blocks are proposed for harvesting over the next five years. These blocks contain sufficient volumes to support commercial allocations of approximately 36,300 m³/year. Domestic harvests, estimated to be around 12,300 m³/year, will take place in several blocks located near the communities. In all cases, permit conditions and the Environmental Protection Guidelines will govern all operations.

Information and research including, surveys will be used to monitor past actions and provide data for future management decisions. Numerous surveys including pre-harvest surveys, regeneration surveys, utilization surveys, and site disturbance surveys will be conducted regularly during this time period. District Conservation Officers will routinely monitor all activities to ensure compliance with various conditions, legislation and guidelines.

Extensive areas have been identified to preserve ecological and local values. Approximately 95% of the entire district area was not used in the allowable cut calculation for various reasons.

These areas provide for habitat for various native animal species as well as act as scientific benchmarks.

Large fires were common in the district in past years, with relatively smaller fires occurring in recent years. Fire staff are located in Port Hope Simpson during fire season with additional support located at the Cartwright and North West River offices. Suppression on fires will occur according to life, property and commercial resources.

There is an increase in the risk of insect and/or disease outbreaks due to the mature and over mature age classes of the forests. To reduce the risk of major forest fires, and insect and disease outbreaks, harvesting of the oldest stand first will be promoted. During this planning period, it is not anticipated that chemical control for insects will be required.

INTRODUCTION

Forest ecosystem management planning began in Newfoundland and Labrador around 1995. The process is based on participation of the various stakeholders who provide input into public meetings during the development of the plans and after the scheduled activities take place.

The result of the planning process in District 21 (FMD21) is the *Five Year Operating Plan for Forest Management District 21* (operating plan). The participants are acknowledged for the time and effort put into the process in the District. A summary of the concerns and mitigations taken from the meetings can be seen in Appendix I.

The operating plan provides details of various management activities scheduled to occur between January 01, 2012 and December 31, 2016. Various activities include harvesting, silviculture, road construction, protection and research which are carried out to meet the goals and objectives of the operating plan and the Provincial sustainable forest management strategy (2003). The Provincial strategy document outlines the broad framework with goals and objectives for the Province. Further refinements of the individual planning activities are compiled into an annual work schedule.

The planning team has described the framework of the ecosystem based forest management planning approach in District 21, by adopting the following vision statement for the planning process:

To create an ecosystem-based management plan for District 21 that ensures the sustainability of a healthy, productive forest ecosystem that will maintain a balance of social, economic and environmental values to local residents over time.

In accordance with the *Forestry Act (1990)*, this document will be submitted by the Department to the Minister of Environment and Conservation to be registered for assessment under the *Environmental Protection Act* and is subject to further public review.

FOREST MANAGEMENT DISTRICT 21 – DESCRIPTION

General Description

Forest Management District 21 (FMD21) is approximately 1.9 million hectares in size. It is bounded to the north by Hawke Bay and Hawke Brook with the boundary following a general westerly direction along the District 20 boundary until it meets the Paradise River, to the west along the Paradise and St. Pauls Rivers and the Quebec – Labrador border to the Strait of Belle Isle, to the east and south by the Labrador Sea including all islands to Hawke Bay (Figure 1). A legal description of this area is provided in Appendix I.

Five ecoregions are represented in the district, with the most significant representation being in the mid-boreal forest ecoregion. As well, it contains six major drainage basins and portions of several others. Historically, the land and adjacent marine areas of the district have supplied various resources and benefits to settled and transient residents. The district is considered a Crown Management District since most land is classified as Crown Land, although very small portions may be allocated to various jurisdictions (i.e. municipal areas, etc.). Finally, a portion of the northern part of the district is currently subject to aboriginal land claim negotiations which have not yet been resolved.

Generally most of District 21 consists of an undulating landscape including upland topography and coastal plains. As well, the area is represented by flat to rolling upland plateaus with a few eskers and shallow river valleys traversing the plateau. Coastal areas include exposed headlands with sheltered inlets and numerous islands (Meades 1990).

Sedimentary rocks form local outcrops. The bedrock is found to be acidic with metamorphic gneiss. Anorthosite, gabbro and quartzofeldspathic gneiss are present with sedimentary and igneous rocks present in trough areas (Meades 1990).

Climate conditions generally range from high / low sub arctic to boreal. Mostly cooler summers prevail with cold winters. Growing season is short, just exceeding 120 days. Precipitation is in the range of 1000 mm to 1100 mm annually (Meades 1990). Areas of permafrost are discontinuous and scattered throughout the District.

Although dominated by over-mature black spruce types, the management district contains a wide variety of forest types and ages (from juvenile to over mature stands) and other vegetation types (bogs, fens, marshes, scrub swamps, barrens and alpine tundra). These vegetation types provide habitat for various populations of many wildlife species including moose, caribou and a variety of large predators and small animal species.

There is a significant history of natural resource use in the management district particularly in timber harvesting near the Port Hope Simpson area. The fishery has supplemented the traditional economic base of many other areas in the management district.

Boreal forest, barren and marine ecosystems are all represented in the management district. On a national scale the major terrestrial ecosystems have been divided into ecozones and forest regions. Forest Management District 21 is almost totally contained within the boreal shield ecozone with a very small portion of the District represented by the taiga shield ecozone (Lopoukhine et al. 1977) of the boreal forest region (Rowe 1972). The forest regions that occur in Labrador are illustrated in Figure 2. On a regional scale, Labrador is divided into 10 ecoregions, which are discussed in subsequent sections.

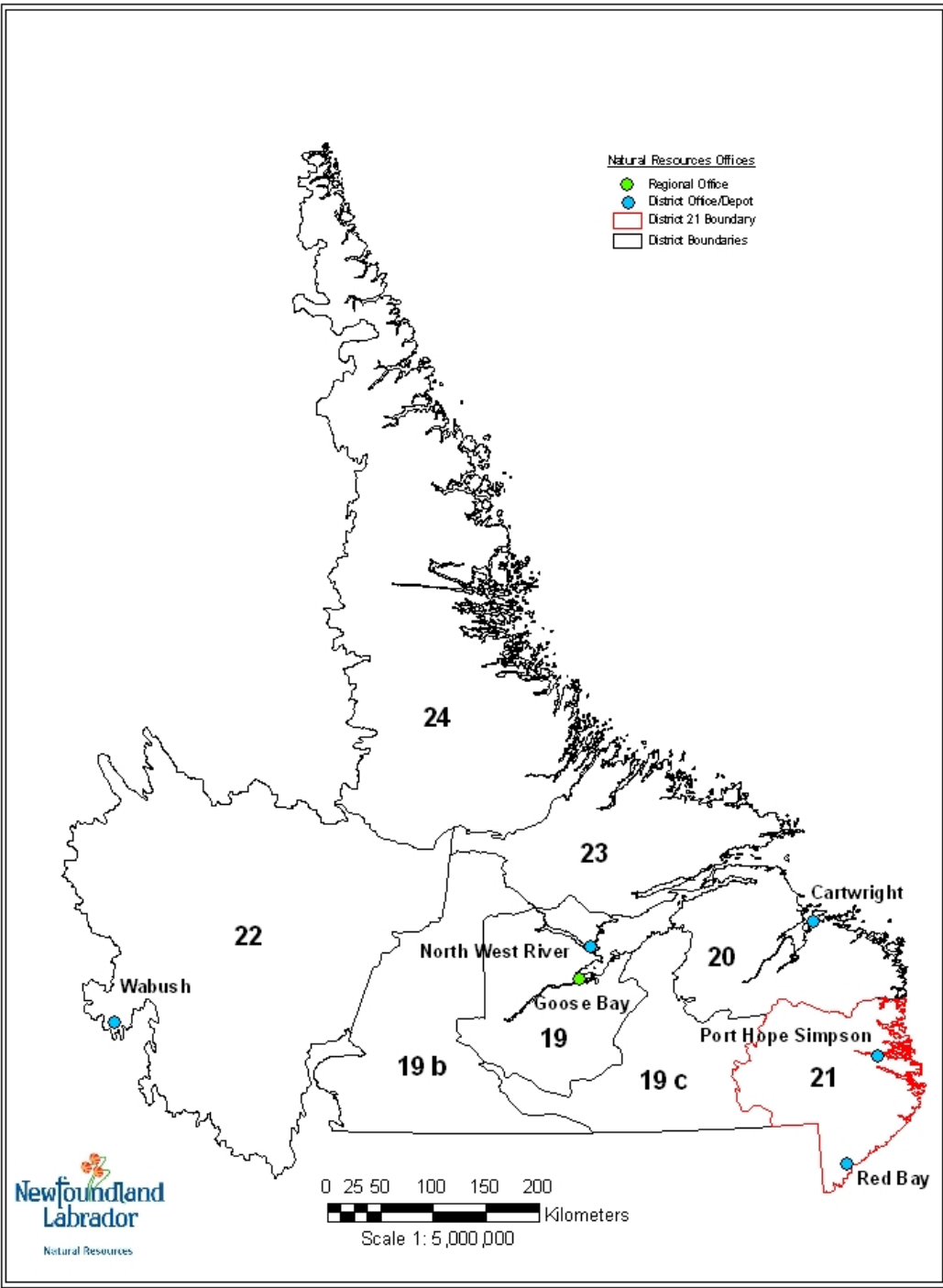


Figure 1: Forest Management District boundaries and office locations in Labrador.

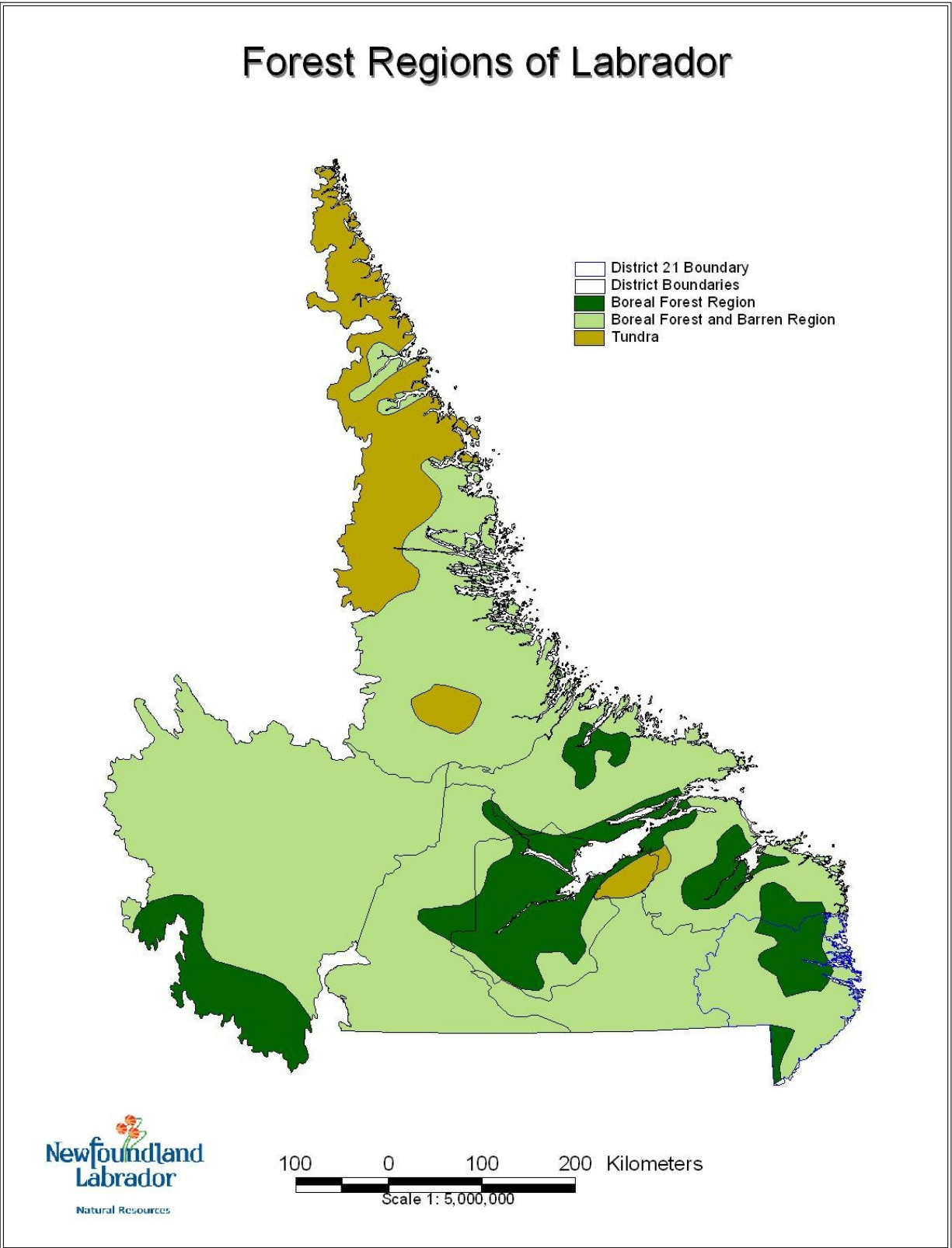


Figure 2: Forest Regions of Labrador. FMD 21 Contains Boreal Forest, Barren and Tundra Ecosystems (S.J. Rowe, 1972).

Canadian Ecological Land Classification System

A hierarchical framework of ecological land classification has been recognized for some time in most jurisdictions as a means of stratifying the earth into progressively smaller areas of increasingly uniform ecological units. In Canada, the Canadian Ecological Land Classification System has been adopted and provides for seven levels of organization based on ecological principles (Table 1).

Table 1: Canadian Ecological Land Classification System

Level	Description	Common Map Scale
ECOZONE	areas of large land masses representing very generalized ecological units, based on consideration that the earth's surface is interactive and continuously adjusting to the mix of biotic and abiotic factors that may be present at any given time (e.g. Boreal Shield)	1:50,000,000
ECOPROVINCE	areas of the earth's surface characterized by major structural or surface forms, faunal realms, vegetation, hydrology, soil and climatic zones (e.g. Island of Newfoundland)	1:10,000,000 1:5,000,000
ECOREGION	a part of the ecoprovince characterized by distinctive ecological responses to climate as expressed by vegetation, soil, water and fauna (e.g. High Sub arctic Tundra Ecoregion)	1:3,000,000 1:1,000,000
ECODISTRICT	a part of the ecoregion characterized by a distinctive pattern of relief, geology, geomorphology, vegetation, water and fauna	1:500,000 1:250,000
ECOSECTION	a part of the ecodistrict throughout which there is a recurring pattern of terrain, soil, vegetation, water bodies and fauna	1:125,000 1:50,000
ECOSITE	a part of the ecosection having a relatively uniform parent material, soil, hydrology, and chronosequence of vegetation	1:50,000 1:10,000
ECOELEMENT	a part of the ecosite displaying uniform soil, topographical, vegetative and hydrological characteristics	1:10,000 1:2,500

Work was done in Labrador by Damman (1983) and subsequently by Meades (1989) which resulted in the delineation of 10 ecoregions. The national *Eco-climatic Regions of Canada* (Ecoregion Working Group 1989) does not fully agree with Damman's (1983) and Meades' (1989) maps. This is due partly to the scale of the national map, which does not allow portrayal of smaller units and also to inaccuracies in transferal from the original maps (Meades 1990). As work progresses, each level of the region will be more clearly defined. This information will be included in revisions of the plan, as it becomes available.

Ecoregions

An ecoregion can be defined as an area within which the ecological relationship between species and habitat is essentially the same (Damman 1983). Damman's important work in insular Newfoundland illustrated that vegetation could be used effectively to delineate regional climatic differences. Within each climatic region, sites with similar topography, drainage and parent materials exhibit similar vegetation patterns (Damman 1983). Thus following cutting or other disturbances, successional patterns can be predicted accurately, once the ecological relationships of the region are understood. The ecoregions of Labrador, illustrated in Figure 3, were described by Meades (1989) using the same approach as Damman (1983). Portions of five ecoregions, briefly described below and by area in table 2, occur in Forest Ecosystem Management District 21. More detailed descriptions of the ecoregions of Labrador and the Island can be found in Meades (1990).

ECOREGION 4. Coastal Barrens - Okak/Battle Harbour

This ecoregion extends from Napaktok Bay south to the Strait of Belle Isle. Much of the coast is characterized by long, sheltered inlets. The summers are cool to warm and the growing season is 100 to 120 days. The winters are very cold. Empetrum barren is the dominant vegetation type, with forest occurring in sheltered valleys. Most mid and lower slopes support a continuous spruce forest with a moss under story. Repeated fires have changed many forested areas to dwarf shrub barrens. Plateau bogs with frozen peat (palsas) and salt marshes on marine terraces are characteristic of the valleys in this ecoregion.

ECOREGION 7. Mid Boreal Forest – Paradise River

This undulating, bedrock controlled landscape of southeastern Labrador has many rock outcrops and supports fairly productive, closed-crown forests. The climate is considered boreal and is moister and cooler than the Lake Melville area. Summers are cool to warm and winters are short and cold. The growing season is 120 to 140 days. Black spruce and balsam fir are the most common tree species, but hardwoods are commonly encountered. Raised bogs are characteristic of valleys in the area.

ECOREGION 8. Low Subarctic Forest – Mecatina River

The main portion of this ecoregion is located in southern Labrador, with two separate areas north of Lake Melville and the Red Wine Mountains. Broad river valleys and rolling hills covered by shallow till, drumlins and eskers are characteristic of the region. Summers are cool and winters are long. The growing season is 120 to 140 days. Somewhat open black spruce forests are the dominant vegetation, with crown densities greater than 75% on better sites. String bog-ribbed fen complexes cover extensive areas throughout the region.

ECOREGION 9. String Bog - Eagle River Plateau

The Eagle River Plateau comprises most of this ecoregion. This upland plateau is composed of extensive string bogs with numerous open pools surrounded by fen vegetation. Bog hummocks are dominated by scrub spruce, Labrador tea, and feathermoss. The peatland expanses are occasionally interrupted by only a few conspicuous eskers, which support open, lichen woodland. Alder thickets are common along river banks.

ECOREGION 10. Forteau Barrens

This ecoregion is located at the southeastern most tip of Labrador, adjacent to the Strait of Belle Isle. Low hills are covered with scrub spruce, crowberry barren and slope bogs. Strong winds and frequent storms occur because of the ecoregions proximity to the Strait of Belle Isle. The growing season is 100 to 120 days. Tree growth is limited by a combination of wind, wet soils and a history of repeated burns. Black spruce and larch can reach 10 to 12cm only along rivers, where soils are better drained.

Table 2: Percentage of eco-regions represented in Forest Management District 21.

Eco-Region	Total area in Labrador Region (ha)	Total area in FMD21 (ha)(%)
Coastal Barrens (Okak-Battle Harbour)	1,360,627	95,179 (7%)
Forteau Barrens	362,032	362,029 (100%)
Low Subarctic Forest (Mecatina River)	5,151,411	527,302 (10%)
Mid Boreal Forest (Paradise River)	2,032,736	931,398 (46%)
String Bog (Eagle River Plateau)	1,822,682	17,333 (1%)
Total	10,729,488	1,933,241

Available Inventory and Information

Labrador Multi-Resource Inventory (Drieman Curtis Inc.)

Landsat satellite imagery, at the 1:1,000,000 scale, was interpreted to classify various vegetation cover types for Labrador. Several different vegetation, disturbance and wetland classification types were identified. This information was mapped and digitized for use on the GIS system. Table 3 summarizes the vegetation cover types and the percentage of area represented by each in District 21. Visual representation of the cover types are depicted in Map 1.

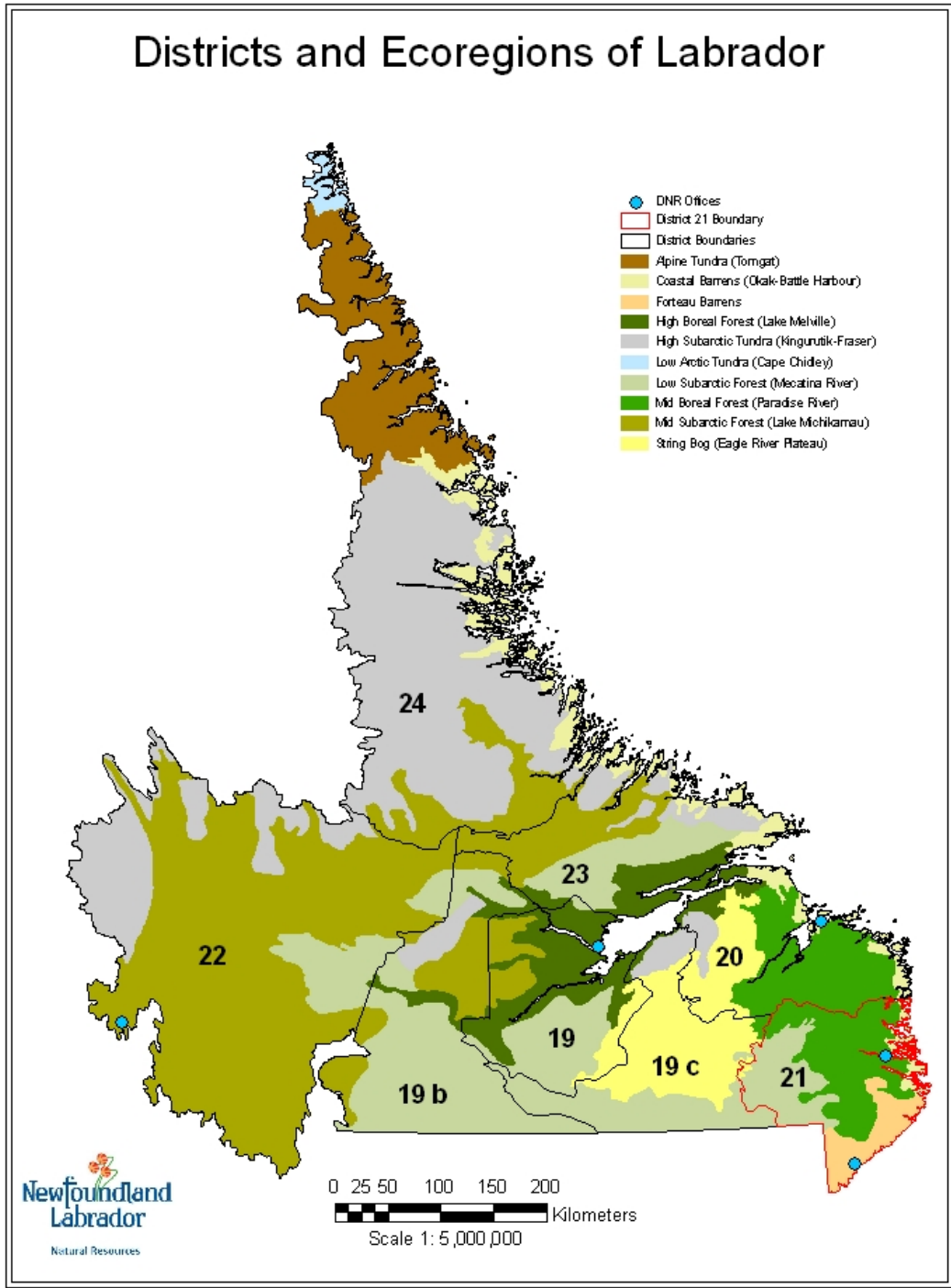


Figure 3: Ecoregions of Labrador (W.J. Meades 1989, revised 1993).

Table 3: Vegetation Cover Types of Forest Management District 21.

Vegetation Cover Type	Percentage of Type
Heavy Spruce/Fir Forest	4.6%
Moderate Spruce/Fir Forest	16.7%
Sparse Spruce/Sphagnum Forest	17.2%
Sparse Spruce/Lichen Forest	8.5%
Regenerating Forests	2.2%
Mixed Hardwood Forests	2.2%
Soil/Rock Barren	11.7%
Recent Burns	4.8%
Lichen Scrub/Bog	5.8%
Bog/Wetlands	8.3%
Water Bodies	5.6%
Unclassified	12.4%
Total	100%

Forest Cover Type Inventory

The Province began its first complete inventory program over thirty years ago. In the beginning it encompassed the entire Island portion of Newfoundland and all of Labrador as far north as the 56th parallel. The program evolved over the years from a timber inventory to a broader ecosystem inventory, but the underlying focus of providing sound statistical information to ensure sustainable management has remained.

The forest inventory program is carried out on a continuous cycle with approximately 10 % of the Province being inventoried in each year. The inventory process is as follows:

- Color aerial photographs are flown by fixed wing aircraft each year in selected locations throughout the Province. Each photograph partially overlaps the coverage of the previous photo so that interpreters can view ground features in 3-dimensions (3-D). To facilitate this 3-D viewing, an interpreter uses a stereoscope which allows him/her to define the height, species, age, and productivity of the forests. The information derived from photographs is verified and supplemented by measuring a series of ground plots. These ground plots also supply information on wildlife habitat and abundance, timber volumes, soils, ground vegetation, etc.
- The next step in the inventory process is converting the boundaries and information created by the interpreter on the photographs into digital format. This is done by cartographic technicians who trace the boundaries with an electronic mouse and store the information in a Geographic Information System (GIS).
- After the information has been loaded into the GIS, planners use it to produce theme maps of forest landscapes for planning and other information needs. The information is also used with computer models to determine the Annual Allowable Cuts (AAC's) and

impacts of fiber management practices on other resource values.

Inventories currently used for planning in District 21 were flown during the late 1980's and further digitized for use with the GIS during the mid 1990's. It was not until around 1995 that GIS technology was available for use at the Cartwright District Office and for planning purposes.

During the summer of 2006 a significant portion of the un-inventoried section of the District was flown and aerial photographs taken. As described earlier in the document, these photos will be interpreted and digitized for future use as forest cover type information. Although the area was flown this year, this data is not immediately available for use, however, once the data becomes available, DNR will work with the data to incorporate it into the annual allowable cut calculation and a further planning team meeting will be scheduled to discuss.

Land Use

Oral accounts and early written records indicate that settled and transient peoples have conventionally used certain areas of the district. Activity has varied in intensity and location according to the seasonal abundance of local resources. The most concentrated activities were centered around the forest and on marine resources during the summer, with more dispersed efforts occurring during the other seasons.

European contact and settlement perpetuated this pattern of concentrated seasonal resource use, followed by an extended period of low-density activity. The most significant change in resource use caused by European intervention was the increased scale of the harvest and the exportation of resources out of the region. Up until today, communities within the District continue to follow this pattern of raw resource exploration.

Early accounts of commercial harvesting and sawmill operations in the district, in particular the Port Hope Simpson area, extend over 70 years. In 1934, the King of England sent Sir John Hope Simpson to Labrador to start a new forest industry. He landed in the area now known today as Port Hope Simpson. The operation, named the Labrador Development Corporation, was managed by J.L. Williams out of England. Commercial operations continued for 8 to 9 years and ceased shortly after the Second World War broke out in 1942. Commercial operations remained dormant for almost 18 years thereafter, with the exception of a few smaller operations. Around 1960, Bowaters, a company from Newfoundland, arrived in Port Hope Simpson and operated until 1970 with horses and tractors. Succeeding Bowaters, commercial operations were again dormant until the early 1990's when commercial operations began to increase. Some of these operators are still in business today. Commercial operations over the years have not been without their problems; some of them still exist today. They are believed to include: lack of infrastructure, transportation issues, lack of experienced labor, high logging costs and financial problems.

District 21 has sixteen communities with populations ranging in size from 100 – 550 residents (Statistics Canada Census, 2006). These communities share similar characteristics and were initially developed as support centers for resource extraction. Some neighboring out ports were gradually absorbed as transportation facilities centralized during recent years, however two out

port communities still remain active today (Williams Harbour & Norman Bay). Forest and marine resources continue to provide the principal economic base for most of the communities, with shellfish being the main marine species and previously the export of pulpwood and processing of dimensional lumber were the main forest operations. Processing plants and sawmills are located in several communities. Other resource activities, such as agriculture (berry picking) and fur harvesting, provide supplementary income to many residents.

The lifestyle of Labrador residents includes the use of several resources of the district. The forest provides a source of wood products (fuelwood and building materials), wildlife (game and furs), non-timber forest products such as mushrooms and berries and opportunities for spiritual renewal and recreation. Forested regions in close proximity to communities are the most heavily utilized areas for these activities. The knowledge that resources provide for basic human needs is available locally and promotes a sense of self-sufficiency that is particularly important in areas with severe climate and few employment opportunities.

Within each community, infrastructure services provide significant secondary employment, including health care, education, protection and public service sector jobs. Many levels of Government maintain offices in the management district. In particular, the Department of Natural Resources maintains two satellite offices at Port Hope Simpson and Red Bay that employ both permanent and seasonal staff.

Several tourist sport-fishing camps have existed for many years in the district. Potential for increased activity in the tourism industry may be significant with completion of the Trans-Labrador Highway, particularly once the proposed Mealy Mountain National Park is developed.

Wildlife resource use (hunting and trapping) is an integral part of the Labrador lifestyle. Hunting activities usually involve wild food sources, such as moose and small game animals. Commercial fur harvesting activities are concentrated along major watersheds and coastal areas. The value of these activities cannot be measured accurately, but from an economic viewpoint, they are considered of supplementary benefit.

Economic measurements for non-consumptive forest values, such as culture and spiritual renewal, are difficult to determine. Although they cannot be quantified, spiritual and cultural benefits have an intrinsic value that is of significant importance to district residents.

Timber utilization includes the use of fuelwood and supplementary building materials by many residents. Although currently of minor economic importance, these activities contribute significantly to the self-sufficient attitude common in remote locations. Commercial timber utilization has decreased significantly; however has considerable potential for revitalization and expansion for local processing.

Forest Condition and Ecosystem Productivity

The boreal forests in Labrador are characterized, for the most part, by an even age structure being dominated by an over mature age class. The tree canopy is poorly developed in many parts of the district (<25% crown cover). Among the factors that limit stand density and thus

crown cover are severe climatic conditions, soils with restricted or excessive drainage, and proximity to the coast. Disturbances, either natural or human, have had impact on forest stands, particularly in the northern part of the district, where extensive fires occurred in 1958 and 1975. Closed canopy forests occur only on rich, moist, mid to lower slopes. They contain a mixture of spruce, fir and hardwood tree species and commonly a well-developed ground layer of feather mosses (primarily *Pleurozium schreberi*). On coarse-textured soils (typical of river terraces and eskers), the dominant vegetation is lichen woodland, which is characterized by an open canopy of black spruce and a well-developed lichen layer. Most animal species found in forested areas of the district are typical of boreal forest regions across northern Canada.

Black spruce (*Picea mariana*) is the most common tree species in the management district, based on volume (approximately 57%) and working group (approximately 54%). Balsam fir (*Abies balsamea*) constitutes approximately 35% of the volume, while other softwood and hardwood species make up the balance. The general characteristics of forest stands in District 21 (site class, age class, height class, crown closure, and working group) according to the district inventory are illustrated in figures 4, 5, 6, 7 & 8. These characters define the limits within which the commercial forest development must function. Primarily even-aged stands greater than 160+ years old, form the dominant age class structure in this forest, although an extensive area has yet to be classified. Most forest sites are classed as poor to medium. Silviculture intervention may enhance future productivity on some sites, but how such treatments will affect the long rotation period (120 years) of forest stands in southeastern Labrador is not fully understood at this time.

Human uses of the forest resources in the District have had some influence on the overall forest structure. Fuelwood cutting has been a common practice however is mostly localized around the communities. Moderate to large scale commercial harvesting operations have also occurred close to the communities of Charlottetown and Port Hope Simpson. Indicators can be used as measurable variables to report on disturbances, resilience and extant biomass for evaluation of maintenance and enhancement of forest ecosystem condition and productivity. Using the CCFM approach, criteria and indicators will be selected to initiate measuring of these variables (CCFM 2000). Data for these indicators are considered attainable during the planning period.

Incidence of disturbance and stress refers to the frequency and severity of major biotic stresses. Depending on the particulars of the disturbance, stress negatively or positively affect forest condition over time.

Indicators for assessment of disturbance and stress on forest condition and productivity include:

- area and severity of fire and insect damage
- area and severity of blowdown
- area harvested commercially

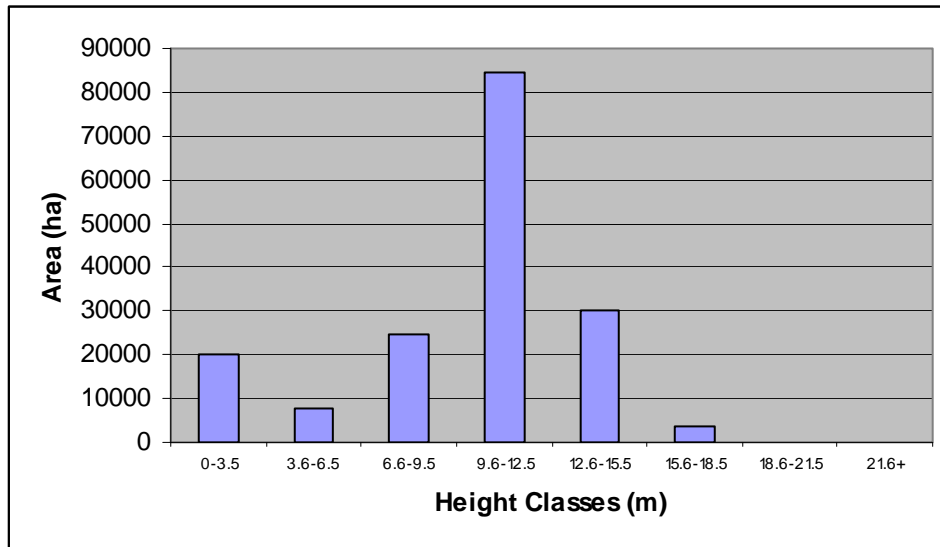


Figure 4: Height class distribution on productive sites in District 21.

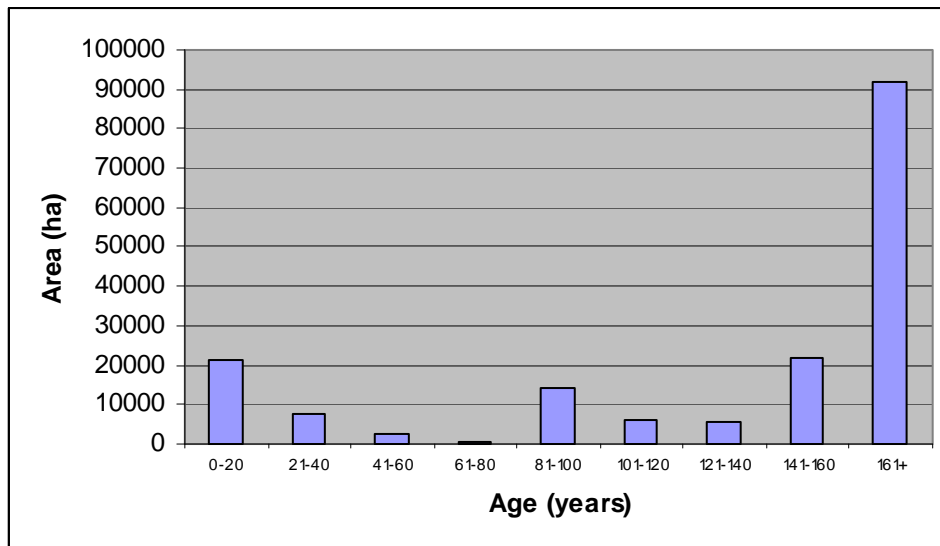


Figure 5: Age class distribution on productive sites in District 21.



Figure 6: Site class distribution on productive sites in District 21.

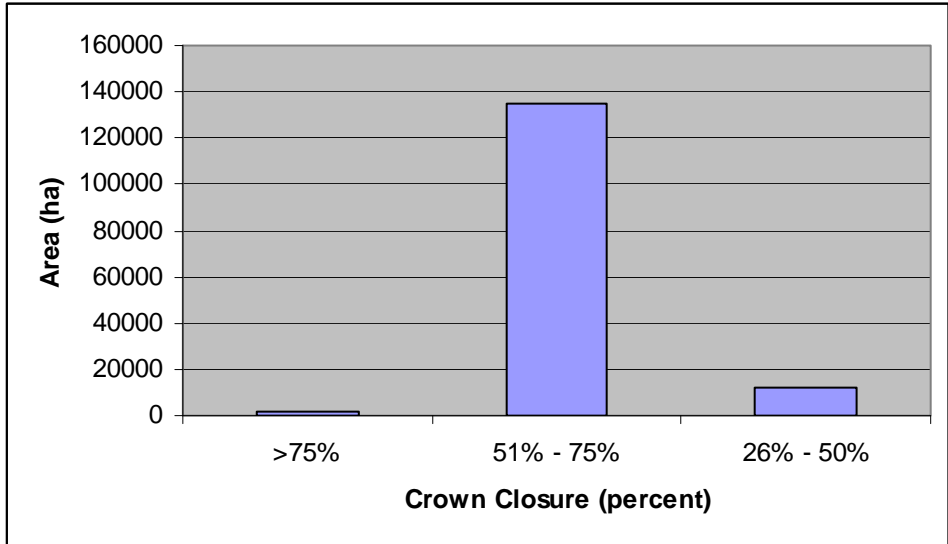


Figure 7: Crown closure distribution on productive sites in District 21.

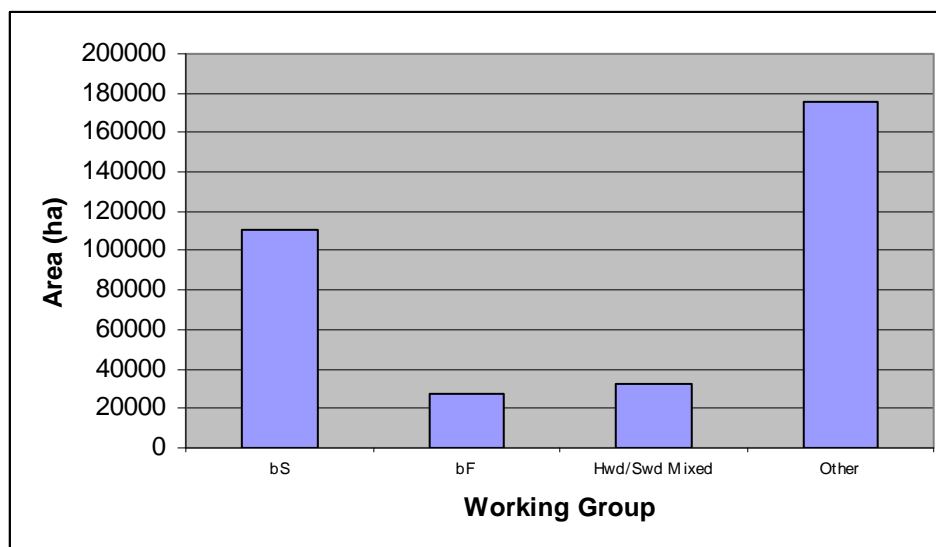


Figure 8: Working group distribution on productive sites in District 21.

Extant biomass is an integrating measure of forest ecosystem condition. Biomass represents the mass of living organisms inherent in an ecosystem and the ecosystem serves as a repository for animal, plant and microbial biomass. Accordingly, biomass is a measure of forest ecosystem condition and productivity. It refers to the condition of the forest in terms of organic matter production of all species and types.

Indicators to measure forest ecosystem extant biomass during the planning period include:

- mean annual increment ($m^3/ha/yr$) by forest type and age class
- frequency and occurrence within selected indicator species

Aquatic ecosystems within forest ecosystems integrate the overall watershed condition and thus provide an important measure of forest ecosystem condition and productivity. Elevated nutrient levels and flow rates in forest streams sustained over a long period clearly indicate a major forest ecosystem malfunction. In these situations, water and nutrients that should be utilized in forest growth are moving rapidly into drainage systems. This threatens the sustainability of the forest as well as the aquatic systems through eutrophication and flooding of downstream areas.

Indicators to measure changes in water quality and quantity during the planning period include:

- water quality as measured by water chemistry, turbidity, and other parameters for selected waterways

- trends and timing of events in stream flows from forest catchments for selected waterways

Information collected on all indicators will be used to assess forest ecosystem condition and productivity change (if any) during the planning period based on the management actions of the plan as well as natural disturbances that may occur.

Biodiversity

Biodiversity comprises the diversity of plants, animals and other living organisms in all their forms and levels of organization, and includes the diversity of genes, species and ecosystems, as well as the proximate and ultimate functional processes that link them. This means maintaining the variety of species (animals and plants) and the ecosystems that sustain them. Globally there are in the order of 5 to 50 million species of organisms inhabiting the earth (Probst and Crow 1991) with 1-2 percent consisting of higher plants, 0.2 percent being vertebrates and the rest being invertebrates. Remarkably, less than 2 million have been described and catalogued. Two thirds of Canada's estimated 300,000 wildlife species live in the forest.

The decline of biodiversity is one of the most serious environmental threats now facing humanity. This decline is thought to be aggravated by deforestation globally. As a result of human activities, ecosystem, species and genetic diversity are being eroded at a rate that far exceeds natural processes (Natural Resources Canada, 1995). This accelerating decline in diversity threatens the ecological, economic, spiritual, recreational and cultural benefits that we currently derive from the earth's living resources. The diversity of life on earth is essential to the survival of humanity.

Globally, governments addressed biodiversity at the United Nations Conference on the Environment and Development at Rio de Janeiro in 1992. The convention on biological diversity was signed by many countries, including Canada. Canada was the first industrialized country to ratify the agreement. The Canadian Biodiversity Strategy has been developed as a guide to implement the convention on Biological Diversity.

The National Forest Strategy (1992) was prepared in response to the changing management direction of Canada's forest. The strategy has objectives to develop working definitions of biodiversity, and to establish a system for reporting nationally on the state of biodiversity, complete a national network of protected areas, formulate forest management strategies to ensure the continuation of old growth forests as a natural heritage, and protect genetic, species and habitat diversity.

The Canadian Council of Forest Ministers (CCFM) released criteria and indicators for defining sustainable forest management in 1995. The first criterion is maintenance of biodiversity and a series of indicators to measure progress on biodiversity. The CCFM report forms the basis for the biodiversity indicators suggested in this strategy.

Maintenance of natural genetic and ecosystem diversity across the landscape is an integral component to ensure species maintain viability through their capacity to evolve and adapt to change. Maintenance of the natural range of ecosystems and the ability of their components to react to external forces and processes provides the equilibrium required for maintenance of species diversity (CCFM 2000). The fundamental requirement for the conservation of biological diversity is the in-situ conservation of ecosystems and the natural habitats and the maintenance and recovery of viable populations of species in their natural surroundings. Forest Management District 21's geographic location, topography and shallow soils make its forest ecosystems vulnerable to temperate extremes. These ecosystems are susceptible to development and comprehensive land use planning is required to ensure that biodiversity is maintained at the present level.

Ecosystem Diversity

Ecosystem diversity is the variety and pattern of communities and ecosystems. Maintenance of the variety and quality of ecosystems is necessary for the preservation of species. At the ecoregion level, diversity is reflected in Damman's classification as determined by soil parent material, topography and climate. Different ecoregions have different plant communities and differences in processes.

Within each ecoregion, the dominant forest types and associated wildlife according to Meades, 1990 are described as:

Ecoregion 4: Coastal Barrens – Okak/Battle Harbour

- Empetrum heath dominates headlands and ridges
- Spruce forest occurs in sheltered valleys
- Spruce krummholz occurs on upper slopes
- Lichen woodlands (Black Spruce with a *Cladonia* understory) dominate outwash terraces
- Salt marshes or plateau bogs common on large marine terraces

Land Mammals

Tundra/Barren Habitat:

Caribou, Red Fox, Bog Lemming, Polar Bear, Arctic Hare, Arctic Fox, Heather Vole

Forest and Scrub Habitats - valley slopes:

Black Bear, Mink, Flying Squirrel, Heather Vole, Porcupine, Ermine, Snowshoe Hare, Pygmy Shrew, Marten, Red Squirrel, Red-backed Vole, Masked Shrew

Wetland Habitats:

Meadow Vole, Meadow Jumping Mouse

Ubiquitous:

Black Bear, Wolf, Least Weasel, Ermine, Least Weasel

Aquatic Habitats:

Beaver, Muskrat, River Otter, Water Shrew

Characteristic Birds

Barren or Tundra Habitats:

Peregrine Falcon, Gyrfalcon, Rough-legged Hawk, Snowy Owl, Snow Bunting, Lapland Longspur, Bald Eagle, Water Pipit, Northern Wheatear

Forest Habitats:

Merlin, Northern Flicker, Swainson's Thrush, Three-toed Woodpecker, Spruce Grouse, Northern Hawk-owl, Dark-eyed Junco

Scrubby or Thicket Habitats:

Willow Ptarmigan, Northern Shrike, Tree Sparrow

Wetland Habitats - marshes, peatlands:

Short-eared Owl

Aquatic Habitats – lakes, shores, bays riverbanks:

Red-throated loon, Canada Goose, Barrow's Goldeneye, Harlequin Duck, Common Eider, Oldsquaw, Semipalmated Plover, Spotted Sandpiper, Purple Sandpiper, Least Sandpiper, Semipalmated Sandpiper, Red-necked Phalarope

Marine Habitats – pelagic, nesting on coast or rock cliffs:

Arctic Tern, Gulls, Razorbill, Black-legged Kittiwake, Common Tern, Common Murre, Atlantic Puffin

Amphibians

American Toad

Major Seabird Colonies

- Outer Gannet Island (54°00' N / 56°31' W)
 - Common Murre (17,700 in 1972)
 - Atlantic Puffin (4,950 in 1972)
 - Black-legged Kittiwake (16 in 1973)
- Gannet Clusters (53°00' N / 56°31' W)
 - Atlantic Puffin (37,425 in 1972)
 - Common Murre (17,500 in 1972)
 - Razorbill (5,400 in 1972)
- Western Bird Island (53°44' N / 56°18' W)
 - Razorbill (2,500 in 1953)
 - Atlantic Puffin (1,500 in 1953)
- Bird Island (53°43' N / 56°15' W)
 - Atlantic Puffin (4,500 in 1972)

Ecoregion 7: Mid Boreal Forest - Paradise River

- Closed crown forest dominates with Black Spruce and Balsam Fir as the most common tree species
- Upper slopes are dominated by Black Spruce/feathermoss forests
- Middle seepage slopes are dominated by Black Spruce-Balsam Fir-White Birch/herb-rich forests
- White Birch and Aspen are more abundant on moist slopes that have been burned
- Bedrock outcrops are partially covered by dense Black Spruce scrub; lichens and mosses dominate clearings
- Domed Bogs, characteristic of this region, occur in valleys

Land Mammals

Barren Habitats:

Caribou, Bog Lemming, Arctic Fox

Forest and Shrub Habitats:

Moose, Caribou, Lynx, Porcupine, Woodchuck, Marten, Mink, Masked Shrew, Red Squirrel, Flying Squirrel, Snowshoe Hare, Heather Vole, Black-backed Vole, Rock Vole, Pygmy Shrew, Star-nosed Mole, Little Brown Bat, Woodland Jumping Mouse

Wetland Habitats:

Meadow Vole, Meadow Jumping Mouse

Ubiquitous:

Black Bear, Red Fox, Wolf, Least Weasel, Ermine

Aquatic Habitats:

Beaver, Muskrat, River Otter, Water Shrew

Amphibians

American Toad, Northern Leopard Frog

Characteristic Birds

Forest Habitats:

Bald Eagle, Osprey, Merlin, Great Horned Owl, Ruffed Grouse, Northern Flicker, Hermit Thrush, Dark-eyed Junco, Blackpoll Warbler, Pine Siskin, Tennessee Warbler, Yellow-bellied Sapsucker, Three-toed Woodpecker, Black-backed Woodpecker, Yellow-bellied Flycatcher

Shrubby or Thicket Habitats:

Yellow Warbler, White-throated Sparrow

Wetland Habitat - marshes, peatlands:

Northern Hawk-Owl

Aquatic Habitats - freshwater:

Canada Goose, Belted Kingfisher, Spotted Sandpiper, Semipalmated Sandpiper

Ecoregion 8: Low Subarctic Forest – Mecatina River

- Fairly open black spruce forest dominates
- Balsam fir occurring only on moist slopes
- Lichen woodland confined to sandy terraces and other dry sites
- Sphagnum – Black spruce forest occupy wet, low areas
- Ribbed fens and string bogs cover extensive areas

Land Mammals

Barren Habitats:

Caribou, Bog Lemming, Arctic Fox

Forest and shrub Habitats:

Moose, Caribou, Lynx, Porcupine, Woodchuck, Marten, Mink, Red Squirrel, Flying Squirrel, Snowshoe Hare, Heather Vole, Red-backed Vole, Rock Vole, Pygmy Shrew, Masked Shrew, Star-nosed Mole, Woodland Jumping Mouse

Wetland Habitats:

Meadow Vole, Meadow Jumping Mouse

Ubiquitous:

Black Bear, Red Fox, Wolf, Least Weasel, Ermine

Aquatic Habitats:

Beaver, Muskrat, River Otter, Water Shrew

Amphibians: *None observed in this ecoregion*

Characteristic Birds

Forest Habitats:

Great Horned Owl, Northern Hawk-owl, Spruce Grouse, Ruffed Grouse, Tree Swallow, Swainson's Thrush, Dark-eyed Junco, Boreal Owl, Northern Flicker

Shrubby or Thicket Habitats:

Alder Flycatcher, White-throated Sparrow

Wetland Habitats – marshes, peatlands:

Common Snipe, Lincoln's Sparrow, Greater Yellowlegs, Rusty Blackbird

Aquatic Habitats – freshwater:

Green Winged Teal, Belted Kingfisher, Spotter Sandpiper, Least Sandpiper

Ecoregion 9: String Bog - Eagle River Plateau

- Extensive string bogs dominate

- Open pools are surrounded by fen lawn vegetation dominated by sedges (*Carex limosa* and *Carex oligosperma*) and peatmoss (*Sphagnum lindbergii*)
- Strands of scrubby Black Spruce forest containing Labrador Tea, and *Pleurozium schreberi* feathermoss, occur on hummocks in bog
- Lichen Woodland occurs on eskers and areas of coarse till
- Alter Swamps common along rivers

Land Mammals

Barren Habitats:

Caribou, Bog Lemming, Arctic Fox

Forest and Shrub Habitats:

Moose, Caribou, Lynx, Porcupine, Woodchuck, Marten, Mink, Red Squirrel, Flying Squirrel, Snowshoe Hare, Heather Vole, Red-backed Vole, Star-nosed Mole, Masked Shrew, Pygmy Shrew, Little Brown Bat, Woodland Jumping Mouse

Wetland Habitats:

Meadow Jumping Mouse

Ubiquitous:

Black Bear, Red Fox, Wolf, Least Weasel, Ermine

Aquatic Habitats:

Beaver, Muskrat, River Otter, Water Shrew

Characteristic Birds

Forest Habitats:

Bald Eagle, Osprey; Merlin, Spruce Grouse, Hermit Thrush, Swainson's Thrush, Hermit Thrush, Dark-eyed Junco, Tree Swallow, Northern Flicker, Black-backed Woodpecker, Three-toed Woodpecker, Yellow-bellied Flycatcher

Shrubby or Thicket Habitats:

Yellow Warbler, Tree Sparrow

Wetland Habitats - marshes, peatlands:

Northern Harrier, Short-eared Owl, Common Snipe, Greater Yellowlegs, Rusty Blackbird, Lincoln's Sparrow

Aquatic Habitats - freshwater:

Belted Kingfisher, Spotted Sandpiper, Least Sandpiper, White-rumped Sandpiper

Ecoregion 10: Forteau Barrens

- Tree growth limited by combination of wind and wet soils

- Black spruce and Larch can only reach 10m-12m only along rivers, where soils are better drained
- In most other lowlands, trees form tuck less than 5m high
- Many ridge tops have been degraded, probably due to fire, to open barrens
- Barrens also occur on uplands and coastal headlands
- Barrens are sub-arctic in species composition. Lichen cover is thick and Pink Crowberry (*Epetrum eamesii*), Alpine Berry (*Vacciniumuliginosum*), and the lichen *Cetraria nivalis* occur on areas with shallow and discontinued snow cover
- Peat lands are usually slope bogs

Land Mammals

Barren Habitats:

Arctic Fox, Bog Lemming

Forest and Shrub Habitats:

Moose, Woodchuck, Red Squirrel, Red-backed Vole, Star-nosed Vole, Little Brown Bat, Lynx, Marten, Flying Squirrel, Heather Vole, Pygmy Shrew?, Woodland Jumping Mouse, Porcupine, Mink, Snowshoe Hare, Rock Vole, Masked Shrew

Wetland Habitats:

Meadow Vole, Meadow Jumping Mouse

Ubiquitous:

Black Bear, Wolf, Red Fox, Least Weasel, Ermine

Aquatic Habitats:

Beaver, Muskrat, River Otter, Water Shrew

Amphibians: - none observed in this ecoregion

Characteristic Birds

Barren Habitats:

Peregrine Falcon, Water Pipit, Rough-legged Hawk

Forest Habitats:

Osprey, Northern Flicker, Black-backed Woodpecker, Merlin, Three-toed Woodpecker

Shrubby or Thicket Habitats:

Alder Flycatcher

Wetland Habitats:

Short-eared Owl, Common Snipe, Lincoln's Sparrow, Greater Yellowlegs, Rusty Blackbird

Aquatic Habitats – lakes, shores, bays, riverbanks:

Common Eider, Semipalmated Plover, Least Sandpiper, Oldsquaw, Spotted Sandpiper

Marine Habitats – pelagic, nesting on coast or rocky cliffs:

Black Guillemot, Gulls, Common Murre, Black –legged Kittiwake

It has been documented that a system of protected areas is a vital component of any biodiversity strategy. In agreement with the Canadian Forest Accord, National Forest Strategy, and Canadian Biodiversity Strategy, each ecoregion in the province is proposed to have a representative area in reserve status. At present, designated ecological reserves and protected watersheds cover less than 1 % of the district land base (Table 4). Amendments to the management plan, submitted prior to the next 5 year operational period, will address potential impacts of this proposal and other issues that may be proposed subsequent to the presentation of the Forest Management Plan for District 21.

Table 4: Current Status and Potential Changes to Land Classification in District 21

Designated Lands	Type (#)	Size (ha)	% Land Base
Municipal	Protected Watersheds(4)	2303	0.12%
Provincial	Provincial Park (1)	68	<0.01%
Total (designated)		2371	0.13%

Note: The total area of District 21 is ~1,933,290 ha.

Formal planning for management of other resources in the management district has not been conducted previously. However, it can be assumed that potential may exist for development in such areas as:

- Value-added and non-timber forest products
- Recreation and tourism, including cottage development, private recreation and commercial tourist development
- Waterway developments, including fisheries enhancement projects and large or small scale hydro development sites.

Protected areas provide a benchmark to measure and guide management decisions. These representative areas protect the wilderness of the ecoregion and are vital for guiding management actions. As benchmark areas they will illustrate the multi-species mosaic that management actions must maintain.

In Labrador, the predominant forest structure is over mature; this is also true for District 21. In addition, much of the forested area of the District is currently inaccessible. As a result, this forest stand structure and function can be maintained. Old growth forests are valued for their contributions to habitat and biodiversity in the area.

Riparian areas are characterized by a transition from aquatic to upland vegetation. The width of a riparian area varies depending on the steepness of slopes, the soil properties and the permanence of the water body. Riparian areas cover only a small portion of the land in a watershed, but because they are often more diverse and productive than upland areas, these habitats are critical to wildlife and fish, and are important reservoirs of biodiversity.

Studies have shown that many wildlife species are more abundant in riparian areas. Some species are entirely dependent on riparian habitats, while others use them for a portion of their life requirements such as feeding or reproduction. The attraction that wildlife has to riparian areas is largely based on the presence of water and its effects on plant characteristics and interrelationships.

Maintaining a healthy riparian area for wildlife habitat is critical. Riparian vegetation not only provides important wildlife habitat, but it also stabilizes stream banks, thereby reducing erosion. The long-term stewardship of riparian habitat for the purpose of maintaining biodiversity ensures wildlife habitat, control of stream temperature, maintenance of plant and animal genetic variety and a legacy for future generations.

Indicators for the assessment of ecosystem diversity include:

- Percent and extent, in area, of forest types relative to historical condition and total forest area
- Percent and extent of area by forest type and age-class
- Area percentage of representativeness of forest types in protected areas
- Level of fragmentation and connectivity of forest ecoregion components
- Percent and extent of area with forested riparian areas

Species Diversity

The most readily recognizable form of reduced biodiversity is species extinction. Slowing down species extinction is key to the conservation of biodiversity. This involves the identification of species at risk and implementing efforts to conserve their habitats. The Province of Newfoundland and Labrador has introduced new legislation as an *Endangered Species Act* which ensures the conservation of recovery and critical habitat for species. Changes in species population levels provide early warning indicators of changes in ecosystem integrity and species diversity.

A variety of mammals, characteristic of boreal and tundra ecosystems, inhabit Forest Management District 21. Large ungulates (caribou and moose) are present in low densities. Large predators, such as black bears and wolves, and a great variety of smaller mammals and avifauna are also present. Polar bears are occasional seasonal visitors to coastal areas. Ten species in Labrador are listed by COSEWIC (Committee on the Status of Endangered Wildlife in Canada) in the endangered, threatened and special concern categories (Table 5). Four of these species require recovery teams under current legislation.

Table 5: Endangered, threatened and special concern species in southern Labrador.

Species	Status	Habitat Description
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Species	Status	Habitat Description
Wolverine (<i>Gulo gulo</i>)	<i>Endangered</i>	Wolverines are solitary animals, most frequently inhabiting tundra areas, especially where there are large herds of ungulates, such as caribou. Actual population size is not know, since there have not been any confirmed sightings on the south coast since the early 1900's
Eskimo Curlew (<i>Numenius borealis</i>)	<i>Endangered</i>	A small upland shore bird that utilizes a variety of coastal and terrestrial habitats including meadows, pastures, old fields and sand dunes during their migration period.
Woodland Caribou (<i>Rangifer tarandus caribou</i>)	<i>Threatened</i>	Woodland caribou prefer mature forests which contain large quantities of lichens and are associated with marches. Bogs, lakes and rivers. In mountainous environments they are found in alpine prairies and valleys. The Mealy Mountain herd is generally found on the north side of Sandwich Bay, near the Mealy Mountains and the Porcupine Strand.
Peregrine Falcon (<i>Falco peregrinus anatum</i>)	<i>Threatened</i>	They nest on steep, rocky ledges and feed on shoreline areas. Their nesting territory tends to be one kilometer around the nest, and their home range can extend up to 27 kilometers. They prefer open habitats such as tundra, seacoasts and high mountains but will hunt over open forest.
Harlequin Duck (<i>Histrionicus histrionicus</i>)	<i>Special Concern</i>	Harlequin ducks inhabit headland and offshore areas during most of the year. In May, they enter the mouths of turbulent, oligotrophic rivers and proceed upriver to nesting sites where they remain until July and then return to coastal areas.
Barrows Golden-eye (<i>Bucephala islandica</i>)	<i>Special Concern</i>	Nests in Quebec and only a small part of the population actually molts in Labrador.
Ivory Gull (<i>Pagophila eburnean</i>)	<i>Special Concern</i>	Nests in the arctic and winters off the Atlantic coast.
Short Eared Owl (<i>Asio flammeus</i>)	<i>Special Concern</i>	Commonly are found in open habitats and marshlands. Forest clearing in eastern Canada has been noted to create new habitat, consequently allowing populations to increase (CWS 2002). Nests mostly along coastal areas, but have been sighted inland. It nests in high grass or on the edge of a forest or boggy areas.
Polar Bear (<i>Ursus maritimus</i>)	<i>Special Concern</i>	They prefer land-fast or coastal pack ice, prey heavily on ring seals and are often found in more northerly climates such as on the north coast of Labrador. Appropriate denning areas and spring feeding areas are critical components of the habitat. The animals' movements are influenced by climate and ice conditions, and by the presence of prey. They are sometimes brought into the district by ice fragments which originated from the north.
Fernald's Milk Vetch (<i>Astragalus</i>)	<i>Special Concern</i>	Known to occur only in southern Labrador. The species grows strictly in calcium-rich soils, where vegetation is sparse or has been removed by natural disturbance and a calcareous substrate is

Species	Status	Habitat Description
<i>robbinsii</i> var. <i>fernaldi</i>)		available.

It is anticipated that the proposed cutting activities, during the proposed five year period, will have little or no direct impacts on existing populations of endangered, threatened or special concern species presence in the district, mainly because of the lack of suitable habitat, associated with those species, in the proposed operating areas. However, if a species identified as at risk is identified within an operating area, all operations will cease immediately and mitigations discussed with appropriate agencies. Recognizable potential impacts (particularly to harlequin ducks in rivers that run through forested areas) are: (1) possible siltation as a consequence of operational activities and (2) increased hunting pressure due to improved access. The potential risk from operational activities can be mitigated or eliminated by following environmental guidelines, respecting recommended buffers along watercourses, and avoiding areas where harlequin ducks have been sited until after the nesting season.

Major furbearing species such as lynx, fox, otter, marten, mink, weasel (2 species), beaver and muskrat occur in low to moderate numbers throughout the management district. Other represented mammals include squirrels (2 species) porcupine, hares (2 species) and various other rodents and insectivores. More than 140 avifaunal species occur in the district including raptors such as the bald eagle, rough-legged hawk, and merlin, as well as ducks, geese and upland game birds.

The management and/or protection of threatened and endangered species will be considered in concert with other management strategies. For each of the species which require different ages and conditions of forest, their specific habitat requirements will be incorporated into management strategies.

Indicators to be used to assess species diversity in District 21 include:

- Number of known forest-dependant species classified as extinct, threatened, endangered, rare or vulnerable relative to the total number of known species
- Population levels and changes over time of selected species
- Number of known forest-dependant species that occupy only a portion of their former range

Genetic Diversity

Genetic diversity within a species is the foundation of all biodiversity. Assessing genetic diversity does not mean attempting to track every gene in the District 21 forests. It means designating and implementing practical measures that can maintain viable populations of all forest vegetation species, and can utilize the genetic diversity of commercially important species to maximum benefit. Genetic diversity is the fundamental basis for the ability of populations

(flora and fauna) to adapt to changing environmental conditions, therefore underlying both species and ecosystem diversity. These gene pools represent the years of natural selection for adaptation to local conditions.

The boreal forests in District 21 have evolved over time as even-aged in response to disturbances such as fire and wind storms. This must be taken into consideration when determining the effects of forest management (including harvesting) on genetic diversity. The spatial patterns of clear felling should mimic natural disturbance across the landscape so that natural processes can continue. During the course of this plan, various cutting designs and patterns will be implemented with the necessary monitoring and evaluation. Exact harvest patterns (which should mimic natural disturbances) within the operating areas will be identified in the annual work schedules.

The management actions of tree planting and pre-commercial thinning may also affect genetic diversity. However, most forest sites in district regenerate from seed sources already on or near the site. Sites which will be selected for planting are those where there is an insufficient stocking of tree species to form a viable second growth forest to replace the one that was disturbed. During any planting efforts will be made to plant native species from local seed sources on sites where they would be found naturally. The current practice, however, is to leave a representative proportion of all those woody tree species that are present in the stand before treatment.

Indicators for genetic diversity will include:

- Number of forest dependant species that occupy a small portion of their former range
- Population levels of representative species from diverse habitats monitored across their range.
- Response to in situ and ex situ genetic conservation strategies for commercial and endangered forest species.

PAST ACTIVITIES

Overview

Commercial timber harvesting activities had been steadily increasing over the previous five years with the establishment and expansion of businesses in the area, however with the down turn of the forest industry globally and the closure of two newsprint mills in the Province, commercial activities have since decreased (Table 3.1). Domestic harvesting, which has been identified by local residents as a significant activity in the area, has been relatively consistent over the last five years with the number of permits averaging approximately 666 per year (Table 6). The majority of the domestic harvesting in the past took place near the communities.

Table 6: Summary of timber allocated and harvested by commercial and domestic operators in District 21 from 2006-2010. * based on avg. permit return of 16m³/permit.

Year	Allocations (m ³)			Harvested (m ³)		
	Commercial	Domestic	Total	Commercial	Domestic*	Total
2006/07	38,781	15,476	54,257	30,125	10,816	40,941
2007/08	16,565	16,181	32,746	13,691	11,280	24,971
2008/09	12,582	15,226	27,808	10,677	10,592	21,269
2009/10	13,390	15,111	28,501	2,043	10,512	12,555
2010/11	4,202	14,302	18,504	714	9,952	10,666
Total	86,060	76296	161,816	57250	53,152	110,402

Activity in other programs, including roads, silviculture and fire suppression has occurred at moderate levels. A summary of these activities for the last five years is given in table 3.2.

Table 7: Summary of road construction, silviculture, insect activity and fire suppression activities which have occurred in District 21 from 2006-2010.

Year	Road Construction (km)	Silviculturally Treated Area (ha)	Insect Treated area (ha)	Area Burned (ha)
2006-2007	8.8	178	0	0.1
2007-2008	5.2	150	0	1.1
2008-2009	2.7	110	10,000	0.0
2009-2010	4.15	193	10,000	0.1
2010-2011	0	0	0	1.9
Total	20.85	631	20,000	3.2

In summary:

- Domestic harvesting activities have remained at relatively consistent levels in the district.
- Commercial harvesting activity had increased to peak levels however has since crashed.
- Silvicultural activities, namely planting, have remained constant over time. With past projects focusing on insufficiently stocked burns in the district.
- The forest access road program has increased in the last five years with the allocation of new budget money.

WOOD SUPPLY ANALYSIS

Annual Allowable Cut Methodology

The annual allowable cut (AAC) is the maximum volume that can be harvested on an annual basis while maintaining a sustainable supply of timber and providing a landscape, which

supports non-timber values for future generations. Since the necessary growth and yield data required to run linear wood supply models (such as WOODSTOCK) are not yet calibrated for the District, the AAC was calculated using the following area/volume formula.

$$AAC (m^3/year) = \frac{\text{Net Commercial Forest Area (ha)}}{\text{Rotation Age (yrs)}} \times \frac{\text{Net Merchantable Volume (m}^3\text{)}}{\text{Hectare}}$$

Where:

- **Net Commercial Forest Area** is the net landbase of commercial forest.
- **Rotation Age** is the time period (in years) required to establish and grow trees to a condition of maturity following a disturbance.
- **Net Merchantable Volume** is the expected merchantable volume on a specified landbase taking into account losses for fire, waste and retention.

Unique to District 21, an annual allowable allocation (AAA) is calculated using the same formula as for AAC calculations however different net merchantable volumes are used. The annual allowable allocation can be defined as the annual allocation available to be allocated in the district.

In District 21, the Department will allocate the AAA to existing operators. The difference between the AAC and the AAA will be available for the utilization credit program and subject to performance.

Net Commercial Forest Area Determination

Landbase	Area (ha)	Softwood Volume (m ³)
Total District Area	1,933,290	N/A
Total Area (1992 inventory)	508,267	N/A
Productive Forest	177,393	15,598,406
Commercial Forest	109,458	13,526,618
Un-Alienated Commercial Forest	83,036	9,651,830

Planning Units	Un-Alienated Commercial Forest (ha)	Softwood Volume (m ³)	Gross Volume (m ³ /ha)	AAC Net Volume (m ³ /ha) (-26%)	AAA Net Volume (m ³ /ha) (-35%)
Charlottetown	10,519	1,301,574	124	92	81
Alexis to Gilberts	32,790	4,070,642	124	92	81
Port Hope Simpson	33,790	4,207,261	125	93	81
Mary's Harbour	5,937	725,413	122	90	79

Planning Units	Net Commercial Forest (ha) (-30%)	Estimated Total Softwood Volume (m ³)
Charlottetown	7,363	1,301,574
Alexis to Gilberts	22,953	4,070,642
Port Hope Simpson	23,653	4,207,261
Mary's Harbour	4,155	725,413

Definitions and Assumptions:

Productive Forest Stands that are capable of producing 35 m³/yr at rotation

Commercial Forest Stands (bF, bS, wS, sH) that contain a minimum softwood volume of 90 m³/ha. Stands less than 9m in height (Height class 4) and less than 75% crown closure on poor sites (3P stands) are not considered commercial.

Un-alienated Com. Forest Isolated stands and sensitive areas were not included in the AAC calculations. Area reductions were applied to the landbase using the GIS to account for:

- 20m forested buffers on rivers, lakes streams
- 100m forested buffers on scheduled rivers
- Stands located on slopes > 30%
- 30m forested buffer on groomed snowmobile trails.
- 100 m forested buffer on Trans-Labrador Highway.
- Town buffers/water supplies
- Parks and reserves

Net Com. Forest Total commercial forest with a 30% reduction applied to account for finer stand level features that require protection such as:

- Additional buffers as required on small streams
- Localized steep slopes
- Wildlife dwellings/habitat.
- Buffering of raptor nests
- Cabin development areas

Rotation Age

Rotation age is the age at which the mean annual increment of merchantable volume reached its peak and yields the most volume per unit area per year. Normal yield tables show that rotation age increases as site quality decreases. They also show that the corresponding merchantable volume and mean annual increment decreases greatly from good to poor sites (USDA 1990). Averages for black spruce stands of three site classes in the boreal forest of Canada are as follows:

	Good	Medium	Poor
Rotation Age (years)	95	113	132
Merchantable Volume (m³/yr)	218	160	101
Mean Annual Increment (m³/ha)	2.3	1.4	0.8

Approximately 63% or more of the area inventoried in District 21 are black spruce stands. The proportion of site classes of forest stands is approximately 29% poor, 54% medium, and 17% good. The average gross merchantable volume is approximately 120 m³/ha. Considering these figures a best estimate of the rotation age for District 21 is **120 years**.

Furthermore, in areas which had sufficient data, yield curves for the predominant strata of Labrador were constructed. Since stand break up data is missing, it was assumed that the forest does not break up, but continues under a gap replacement system. Yield curves were constructed were classed by strata and eco-region, high boreal forest, mid boreal forest and sub-arctic boreal forest. Further descriptions of the eco-region classification system are in the strategy document. Yield curves were assigned to stands based on working group (bS or bF), site class (good, medium, poor) and density class (1,2,3).

The majority of the inventoried area in District 21 falls within the mid boreal forest eco-region. The approximate rotation age for each graph was estimated and a weighted average based upon the amount of area in each stratum on the landbase was calculated. According to the available data the rotation age is approximately 108 years. This is a considerable amount lower than the rotation age used to calculate the AAC. Yield curves generated from TSP data for this eco-region support that on average the gross mean volume of a 120 year old stand is greater than the estimated (Appendix II).

Net Merchantable Volume Determination

The forest cover inventory used to derive the described landbase measures softwood and hardwood volumes per hectare of forestland. Analysis of 1:12,500 scale aerial photos identified height, species, age and productivity of the landbase. Ground truthing plots were used to verify this information and furthermore the resulting inventory has specific volume/hectare values for all forest cover types. During the landbase net-down exercise the commercial volume and the commercial landbase area are determined. The gross volume/hectare is found by using the following formula:

$$\text{Gross Volume/Hectare} = \frac{\text{Net Commercial Volume}}{\text{Net Commercial Area}}$$

This number (Gross Volume/hectare) is further refined to account for retention, waste, cull and natural disturbances. This number, referred to as the Net Commercial Volume, is then used in the AAC and AAA calculations. The expected net downs for District 21 were applied to account for the following losses for each calculation:

Annual Allowable Cut Deductions

Cull	14%
Residual Stands	6%
Harvesting Losses	5%
<u>Fire</u>	<u>1%</u>
Total	26%

Annual Allowable Allocation Deductions

Utilization (cull/harvesting losses)	28%
Residual Stands	6%
<u>Fire</u>	<u>1%</u>
Total	35%

AAC Calculations:

Charlottetown:

$$\frac{7363 \text{ ha}}{120 \text{ yrs}} \quad \times \quad 92 \text{ m}^3/\text{ha} \quad = \quad 5,645 \text{ m}^3/\text{year}$$

Alexis to Gilberts:

$$\frac{23953 \text{ ha}}{120 \text{ yrs}} \quad \times \quad 92 \text{ m}^3/\text{ha} \quad = \quad 17,597 \text{ m}^3/\text{year}$$

Port Hope Simpson:

$$\frac{23653 \text{ ha}}{120 \text{ yrs}} \quad \times \quad 93 \text{ m}^3/\text{ha} \quad = \quad 18,331 \text{ m}^3/\text{year}$$

Mary's Harbour:

$$\frac{4155 \text{ ha}}{120 \text{ yrs}} \quad \times \quad 90 \text{ m}^3/\text{ha} \quad = \quad 3,116 \text{ m}^3/\text{year}$$

AAA Calculations:Charlottetown:

$$\frac{7363 \text{ ha}}{120 \text{ yrs}} \quad \times \quad 81 \text{ m}^3/\text{ha} \quad = \quad 4,970 \text{ m}^3/\text{year}$$

Alexis to Gilberts:

$$\frac{22953 \text{ ha}}{120 \text{ yrs}} \quad \times \quad 81 \text{ m}^3/\text{ha} \quad = \quad 15,493 \text{ m}^3/\text{year}$$

Port Hope Simpson:

$$\frac{23653 \text{ ha}}{120 \text{ yrs}} \quad \times \quad 81 \text{ m}^3/\text{ha} \quad = \quad 15,965 \text{ m}^3/\text{year}$$

Mary's Harbour:

$$\frac{4155 \text{ ha}}{120 \text{ yrs}} \quad \times \quad 79 \text{ m}^3/\text{ha} \quad = \quad 2,709 \text{ m}^3/\text{year}$$

DISTRICT VALUES

Aesthetic Values

Scheduled commercial harvesting activity may be visible from the TLH route or certain places along snowmobile trails. The arrangement of the operating areas should minimize the visual impact of these operations. Skyline reserves will be maintained and roads will be located on the lower slopes and buffered to reduce visibility wherever possible. Preliminary work has been done to start identifying the view shed of the TLH. The view shed has been produced for the majority of the proposed commercial areas in this five year plan and is considered a tool for managers to minimize visual effect of harvesting along the TLH. A digital elevation model (DEM) of a section of the district including the Charlottetown branch road and a section of the highway from north of Port Hope Simpson towards Cartwright approximately 12 km past the Charlottetown Branch road was derived from 1:50 000 contours of the area. Using ArcGIS software, many observer points along this section of the TLH were analyzed and the areas that were visible from the line of sight points were combined to form the view shed (Map 2).

The view shed identified for a portion of the TLH is approximately 43,254 ha in total size. An analysis of the effect that removing this view shed from the landbase was completed and revealed that if removed approximately 8500 ha of net commercial forest would be removed from the landbase resulting in a decrease in the Districts AAC, of approximately 8,600 m³/year.

It was agreed that the view shed would not be excluded from the landbase analysis for the AAC calculation for this reason.

Wherever possible, the planning team agreed on the following guidelines for operations within the view shed:

- Through operational planning, operations scheduled within the outlined view shed should be done during winter months, to limit ground disturbance and to protect advance regeneration.
- Closer operational planning by the Department and operators, within the view shed should occur to strategically locate skid trails to limit ground disturbance and their view from the TLH.
- Areas harvested within the view shed should be priority for regeneration surveys and for scheduled silvicultural prescriptions, in particular planting.

Currently there are no commercial operating areas that identified on or near snowmobile trails groomed by the Labrador Winter Trails. There are several domestic blocks which are accessible by groomed trails; however, since domestic harvesting is on such a small scale and often a selective harvesting process, the visual impacts are anticipated to be negligible. Officers will monitor domestic operations along groomed trails. If conditions are warranted, view shed work on groomed snowmobile trails may be explored in future planning periods.

Hunting and Trapping

During this planning period, domestic hunting and trapping opportunities will continue as permitted under domestic permit. Domestic harvesting of wild meat (small game), fish, berries and mushrooms for subsistence and furs for sale are common in the district. Current areas will allow for these activities to continue with in normal levels. Seasons and bag limits along with research requirements and regulations are prepared by the Department of Environment and Conservation with input from the public on an annual basis.

Non-Timber Forest Products

Other non-timber forest products, which are often consumed domestically or used frequently for crafts, are harvested in the area. Common forest products include the harvesting of other berries such as red berries, blue berries and squash berries and various types of fungi. These products are harvested from both natural and disturbed areas in the district. Possible economic opportunities exist in the sale of these products. It is expected that these activities will continue to be permitted in the area.

Parks and Natural Area Reserves

Significant natural features, habitat types and landscapes are represented across the Province as part of the Provincial Parks system. These parks provide areas for conservation, research benchmarks, recreation and educational opportunities and ecotourism in the Province.

Pinware River Provincial Park

Pinware River Provincial Park was designated in 1974. Located in the Forteau Barrens ecoregion, this 68 hectare park is the only Provincial Park in the District. The park area is composed of diverse vegetation types, pristine waters and wildlife. The park provides outdoor experiences such as camping, picnicking fishing and hiking opportunities.

There are no commercial harvesting operations planned in this five year operating plan neither within the Pinware Provincial Park nor near the boundary of the park. There will also be no domestic harvesting within the park boundaries which will be clearly identified on domestic harvesting maps. The Department will work with the Parks Division to determine if a no cutting buffer around the park is necessary during this planning period.

Gilbert Bay Marine Protected Area (GBMPA)

After many years of research, the Department of Fisheries and Oceans designated Gilbert Bay as a marine protected area in October of 2005. The bay itself is 47 km² in size and supports various marine resources such as shellfish, fish, marine mammals and aquatic plants. The bay also supports populations of migratory bird species. The most noted resource it supports is a resident population of reddish-brown cod fish that have been proven to be genetically distinct from other Labrador cod. Various conservation measures have been implemented in the GBMPA to protect the unique ecosystem. These measures apply to the bay itself and it is not anticipated that any activities planned in this management plan will impact the unique ecosystem due to the fact that all anticipated activities are scheduled to occur on land and far enough away from the bay.

Potential Developments

Various locations in the district were sites of traditional aboriginal activity and initial European contact. Although historical resources may be of significant value in the area, lack of data prevents a more comprehensive assessment of this resource.

The possibility exists for large and small scale hydro development along with potential for wind power generation within the district. Plans or proposals have yet to be developed that will determine the full potential of this resource. However, these hydro developments are not anticipated during the 5 year planning period.

Agricultural activities are under developed in the district. Although some commercial and home gardening is practiced, climate and soil conditions are not conducive to an extensive agricultural effort. The harvesting of wild berries, particularly bake apples (*Rubus chamaemorus*) is a well established practice that can generate considerable revenue in good years. This activity is usually confined to the coastal tundra or the boreal forest & barren zone (Boreal Forest Section B31; Rowe, 1972).

Rare earth mineral deposits of various types have also been identified and are being explored in the District. Sufficient data is not available to provide a complete economic assessment of these finds, although surveys continue to be carried out. Unless significant deposits are located, it is not expected that any mining will occur during the 5 year period of this management plan.

Various other recognized and potential resources may exist in the management district. However, few facts are available relative to their location, extent, value and economic potential. Recognized values and resources existing in forested lands of the district include:

- Tourism and recreational opportunities
- Timber resources
- Wildlife habitat and resources
- Aesthetic values
- Fish habitat and resources
- Non-timber forest products (berries, medicinals, mushrooms)
- Mineral resources
- Subsistence (food)
- Water resources (watersheds)
- Historic resources
- Hydro potential
- Cover value (protection of land from soil erosion)

Recreational Cabin Development

Recreational cabin development is expected within the district during the outlined operating period at fairly modest levels. Although it's not apparent in the current situation, it is possible that cabin development areas may expand, in response to the increased construction of resource access roads. Common concerns identified include, i) land use conflicts, ii) density and expansion concerns and iii) possible effects on critical habitat. These concerns will be dealt with on a case by case basis and reflected to the appropriate agency. Current environmental guidelines require a 50 meter treed buffer between existing approved cabin development areas and any forest operation.

Timber Values

Forests in District 21 provide many values to local residents. One of the most apparent values noted is the value of the forest for timber sources. The harvesting of timber for domestic and commercial purposes in District 21 has been ongoing for several years. Commercially the timber can provide employment to local residents and in many communities was the main revenue generator.

The ability for local residents to harvest timber for personal use (fuelwood and sawlogs) was also noted as an important value for stakeholders. Many families rely on these resources to provide building materials and for fuel to heat their homes, during harsh winter months.

Both commercial and domestic harvesting activities are expected to continue throughout the life of this five year plan and in subsequent plans. Specific areas have been identified for commercial and domestic harvesting as described further in this document.

Tourism and Outfitting

Outdoor recreational activities play a significant role in the lifestyle of most residents of the district. Such activities include hunting, fishing, kayaking, hiking and camping. Access to more remote areas is provided by snowmobile, boat, helicopter or float planes.

Eleven scheduled Atlantic Salmon Rivers, including their tributaries, are located within the management district. These and other rivers support a considerable tourist industry, primarily sport-fishing for salmon, brook trout, arctic char and northern pike. Also, local recreational and subsistence fishing is pursued by many residents of the district.

Although intensive fisheries management plans have yet to be initiated, the potential for increased activity exists on various non-scheduled water systems within the district. The quality of the inland sport-fishery in Labrador has a world-wide reputation, particularly for consistency, frequency and large fish size.

With the exception of hunting/fishing outfitting, little commercial tourism development, such as visitor lodges or wilderness touring has occurred in the district. However, considerable potential does exist for more formal and developed recreational facilities. This potential includes such projects as municipal and provincial parks and natural area reserves. Also, the extensive major river system in the district may provide additional opportunities for the development of canoe or kayak routes. These activities are strongly linked to maintaining a natural and aesthetically pleasing environment. A deep appreciation of the natural environment has always been an integral part of the character of Labrador residents. An accurate measure of this value cannot be expressed adequately, but it is recognized as a definite resource.

Transportation

The transportation network in Forest Management District 21 was strongly influenced by the isolated nature of the Labrador coast. Intermittent air service is provided to most of the communities by gravel airstrips and a twin Otter service out of Goose Bay. Regular marine transportation is available at various developed harbors. Marine transportation to connect outpost communities of Norman Bay, Williams Harbour and Battle Harbour are generally operational for six months (from mid-June through mid-December), while the marine service across the Labrador Straits is operational year round, depending upon ice conditions.

Currently, the Trans-Labrador Highway (TLH), which consists of an all-weather gravel road, connects communities from Cartwright south to Lanse au Clair and north to Happy Valley – Goose Bay. Proposed harvesting activities are not scheduled to occur within the right-of-way of the TLH. A minimum of 100 meter no cutting buffer will be implemented for all domestic and commercial harvesting along the TLH and its access roads. Additionally, approximately 50km of forest access road has been constructed or maintained under the direction of the Newfoundland Forest Service.

Forest industry development on the coast of Labrador has always been somewhat limited due, in part, to transportation problems. Operators have had to resort to barging their product to market and have had to keep large inventories of product for extended periods between shipping

seasons. Additionally, access to sufficient timber, the basis for any industry expansion, has been limiting.

In addition to the TLH, snowmobile trails are commonly used for transportation during the winter months. However, this mode of transportation is not practical to support commercial movement of goods and services. Over all there are approximately 450 km's of groomed and occasionally groomed snowmobile trails in District 21. These trails connect numerous communities and provide access to domestic harvest blocks. They are also used by adventure tourists on snowmobile. To protect the aesthetic value of the trails a minimum of 30 meter no cutting buffer will be implemented for all domestic and commercial harvesting along the trail systems. There are no commercial harvesting blocks scheduled for this planning period near any of the groomed trails.

Value Added Processing

Although limited by its sporadic distribution across the District, there is an indication that there is an adequate supply to support management for commercial timber extraction. Furthermore, there are opportunities for advancement in the sawmilling and value added sectors of the forest industry. Opportunity exists for secondary processing in the District and Region, furthermore creating local employment. The Department along with other stakeholders are working towards advancing the forest industry in the District and region to further create local employment opportunities.

Water Resources

Water resources within the district were identified as an important value to local stakeholders. As well as being a significant attribute of ecosystem health, aquatic habitat plays an integral role in the lives of local residents. Historically, water resources in the district have provided domestic food sources (fish & shell fish), supported various commercial fisheries (offshore & inland), and have provided tourism and recreational opportunities to local residents and to tourists. District 21 has several scheduled salmon rivers and many trout and char fishing waters which attract many tourists to the south coast of Labrador.

District 21 has four protected water supplies listed under the Water Resources Act (Appendix III). There will be no commercial or domestic harvesting scheduled or permitted in either of the protected water supply areas. Furthermore, these protected areas will be identified on domestic maps supplied to harvesters and identified and enforced as no cutting areas.

PUBLIC CONSULTATION PROCESS

Overview

The previous work and forest management plan (2007-2011) entailed a comprehensive consultation process, which entailed workshops and public meetings (16 in total) to determine

the long term values of the District. Since the majority of the values identified during the previous process over-extended the life of the 2007-2011 forest management plan, it became apparent after speaking with people from the area in the current process that the same values were still important and stakeholders suggested they be carried over to this plan.

In addition to the information and values gathered and discussed during the previous public process, six public meetings were scheduled in a central location within the district (Port Hope Simpson (PHS)) starting in March 2011. Meetings were held on a regular basis at the following dates and locations:

1. March 1, 2011 (Meeting was cancelled due to stormy weather)
2. March 7, 2011 (Meeting was re-scheduled due to low turnout (one person)).
3. March 17, 2011
4. April 5, 2011
5. May 10, 2011
6. July 4, 2011

Although overall participation was low by the community members, the residents who did participate did contribute meaningful scientific and local knowledge to the process which was key in the development of this plan. The following is a list of participants who have attended sessions since the planning process began in March of 2011. Minutes for all the planning sessions were distributed and copies can be requested through the Cartwright District office (709-938-7362).

Kirby Pye	(Commercial operator from Lodge Bay)
Thomas Pye	(Commercial operator from Lodge Bay)
Werner Curl	(Domestic cutter from PHS)
Stephen Sturge	(Commercial operator from PHS)
Simon Strugnell	(Commercial operator from PHS)
Donald Sampson	(Commercial operator from PHS)
Lloyd Hicks	(Domestic cutter/Trapper from PHS)
George Russell	(NunatuKavut representative from HVGB)
Roxanne Notley	(SADC representative from PHS)
Lloyd Sampson	(Domestic cutter from PHS)
Alton Sampson	(Domestic cutter from PHS)
Cindy Penney	(NunatuKavut representative from HVGB)
Corey Elson	(DFO representative from HVGB)
Melvin Penney	(Commercial operator from PHS)
Tanya Schlossek	(Regional Planner with DNR from HVGB)
Eli Sheppard	(District Ecosystem Manager with DNR from CART)
Nina Penney	(Conservation Officer III with DNR from PHS)

District Vision Statement

As part of the planning process, the 2007-2011 vision statement was adopted for District 21:

“To create an ecosystem-based management plan for District 21 that ensures sustainability of a healthy, productive forest ecosystem that will maintaining a balance of social, economic and environmental values to local residents over time”

District Guiding Principles and District Objectives

In an effort to work towards the vision, stakeholders identified guiding principles and objectives to be met. The five guiding principals for the District were identified as:

- Ecological
 - By integrated resource management, we aim to sustain and respect a healthy, productive forest ecosystem that can provide many social and economic benefits to local residents.
- Values
 - Ensure that all social, economic and ecological values are protected.
- Adaptive Management
 - Decisions and forest practices will be based on available scientific knowledge, wherever possible. The precautionary principle will be applied to forest activities, utilizing monitoring, assessment and adaptive management.
- Information Gathering
 - Ensure that public input is integrated into the planning process and public and community concerns are considered during the development of the plan.
- Monitoring
 - Through an adaptive resource management monitoring regime, activities will be monitored to evaluate success in meeting the objectives of the plan.

Some specific objectives identified as important for the plan were:

- Maintain and foster existing commercial operations in the District.
- Maintain local employment opportunities in the District.
- Maintain a healthy environment.
- Maintain water quality and fish habitat during the course of the planned forest activities.
- Maintain and better understand wildlife habitat for all species in the District.
- Maintain road access to forest resources.
- Maintain and enhance value-added opportunities in the District.
- To plan and utilize silviculture strategies suitable to the area.
- To protect the resource against insect and disease outbreaks and fire.
- Provide maximum social and economic benefits to local residents.

OBJECTIVES OF ECOSYSTEM MANAGEMENT

The *Forestry Act, 1990*, has produced a philosophical and pragmatic shift in forestry thinking in Newfoundland and Labrador from an output-oriented management (i.e. timber management) to an ecosystem-based management approach. Ecosystem management is based on the concept of sustainable development, as described by Gro Harlem Brundtland in *Our Common Future* (1987). Section 2 of the *Forestry Act* describes sustained yield forest management as “a policy, method or plan of management to provide for an optimum continuous supply of timber in a manner consistent with other resource management objectives, sound environmental practices and the principle of sustainable development”. Further emphasis has been placed on this shift by the *Canada Forest Accord* and the 1992 National Forest Strategy, titled *Sustainable Forest: A Canadian Commitment*, of which the Government of Newfoundland and Labrador is a signatory. The goal of these two initiatives is “to maintain and enhance the long-term health of our forest ecosystems for the benefit of all living things, both nationally and globally, while providing environmental, economic, social and cultural opportunities for the benefit of present and future generations”.

The Department of Natural Resources recognizes that single resource management is ineffective and too narrow in scope, to adequately address the requirement of managing forest ecosystems. Therefore, a new management strategy was adopted that focuses on ecological principles (i.e. adaptive ecosystem management or ecosystem management).

Management Strategies

The management framework is the crucial element within the planning process. It integrates the past, present and future ecosystems into a meaningful context which reflects the aspirations and intentions of the stakeholders.

The model principles within the Terms of Reference reflect the philosophy of the management framework. The less than perfect understanding of all ecosystems places considerable emphasis on the precautionary requirement, an adaptive approach with the consensual agreement of all stakeholders.

The management framework is outlined by (a) providing a vision statement and guiding principles, (b) identifying key values and associated goals, (c) relating appropriate indicators and objectives, (d) developing an appropriate strategy, and (e) ensuring additional factors, concerns or issues are addressed specifically within the plan or its appendices. The management framework is part of a dynamic process, which stresses continuity over extended time frames.

The Department of Natural Resources identifies its vision statement in the *Provincial Sustainable Forest Management Strategy 2003* as the following:

The forests of Newfoundland and Labrador will maintain a sustainable balance of environmental, economic and cultural values desired by society. They will provide for viable populations of native species,

sustainable yields of forest products and the creation of wealth and employment to support local, regional and provincial economies.

Also accepted within this context are the following six principles, which are required to support this vision statement and serve as a foundation from which the sustainable forest management framework will be developed:

- Forest ecosystems are managed to maintain their ecological integrity, productive capacity, resiliency and biodiversity.
- Management practices are to respect all forest land use and forest values.
- Partnerships will be fostered to provide meaningful participation in sustainable forest management.
- Economic benefits from the forest resource will be maximized.
- Adaptive management principles are to be applied in the management of forest ecosystems.
- Conservation and compliance that ensures the protection of wildlife and forest ecosystems.

The forest ecosystem includes a multitude of living and non-living components that interact with each other and their environment. This dynamic process, having both spatial and temporal dimensions, is of immense intrinsic value. Its existence influences life on earth, hence values and goals presented can only reflect a small subset of the potential of the forest ecosystem to present or future generations.

Recognizing the magnitude of any attempt to identify or imagine a complete list of values, present and future, adopted from the *Provincial Sustainable Forest Management Strategy*, the following is a broad based list of **criteria** to be used as a measure of progression towards sustainable forest management within the forest ecosystems of the Province and District 21:

- Biodiversity of ecosystems
- Productivity and health of the ecosystems
- Soil, water, and physical environment conservation
- Forest ecosystem contribution to ecological cycles, both locally and globally
- Multiple benefits to society, both consumptive and non-consumptive
- Sustainable systems that endure through time

Specific Provincial **values and goals** associated with the above criteria are identified for this management period (Provincial Sustainable Forest Management Strategy 2003):

Criterion 1. Conservation of biological diversity

Core indicators are a protected area system, maintenance of historic wildlife populations and specific concerns with species distribution (Mealy Mountain Caribou Herd). Objectives in this regard include establishment of a protected area network

Provincial Values Include:

- Representative landscapes: i.e protecting forest ecosystems
- Special places: i.e. protecting white and red pine stands
- Maintaining wildlife habitat

Criterion 2. Productivity and health of forest ecosystems

A synopsis of the relevant material is the maintenance of the land base (no net loss), it's productivity (all species - current dynamics and resiliency) and minimizing adverse impacts (non-natural to nil) within acceptable cycle levels (to be determined).

Provincial Values Include:

- Natural ecological processes will be maintained
- Environmental integrity
- Natural productive capacity: i.e. no loss of tree growth

Criterion 3. Conservation of soil, water and physical components

The central theme is to preserve all ecosystem components by eliminating adverse impacts. Since all activities have some impact, the objective is to reduce/mitigate adverse impacts through adequate identification (wetlands, sensitive areas), appropriate guidelines (standards etc) and sufficient enforcement (level of infractions/severity). Of particular importance is the access road system (need, densities, duration, re-habilitation).

Provincial Values Include:

- Water and soil

Criterion 4. Forest ecosystem contributions to global ecological cycles.

The basic intent is to ensure all ecological cycles are maintained and functioning. Most importantly and appropriate balance between utilization, dynamics, reserves and adequate surrogate interim measures for cycles poorly understood/difficult to measure (soils).

Provincial Values Include:

- Forests as carbon sinks: i.e. measuring the amount of carbon in our forests
- Forest land conservation

Criterion 5. Multiple benefits

Fundamental to the plan is the extent of deliverables (resources, values etc) and their sustainability. Within this context appropriate allocations are determined (including an acceptable range), necessary treatments (expenditures), adequate benefits (locally, value added)

and balance between inter/intra resource users. Furthermore, adequate identification and measures for non-marketable value/resources are included. In this regard, agreed measures/parameters for limits, allocation of various resources or land uses constitute major objectives.

Provincial Values Include:

- Commercial Timber
- Employment
- Revenue from timber and non-timber forest products and services
- Recreation
- Forest products and personal use

Criterion 6. Sustainable ecosystems are maintained

The longevity of ecosystems requires a significant public commitment to ensure sustainability. In this respect, indicators are directed towards an adequate process (participatory, flexible, continuous, empowered), recognition of aboriginal rights and requirements, sufficient resources (planning, implementation, monitoring, compliance, etc) over extended time frames and an adequate information system. Within this context the existence and expected duration of required support for the various aspects and parameters is the fundamental objective.

Provincial Values Include:

- Aboriginal perspectives and involvement
- Forest contribution to community sustainability
- Fair decision-making
- Informed and responsible decision-making

The planning process and subsequent plans are the crucial links between abstract concepts and what transpires in reality. Critical components identify extent, type of activities, scheduling, and expected results within implementation constraints. Within this context, the previous sections provide the foundation for: (a) how indicators and objectives will be met; (b) a strategy for implementation; and (c) associated concerns, issues, factors and how they are to be addressed throughout the plan/process.

From a conceptual perspective, indicators provide a measure or sense of the health of particular value/goal sets. Objectives are measures which indicate the direction/extent the indicators move through specified activities in a given time frame.

Implied within the adaptive management system is a dynamic process which includes indicators/objectives. Circumstances may dictate a more appropriate selection of activities, which are subject to annual constraints (knowledge, data, resources like licenses, staff etc).

Maintaining a functional, viable ecosystem, which is capable of adequate resiliency, is the cornerstone of this plan. Adhering to the precautionary principle, while utilizing an adaptive management approach forms the basic strategy for implementation of activities. Associated with

this, a natural soft touch approach will be employed capitalizing on inherent ecosystem resiliency.

The strategy recognizes three levels of concern:

Table 8: Levels of interest.

Level	Plan Reference	Description	Map Scale
Landscape	District and Regional	Entire district with regional connections, 20 - 200 year time frames, horizon conceptual plan and management plans, major concerns of patterns, extent, connectivity over a broader scale.	1:500,000 to 1:250,000
Watershed	Watershed	Usually watershed or sub-watershed, district connections 5 - 20 year time frames, operational and management plans, major concerns of extent, locations, connectivity.	1:50,000
Stand	Planning Unit and Harvest Block	Localized area, watershed connections; specific and data led attributes, 1 - 5 year time frames, annual and operational plans, major concerns of locations, connectivity, legacy issues.	1:20,000 to 1:5,000

To initiate forest ecosystem planning, guidelines for various aspects will be employed on a priority basis (i.e., harvest, cabin locations, and other resource aspects). During the first operational period, data on applicability, results, and changes required and other parameters will be assessed. More formal protocols may then be developed and implemented.

Interim harvest (use) levels have been determined (5 year operational plan) which are subject to annual and periodic review. Some aspects of the process (i.e., protected areas) are outside the bounds of this planning process. Interim measures to address this key issue can however be implemented. These will ensure future options remain available.

Monitoring, enforcement, assessment together with subsequent change to the strategy and implementation are crucial to this plan. Stipulated review periods (1 & 5 years continuous) together with the long term mandate (staff & resources) of the Department of Natural Resources will enhance this aspect.

Major priority areas include:

- Protected areas; Landscape, Watershed and Stand levels
- Models and classification (resource, value aspects)
- Access roads & integrated use
- Natural cycles & controls
- Predicated & actual succession or results
- Land use and impact (extent, severity, duration)

Six major areas of concern relative to forest development in the district are recognized. These issues include:

1. **Maintenance of a healthy forest ecosystem.** The health, stability and preservation of the environment are major issues to all humanity and particularly to residents of the management district. The lifestyles and culture of Labrador residents, especially aboriginal people, are closely tied to the forest. Therefore, maintenance of the forest ecosystem in a healthy state will remain a major issue throughout and beyond the duration of this 20 year management plan.
2. **Lack of an adequate database.** At present, a database that can be used to analyze the interrelationships of forest habitats, wildlife and other resources is deficient. The full impact of resource use on the ecosystem cannot be evaluated until an accurate assessment of the benefits and values of all resources is available.
3. **Lack of comprehensive land use planning.** Specific techniques and guidelines for implementing an integrated resource management approach, at a landscape scale, are necessary to minimize potential conflicts among various resource agencies and user groups. Additionally, such guidelines must be adequate to preserve integrity at a watershed and stand level.
4. **Economic and social concerns.** Although environmentally sound economic opportunity is welcome, a degree of social change will certainly occur with forest resource development. The impact of primary and secondary development on other forest values and benefits will depend upon the pace and extent of the development. Mitigation of foreseeable adverse impacts will be carried out, whenever feasible.
5. **Communication process.** A public participation process that involves continuous communication and the commitment of a concerned public must be strengthened to achieve a consensual approach to ecosystem management. Recent attempts to develop a communication system that adequately involves all interested stakeholders have not been completely satisfactory, although initial responses are encouraging.
6. **Monitoring.** The existence (including assessment, enforcement and reporting) of an adequate monitoring process which is open to public inspection, relevant, dynamic and responsive.

The previous sections together with the following operational program will help to address these concerns for this operation period (5 years). As part of a dynamic process, subsequent reviews, procedures, changes will improve and enhance all aspects of the planning endeavor toward realizing the vision statement.

Adaptive Forest Ecosystem Management

The Department of Natural Resources defines sustainable forest management as “the maintenance of the long-term health of forest ecosystems while providing ecological, economic and cultural opportunities for the benefit of present and future generations”. Implicit in the definition of ecosystem management are the following four basic ideas:

- It deals with using concepts, principles, and relationships which are not fully understood to make decisions. Management must, therefore, be conservative and adaptive.
- It places emphasis on the long term processes (i.e. ecological rotation)
- It looks to manage the health and vigor of whole ecosystems
- It manages for a broad range of complex social and natural values (i.e. it is humanitarian)

Holling (1978) suggests that adaptive management assumes knowledge is provisional and focuses on management as a learning process or continuous experiment, incorporating the results of previous actions and allowing managers to remain flexible and to adapt to uncertainty. Thus adaptive management deals with what is not fully understood.

Much of the misunderstanding surrounding ecosystem management is the belief that short-term jobs, goods, services, and profits may have been provided at the possible expense of the long-term health of ecosystems. However, ecosystem management seeks to find a balance between short-term goals, while sustaining the functions and processes of the ecosystems (e.g. providing jobs and preserving the natural habitat of the indigenous wildlife species). Clearly, ecosystem management must be first concerned about the long-term viability of the ecosystems and, then, about management of the outputs that can be obtained from them. Without first providing for the long-term health of the ecosystem, how can economic development be sustained?

Society and its economy are linked directly to the ability to manage ecosystems effectively. During the past few years, the province has been facing a crisis due to the collapse of the fishery. Thus, Newfoundlanders and Labradorians are well aware of the consequences of being more concerned about maximizing short-term jobs and profits instead of looking first to properly manage ecosystems. The specter of a similar situation occurring in the terrestrial ecosystems haunts resource managers. However, this fear can serve as an impetus to assure that a parallel situation does not happen in the forest industry. Implementing ecosystem management will mean finding new ways and approaches of understanding and managing ecological principles. It is increasingly understood and accepted that society and its economy must change to align itself with the ecosystems in which people live and work, not the reverse.

The Department of Natural Resources has spent a great deal of time and energy establishing balances between short-term outputs (primarily jobs) and long-term maintenance of the forest ecosystem. While departmental staff recognize the desperate need for meaningful employment in this province, they recognize the potential long-term damage that can occur to land-based ecosystems and the economy, if short-term goals supercede the forest ecosystem’s ability to meet these needs. The task is daunting, reaching far beyond the allocation of a timber resource. This

has required the development of partnerships with other resource managers, stakeholders, and the general public. The fundamental issues are establishing trust, building relationships and changing attitudes towards management at the ecosystem level.

Socio-Economic Factors

Social and economic factors have a significant influence on forest developments in the district. District 21 is sparsely populated with sixteen permanent coastal communities and a total population of approximately 2500 residents.

The work force in District 21 is generally trained and some have been and are employed in the forest industry. Currently smaller forest based operations in the district exist with an estimate that up to 50 individuals have generated full-time income from the resource. In some communities, the forest resource is used as a supplementary income during winter months by many individuals. It is anticipated that forest industry developments in the area including advancement in the commercial harvesting and sawmilling sectors, will provide even more training opportunities and local employment in the value added sawmilling sector for local residents. Although the exact number of opportunities that may become available to residents is unknown, it is expected that residents from all communities will benefit from this advancement. Furthermore, all of these opportunities are open to women and women are encouraged to enter this industry.

Product processing and marketing in district 21 has been relatively limited in the past. Generally, the forest products sector consists of dimension lumber production and a small amount of value-added wood product production. Currently, there are 31 commercial sawmills licensed in the district. Commercial sawmill productions for the past six years can be seen in figure 9 below.

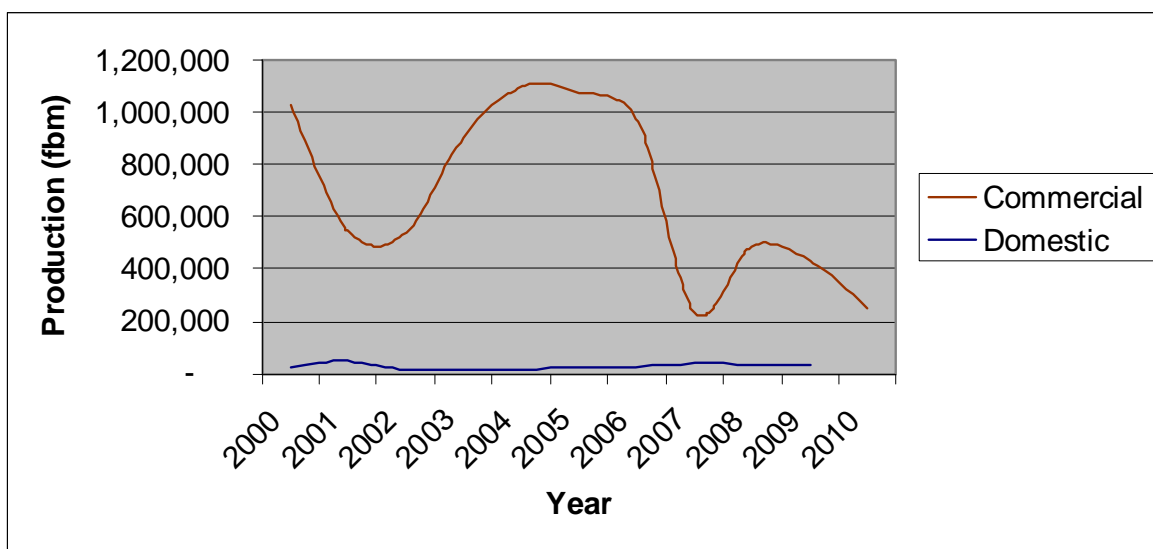


Figure 9: Commercial and domestic sawmill production in District 21 (2000-2010)

Utilization

Good utilization is integral to the concept of sustainable forest management. Unnecessary wastage of harvested fiber is unacceptable, especially in light of the Provincial wood supply situation. Of equal ecological importance is the retention of snags, groups of green trees (green tree retention) and coarse woody debris in areas subject to harvesting operations. These *residual* components provide food and habitat for a wide range of flora and fauna and contribute to stabilizing slopes and to long term site productivity. Since a majority of the commercial forest (and all of the proposed operating areas) are in over mature age classes, an inflated percentage of rot is expected. Recent cutting operations suggest that sufficient coarse woody debris will be retained in the form of harvested trees with excess rot, butt junks, etc. In addition to enforcing utilization standards set out under the *Cutting of Timber Regulations*, district staff will monitor operations to ensure that green tree retention is practiced and that a minimum of 10 snags per hectare be retained in harvested areas. As part of a province-wide program, formal utilization surveys will be carried out in the district. The survey results will be used to determine utilization deductions which will be used in subsequent AAC calculations.

Monitoring

Both short and long term monitoring are integral to the adaptive management process. District staff will monitor harvesting operations to ensure compliance with terms set out under the Forestry Act and with guidelines set out under this plan and the Five Year Operating Plan. Long term monitoring will also continue on existing cutovers and silviculturally treated areas and the stakeholders committee will conduct annual reviews (including indicator assessment) of all operations and make recommendations where appropriate.

PROPOSED ACTIVITIES

Overview

An overview of the proposed forest management activities scheduled for this five year period (2012-2016) is outlined in appended maps 3a&b. Activities include: i) harvesting, ii) silviculture, iii) road construction.

The District 21 inventoried area is further refined into 4 planning areas. A total of 243,000 m³ solid is available for commercial and domestic harvest during the five years covered under this plan. Commercial operations will harvest approximately 180,500 m³, which is scheduled to be harvested from twenty-seven commercial areas identified. Domestic allocations are expected continue at current levels (~12,000 m³/year), for a five year harvest of 61,500 m³ total. The majority of the domestic harvesting will take place in designated domestic areas near communities.

Silviculture activities, namely planting, will be applied using a prescription approach during this planning period. Other activities will focus on monitoring and research with the intent of adapting an effective long term strategy for the District.

Considerable amounts of primary and secondary access road will be required to be constructed to access commercial timber resources outlined in this planning period. Road construction will occur in three of the four planning areas. Access roads will also support other activities such as fire suppression, silviculture initiatives, and monitoring activities. Operational activities described in the following section should be considered within the context of the provincial sustainable forest management strategy.

Allocation of Wood Supply

The total AAC for District 21 is calculated to be 48,600 m³. Details of these calculations and rationales used were previously are described in the wood supply analysis section. An annual allowable allocation (AAA) was also calculated for the district (Wood supply analysis section). The AAA is the volume that is available for allocation to operators annually. This amount, which is approximately 11% less than the AAC will be allocated to District 21 operators. The difference between the two calculations (approximately 5,400 m³) will be available to operators and subject to performance.

It should be noted that the 1992 forest inventory did not survey the entire district; it did however survey the majority of the non-isolated commercial forest in the district (Figure 10). At that time, the Trans-Labrador Highway (TLH) was not proposed and therefore access to the majority of the district was unrealistic. Since then, the construction of the TLH has accessed new commercial timber resources of which the inventory has not been completed to date. Activities outlined in this operating plan are based on the current inventoried area only. This area is further refined into four planning areas herein referred to as: Charlottetown, Alexis to Gilberts, Port Hope Simpson and Mary's Harbour. Table 9 and figure 11 outlines the areas and their calculated AAC's and AAA's.

In addition to the four planning areas there is a very small area in the Pinware River valley that was photographed and had field work completed in the early 1980's. The inventory data for this area has not been updated since this time. Due to the absence of updated data, a new annual allowable cut for the area could not be calculated. Harvesting in this area is limited to domestic harvesting by residents of the Labrador Straits area and is expected to continue at the historic rate of less than 4,000 m³/year.

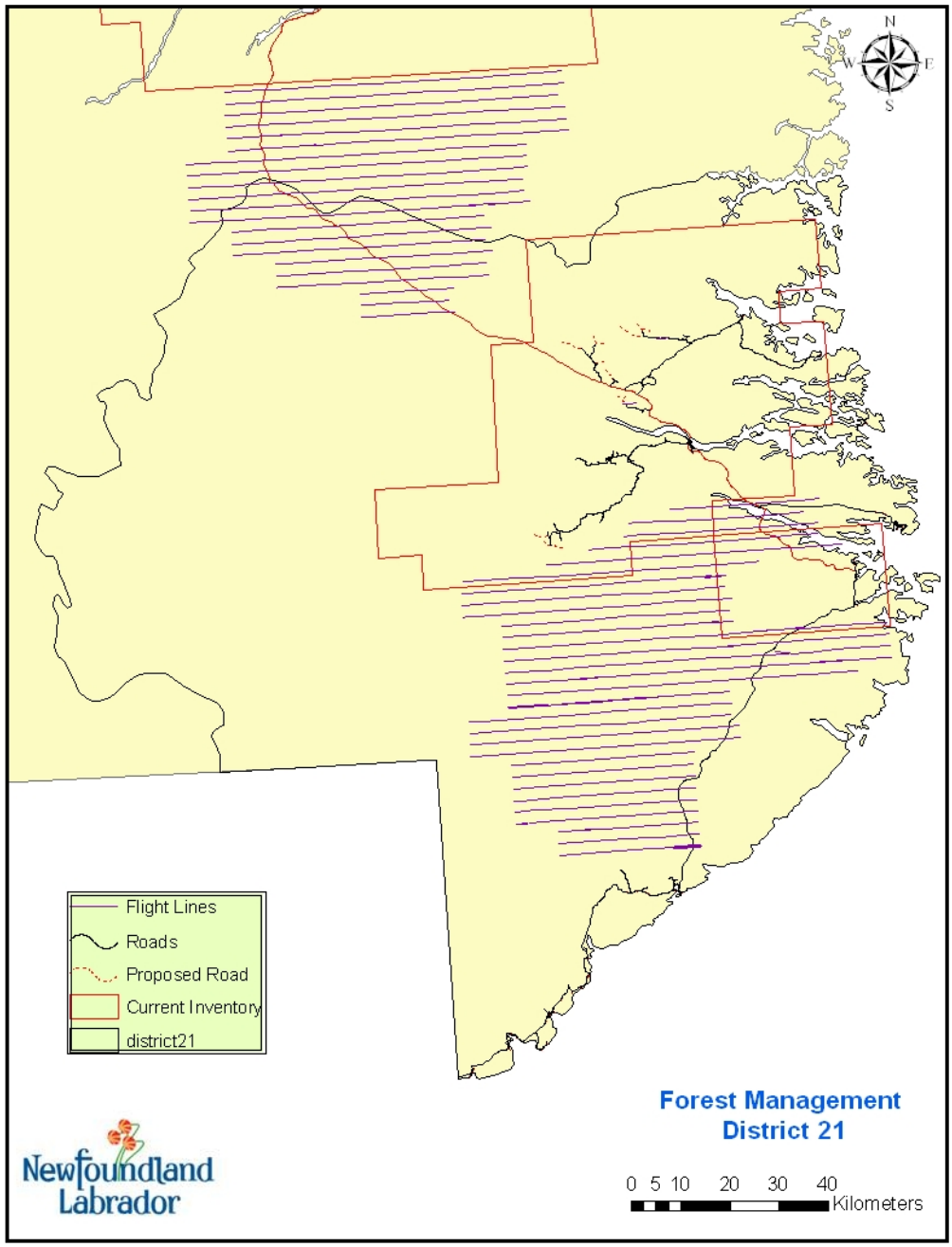


Figure 10: Map of Forest Management District 21 illustrating current and new inventory area.

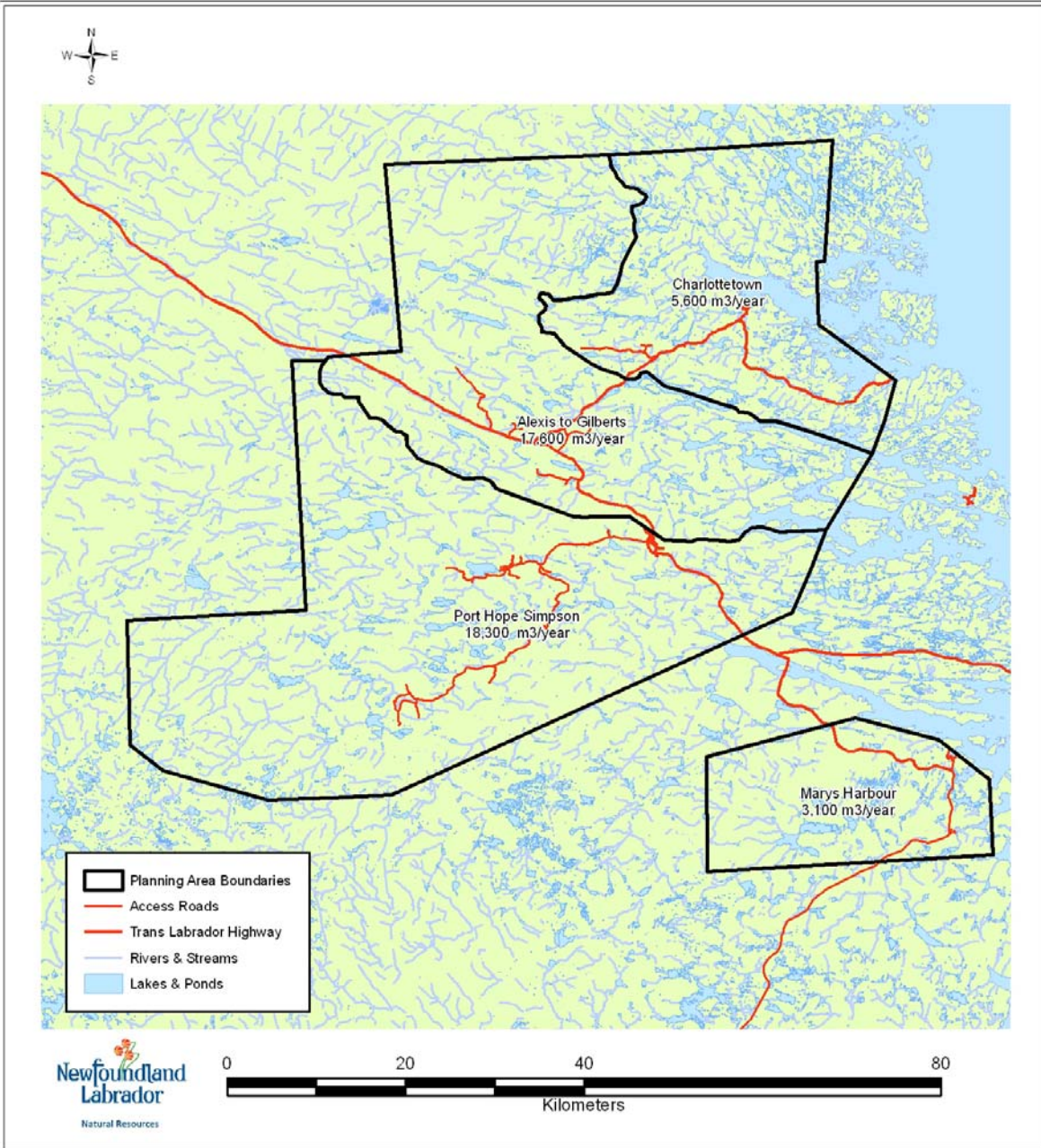


Figure 11: Location of planning units with corresponding AAC's.

Table 9: Planning areas in District 21 and their associated AAC's and AAA's.

Planning Area	Annual Allowable Cut (m³/year)	Annual Allowable Allocation (m³/year)
Charlottetown	5,600	5,000
Alexis to Gilberts	17,600	15,500
Port Hope Simpson	18,300	16,000
Mary's Harbour	3,100	2,700
Pinware River	4,000	4,000
Total	48,600	43,200

Table 10 summarizes the anticipated harvesting activity (domestic and commercial) scheduled for this planning period. In total 243,000 m³ is available for harvest over the next five year period. An anticipated level of 181,500 m³ has been estimated for commercial and small scale commercial operations and 61,500 m³ has been estimated for domestic use.

Table 10: Summary of anticipated harvesting activity in each planning area for each year of the planning period.

Planning Area	Commercial (m³)	Domestic (m³)	Total (m³)
Charlottetown	3,800	1,800	5,600
Alexis to Gilberts	15,500	2,200	17,700
Port Hope Simpson	16,000	2,200	18,200
Marys Harbour	1,000	2,100	3,100
Pinware River	0	4,000	4,000
Total	36,300	12,300	48,600
5 Year Total	181,500	61,500	243,000

Timber Harvesting Operations

Environmental Protection Guidelines were developed through the review of scientific literature, input from various Provincial and Federal Government departments and local stake holders (Appendix IV). These guidelines are currently under review. Any significant changes will be implemented immediately. All harvesting operations in the district will be subject to these guidelines along with the permit conditions and any requirements outlined in the five year operating plan or the strategy document.

Commercial Harvesting Operations

Commercial permits will be issued annually for the period of January 1 – December 31 upon approval from the District office. Currently there is additional AAC to issue any new commercial permits or increase allocations to existing permits, unless existing allocations are returned to the Department. To ensure maximum utilization of the District allocation the following guidelines have been put in place within the District.

Existing commercial permit holders who:

1. Do not license or do not harvest for a period of 2 consecutive years will not be considered for permit renewal and shall be considered as new applicants. Their allocation shall be returned to the Department for re-allocation.
2. Harvest volumes below their annual allocation levels for a period of 2 consecutive years without reasonable justification, will be subject to a reduction in permit volume. Their allocation shall be returned to the Department for re-allocation.
3. Do not follow the proposals which they submitted to the Department for the permit or increase in allocation, will not be considered for permit renewal and shall be considered as new applicants. Their allocation shall be returned to the Department for re-allocation. Ideally any re-allocation or new allocations will be tied to establishing or expanding commercial sawmill operations in District 21.

In all cases above, permit holders will be given notification in writing and given 2 weeks to provide justification. The District Manager in consultation with the Regional Director will determine if the justification is appropriate in each situation.

Consideration will be given to existing commercial operators for increases in their allocations before any new permits are issued in the District. Increases in permit allocations will be subject to evaluation by the Department and linked to local value-added processing capacity in the District.

All commercial operations will be scheduled to occur in the twenty-seven operating blocks identified in this plan. Appended in the maps are the locations of these areas outlined on 1:12,500 cover type and 1:50,000 topographical maps (Maps 4-25). Further refinements to the operating blocks to account for site specific features will be made in the annual work schedule prior to the beginning of each operating year. An additional net down of -20% has been applied to the anticipated volume from each operating block to account for stand level features that require protection (Table 11).

A classification analysis of the inventoried area was completed to summarize the amount of area in each of the predominant strata for each of the planning areas (Appendix VII). These classifications were used during the identification of the commercial operating areas. Where ever possible, commercial operating areas were identified while trying to mimic the natural distribution of strata on the landbase. This will ensure that all merchantable stands are harvested overtime and that not all the “good” wood will be harvested first, leaving the “bad” wood for future operations.

Majority of the commercial harvesting in the district will utilize mechanical equipment such as mechanical harvesters and forwarders. Harvesting of commercial timber on a small scale using manual cutters or some combination of both harvesting systems is expected. All commercial harvesting will be through the clear-cut silvicultural system, full tree harvesting will not be permitted.

Table 11: Summary of commercial harvest block volumes for 2012-2016.

Planning Unit	Operating Unit	bF/bS Swd. Vol. gross (m ³)	bF/bS Swd. Vol. net (m ³) (-20%)	Gross Area (ha)	
Charlottetown	C1	500*	400	118	
	C1EX	4,591	3,673	35	
	C3	400*	320	149	
	C3EX	10,318	8,254	68	
	C4	11,999	9,599	94	
	CN2	3,896	3,117	31	
Unit Total		31,704	25,363	495	
Alexis to Gilberts	A1AG	300*	240	144	
	A2AG	200*	160	44	
	A3AG	25,950	20,760	192	
	AG1	7,982*	6,386	247	
	AG2	11,379	9,103	102	
	AG3	14,348	11,478	115	
	AG4	12,212	9,770	102	
	AG5	19,821	15,857	292	
	NP1	300*	240	85	
	NP2	4,561	3,649	28	
	Unit Total		97,053	77,643	1,351
Port Hope Simpson	3PHS	2,489*	1,991	75	
	4PHS	4,966*	3,973	198	
	5PHS	7,613	6,090	63	
	6PHS	9,831*	7,865	143	
	7PHS	6,684	5,347	51	
	8PHS	11,469	9,175	91	
	9PHS	10,606	8,485	92	
	10PHS	26,063	20,850	220	
	11PHS	7,377	5,902	59	
	12PHS	35,642	28,514	311	
	Unit Total		122,740	98,192	1,303
	Marys Harbour	1MH	7,527	6,021	62
Un-inventoried	SLR1	8,000*	6,000	113	
District Total		267,024	213,219	3,324	

* Portion of block has been previously harvested. Estimated gross vol. remaining

Permits <385 m³ will be considered small scale commercial operations. These operations generally use chainsaws and most likely operate during the winter months. Furthermore, they will generally harvest areas that do not have road access and areas that cannot be accessed by mechanical equipment.

Utilization data was gathered during previous field seasons on various commercial cutovers through out the district. Compilation of the data has confirmed that poor utilization practices are apparent in the district. Consequently, a utilization deduction factor of 28% was used to account for harvesting losses and cull during the annual allowable allocation (AAA) calculations (wood supply section). This figure is a considerable amount higher than anticipated and used during previous calculations. The total effect on the 2011-2016 wood supply was a reduction of <1% in the AAC from the last calculation and a reduction of -11% in the AAA level for the district (Table 12).

Table 12: History of annual wood supplies for District 21.

Wood Supply Year	Annual Allowable Cut (m ³ /year)	AAC Change from previous year	Annual Allowable Allocation (m ³ /year)	AAA Change from previous year
Pre 2007	49,700	0%	N/A	N/A
2007-2011	48,700	-2%	43,300	0%
2012 - 2016	48,600	<1%	43,200	<1%

All commercial operators with permits > 5,000 m³ will experience a decrease of 11% on their annual allocations in the 2012 operating year. This volume can be recovered by each operator, subject to utilization performance. The district proposes to implement a utilization credit program on a trial basis during this planning period. The purpose of this program will be to:

1. Mediate the impacts of a lower AAA on commercial operators by giving credit to operators who improve their utilization.
2. Ensure overall improvement of the utilization of the forest resources in the district.

Commercial operators will be given an opportunity to recapture a credit for up to 11% of their regularly allocated volumes, based upon individual performance. This credit program will be voluntary by commercial operators and be administered under the following guidelines:

1. Operators must contact the nearest Department of Natural Resources office to request utilization surveys upon completion of a assigned harvesting block.
2. The Department will conduct utilization surveys as per guidelines designed by the Newfoundland Forest Service, as soon as possible thereafter.
3. Utilization number for each operator will be calculated at the end of each operating year and any credit or debit will be applied to the following years permit.
4. Operators are eligible to earn credit for volumes up to and not exceeding their regularly allocated volumes.
5. Operators must be in good standing with the Department to be eligible to participate in this program.
6. Once an operator voluntarily agrees to participate in the program they must continue for the five year operating period. Failure to do so will result in the permit being reduced to the AAA volume (-11%).

7. At the end of the five year planning period all utilization surveys will be combined to create a utilization figure for the district. This number will be applied to the next planning periods annual allowable cut calculations.

Domestic Harvesting Operations

The harvesting of fuelwood, sawlogs and building materials by residents for domestic use will continue under a domestic permit, primarily in the thirty-four areas identified in this plan. Domestic permit sales are expected to remain relatively stable over the five years of this plan. On average 666 domestic permits are issued each year in the District. These permits are available in person or by mail from any Natural Resources office in the District. Domestic harvesters must wait until receiving their original domestic permit before harvesting activity can commence.

Domestic permits will be issued for the requested amount up to a maximum volume of 23 m³/permit and the permitting year will be from January 1 to December 31 each year, unless otherwise stated. Analyses of domestic returns have indicated that on average each permit holder is harvesting 16 m³/year. The Department will work over this planning period to gather more domestic harvesting data through mandatory regulatory returns, spot checks and random surveys. Each harvester is eligible to select a primary and secondary cutting area which will be shown on the permit. These areas are generally located close to the communities and are identified in appended maps 26 & 27. Permits, maps and conditions are required to be on person while harvesting and should be ready if checked by a Forestry Official. Areas affected by insect damage will be identified on domestic permit maps. In an effort to utilize this dying wood, domestic harvesters will be encouraged to salvage this wood.

Consensus was reached among local planning members that the following exceptions should apply to domestic harvesting in buffers:

1. Domestic harvesters should be allowed to harvest specialized boat timbers in any buffer.
2. Domestic harvesters should be able to cut dry wood or salvage blow-downs within the 100m buffer of the Trans-Labrador Highway.

These activities will require prior approval from District staff and occur within existing legislation. These activities will be closely monitored and subject to review on an annual basis. Modifications to these practices may be recommended as required.

Small volumes of wood are expected to be harvested outside of the identified domestic areas by cabin owners. Requests for domestic harvesting blocks outside the identified areas will require prior approval from District staff. Such operations will be monitored and will be subject to review on an annual basis. Modifications to this practice may be recommended and enforced as required.

Silviculture

Silviculture refers to the theory and practice of controlling the establishment, composition, growth and quality of forest stands to achieve the objectives of management (Smith, Larson, Kelty and Ashton, 1997). Two of the most common techniques in District 21 are planting and pre-commercial thinning.

In the past, forest stands in District 21 have been subject to large scale disturbances including fire and harvesting. The occurrence of major fires in the district has had a strong influence on existing distribution of vegetation types including lichen woodlands and birch stands. Foster (1983) reported a strong correlation between fire distribution over the past 110 years and the location of lichen woodlands and birch stands.

Regeneration surveys completed in the district have indicated that the majority of the harvested areas adequately regenerate within a five year period and this can be easily seen on recent cutovers in the District. Although no regeneration surveys have been conducted in burn areas, observations have indicated that some of these areas have not been regenerating as fast. Many factors may have contributed to this slower regeneration time such as pre-disturbance site characteristics, seed sources, repetitive burns or fire temperatures. Harvested areas will be monitored and detailed regeneration surveys will be conducted in areas where regeneration appears to be inadequate three to five years after the disturbance.

One silvicultural prescription will be scheduled for the next five years, planting/gap planting including site preparation where required. Stands harvested in the past five years or those scheduled for harvest in this plan or burn areas not adequately regenerating will be treated as candidate areas for planting. Any stands harvested during this plan will be located within the proposed commercial blocks outlined in maps 4 to 25. Selection of the species to be planted will be highly dependant upon the pre-disturbance stand structure and will be dealt with on a site specific basis. Subject to funding, cone collections may be initiated on the South Coast of Labrador to provide a local planting stock of native tree species. All scheduled planting projects will be supported by the Labrador Regional Tree Nursery in Goose Bay.

Primary Access Road Construction

The system of resource access roads in the district is currently underdeveloped for the purpose of establishing a commercial forestry operation.

Road network construction is essential to the success of harvesting (domestic and commercial) operations, silviculture treatments and fire suppression in the district. In the past, all road construction in District 21 was constructed under the Provincial access road program, under the Department of Natural Resources. The anticipated forest access road network to access the commercial harvesting areas for this operating period is summarized in table 13 and appended in maps 28 - 30. Based upon current construction costs, well in excess of one million dollars is required. Construction each year will depend on the amount of money available in the roads budget.

Table 13: Summary of proposed primary access road construction required for the period of January 1, 2012-December 31, 2017.

Year	Class	Approx. Length (km)	Water Crossings (1:50,000 topo. map)
Charlottetown	C & D	2.4	0
Discovery I	C & D	2.5	0
Discovery II	C & D	5.2	0
Noralls Pond	C & D	0.0	0
Port Hope Simpson	C & D	3.9	0
Mary's Harbour	N/A	0.0	0
Total		14.0	0

Operational roads (secondary or spur) are not identified in this five year plan. However they will be necessary to ensure that timber scheduled for harvest is fully accessed. Operators will have to construct short spur roads to access all timber in each harvesting block. Royalty reductions, as per regulations, are offered as incentive for commercial operators to construct their own access. These roads are subject to established environmental standards and are subject to approval by District staff. Operator built roads will be identified during the preparation of the annual work schedules.

Due to the relative lack of existing forest access roads, decommissioning was not considered by the stakeholders committee during this planning period. A detailed review of the access roads program will be undertaken towards the end of the planning period to establish whether or not decommissioning will be required during the next planning horizon. Individual operators will be expected to rehabilitate extraction trails to a standard acceptable to district guidelines.

Road construction activity will be carried out as per Departmental specifications and the Environmental Protection Guidelines, which are provided in appendix IV. Under section 48 of the *Water Resources Act*, certificates of approval will be obtained from the Water Resources Management Division of the Department of Environment and Conservation for any culvert or bridge crossing. In addition, approval under section 5(1) of the *Navigable Waters Act* (NWPA) will also be obtained for any water crossing prior to the commencement of any work. Where ever possible, bottomless culverts will be used on all fish bearing streams (1.0 m or greater). The Department will continue to work with the Department of Environment and Conservation and the Department of Fisheries and Oceans to ensure unimpeded fish passage in all stream crossings involved in this and other operating plans.

Ecosystem Research and Monitoring

Adaptive management can be defined as a systematic process for continually improving management policies and practices by learning from the outcomes of operational programs. Furthermore, research and monitoring are key components of this process. During the planning process several research and monitoring initiatives were identified by local stakeholders. Subject

to operational funding, this plan will follow the various research and monitoring initiatives, which are described in further detail in the Strategy Document.

Some of the broad scale research topics that will attempt to be targeted in this operating period are:

- Modification of harvest patterns
- Growth and yield data for strata
- Updated forest inventory and acquisition of new inventory areas
- Wind throw management regimes
- Visual assessment of forest harvesting (view sheds)
- Impacts of timber harvesting (ecological, social and economic)

Site specific information is also a key element in adaptive management. They provide benchmark data to base and evaluate forest management decisions. Numerous surveys are planned for this operating year, subject to funding and availability of staff, to provide this base line data.

Pre-harvest Surveys

Proposed harvesting areas will be surveyed for sensitive habitats such as the presence of raptor nesting sites, critical spawning areas and the presence of aquatic furbearers. Detailed harvest sensitivity surveys (slope and drainage) may also be conducted to identify areas with high soil compaction and erosion hazard potential. Results of the pre-harvest surveys will be used in the final determination of the harvest block layouts.

Regeneration Surveys

Regeneration surveys will be conducted on areas that have been disturbed (harvesting or fire) to determine the quantity and quality of natural regeneration. Areas will normally be surveyed three to five years after the disturbance to allow sufficient time for seedling establishment. Surveys will be conducted as outlined in the Regenerations Assessment Procedures by the Newfoundland and Labrador Forest Service.

Utilization Surveys

Problems with improper utilization will be addressed through regular monitoring and enforcement by District Conservation Officers. Formal surveys, defined by the Newfoundland Forest Service, will be carried out to obtain baseline data or to resolve disputes.

Permanent Sample Plot and Temporary Sample Plot Measurements

While these surveys are necessary to measure the immediate impact of activities on the ecosystem, mechanisms to monitor change over the long term are also necessary. An important component of this long term monitoring is the establishment and re-sampling of permanent sample plots and temporary sample plots in the District. In addition to obtaining growth and

yield information, data pertaining to site, course woody debris and the presence of small mammals and song birds will be recorded and monitored over time.

Ground Disturbance Surveys

These surveys, as defined in the Ground Disturbance Survey Guidelines developed by the Newfoundland Forest Service, will be conducted following harvesting in conjunction with the utilization surveys. These surveys will ensure compliance with the site disturbance and erosion sections of the Environmental Protection Guidelines.

Under the mandate of the Department of Natural Resources, District Conservation Officers will routinely monitor harvesting (commercial and domestic), road construction (Provincial and operator funded), silviculture operations, wildlife harvesting (small and big game) and nuisance wildlife problems (bears). This will ensure that activities are being carried out in a manner consistent with various legislation, guidelines and objectives and goals of the forest management plan. Inspections will include documentation, reports, results and corrective actions if required.

Public & Operator Education

Efforts by District staff to educate and foster new ideas to the public and operators on ecosystem management initiatives will continue within the District. Continued interaction with the public and operators will likely result in the better understanding of key management decisions made by managers, and their relationships with the goals and objectives of forest management. During this planning period it is expected that District staff will continue to:

- Deliver presentations to school and youth groups on forest ecosystem management topics.
- Maintain contact and good working relationships with town councils, resource groups, development associations and other Government Departments.
- Conduct operator workshop on various management issues including utilization, ground disturbance and road construction on a regular basis.
- Continue to participate in National forestry and wildlife weeks.

ENVIRONMENTAL PROTECTION

The protection of ecosystem health, biodiversity and aquatic and terrestrial habitats is a management objective of District 21. General goals and objective to achieve this are described further in the strategy document and in detail in the Environmental Protection Guidelines, which are appended to this document.

Habitat Protection

The protection and conservation of wildlife habitat has been identified by stakeholders as an important objective of timber harvesting. Any critical habitat that may be identified during pre-

operational surveys will be forwarded and discussed with the Wildlife Division of the Department of Environment and Conservation.

Over mature forests contribute greatly to biodiversity and support an assortment of plant and animal species. Over mature forests often contain a complex arrangement of structural and functional ecosystem features such as coarse woody debris. Coarse woody debris, which includes both standing and downed woody material, is very important to flora and fauna species. In recognition of this value, whole tree logging systems will not be permitted under this plan. Logging systems that leave coarse woody debris (limbs and stems) along with cut block patterns that maintain green tree retention areas will be favored. Snags will be maintained as per the Environmental Protection Guidelines and efforts will be made to follow patterns of natural disturbances such as irregular and feathered edges.

In this case large contiguous tracts of forested areas have been excluded from the current wood supply analysis. Approximately 78% of the district was not considered during the AAC calculation. Connectivity over the landscape will be maintained through a combination of riparian areas, retention forest and leave areas, hardwood forest, wildlife corridors, wildlife denning and nesting buffers, and scrub and bog forest patches.

Riparian buffers were considered important by stakeholders and are critical in the protection and conservation of aquatic ecosystems and the maintenance of water quality in general. Stakeholders reached consensus for riparian buffers to be applied as follows:

- Minimum requirement for 20m forested buffer around all water bodies identified on latest 1:50,000 topographic maps and on all water bodies that are 1.0 m in width or greater.
- Minimum requirement for 100m forested buffer around all waters identified as accessible spawning or rearing areas identified by T.C. Anderson in the Rivers of Labrador (1985).
- Additional buffer width to be applied where it can be determined that critical fish or wildlife habitat may be affected.
- Where slope is >30%, a no harvest forested buffer of (20m or 100m) + (1.5 x slope %) will be applied.

At the stand level black bear denning sites and raptor nests will be buffered as recommended in the EPG. In addition, a 50m buffer will be maintained on identified waterfowl staging areas. Any other Locations of denning sites, raptor nests or staging areas will be forwarded to the Wildlife Division of the Department of Environment and Conservation. Stand level features such as these will be identified during annual pre-harvest surveys and accommodated in the annual work schedule.

Forest Fire Protection

The most predominant disturbance in the Labrador Region has been the natural occurrence of forest fires; in particular some of the largest fires in the Region have been recorded in District 21. Although fire research is limited for the District, Foster (1983) estimated the fire cycle for the southern coast of Labrador to be ~500 years. To ensure minimal losses an effective fire suppression program is necessary.

A fire suppression priority map (Map 31) has been developed as a guide for fire suppression activities in the District. Although, natural cycles are preferred, suppression activities will occur in priority areas in order of human life, property, and resources. Forest fire suppression activities will occur within the strategies outlined in the Forest Strategy plan and in conjunction with regional fire management strategies.

Satellite offices in Port Hope Simpson and Red Bay have staff and equipment to provide initial suppression attacks when required. Two seasonal Conservation Officers (fire protection) are stationed in Port Hope Simpson from mid May to September, complemented by two full-time Conservation Officers in Port Hope Simpson and one Conservation Officer in Red Bay. The Port Hope Simpson office is manned from 1200 to 1900 hours daily. After regular hours, the district maintains a fire duty officer on stand-by to receive fire reports and dispatch staff and equipment. The Forest Management Centre located in North West River, assists in coordinating air support (tanker & helicopter) and can provide additional staff and equipment as required.

Insect and Disease Control

In addition to the environmental protection mechanisms outlined throughout other parts of this document (including the appended Environmental Protection Guidelines for Ecologically based Forest Resource Management) (Appendix IV), the forests of FMD 21 are also protected by province wide programs from insects and diseases. Since many forest pests are endemic, there is an increased risk of insect and disease outbreaks in over mature stands. The general strategy of harvesting the oldest stands first will not only potentially reduce the future risk of these outbreaks but also will reduce the future risk of fire by targeting the stratum that contains the most abundant dead and dying timber.

Insect and disease protection activities are coordinated on a Provincial basis from the Forest Protection Division in Corner Brook. During routine field work, District staff will focus on the forest condition in an effort to detect any significant insect or disease infestations as early as possible. All significant infestations will be reported to the provincial coordinator and appropriate action discussed with District and Regional staff.

Large scale infestations were not common on the south coast until 2006; consequently the application of spray programs occurred in 2008 & 2009 for hemlock looper. Since this time it appears that population levels of hemlock looper has decreased and it is unknown when population levels will rise again. Large scale spray programs using chemical or insect control agents may be required during this planning period. Any proposed spray program will be registered as separate undertakings with the Environmental Assessment Division of the Department of Environment and Conservation for environmental assessment and further public review.

Enforcement and Compliance

Conservation Officers will monitor harvesting operations, road construction and silviculture operations and enforce Provincial Legislation (including the Forestry and Wildlife Acts and

associated regulations) on a daily basis within the District. This will ensure that activities are being carried out in a manner consistent with legislation, guidelines and the objectives and goals of the strategy document. Specific issues targeted during this operating period will be; over cutting of permits, poor utilization practices, in particular on right-of-ways and environmental issues such as ground disturbance and waste disposal. Particular attention will be paid to annual allowable cuts for each planning area and ensuring that both commercial and domestic operators are within their assigned areas.

PLAN ADMINISTRATION

Monitoring

A monitoring committee, consisting of representatives from each stakeholder group, will be established to evaluate the results of the activities planned in this document. The Department of Natural Resources will determine representation on this monitoring committee. The main focus of the committee will be to monitor activities and evaluate the overall progress towards the long-term goals outlined in this document and in the *Provincial Sustainable Forest Management Strategy 2003* and make recommendations to the Department where necessary. The Department will prepare an annual work schedule for each operating year, which will be reviewed by the monitoring committee.

Amendments

Further refinement of the commercial harvest blocks outlined in this plan will be detailed through the development of an annual work schedule by January 01 each year.

Any amendments to the operating plan will be processed through the Forest Ecosystem Management Division in Corner Brook and, where appropriate, will be registered as undertakings with the Environmental Assessment (EA) Division of the Department of Environment and Conservation. Amendments that require EA registration will be subject to environmental assessment and further public input. Any amendments that do not require EA registration will be approved or disapproved by the District Manager in consultation with the Forest Ecosystem Management Division.

REVIEW COMMENTS AND PROPOSED MITIGATIONS

The following table outlines the issues raised along with proposed mitigations by the Department. Many of these mitigations have been addressed in the current plan.

Dept./Issue	Proposed Mitigation	Site Specific Mitigation (FMD 21)
1) DNR – Agrifoods Agency General comments	- No concerns, overall positive and looking for means to expand industry	No further action required
2) DNR – Mines Branch	- No response to date	
3) DE&C – water resources	- All activities in PWS area require prior approval under the Water Resources Act - Recommend an environmental buffer of min. 15m along high water mark of all bodies of water showing on 1:50000 mapping - projects located on boundary of PWS areas must be reviewed ensure they are not within buffer zones and to ensure compliance with policy	- The district has three water supply areas, of which in an attempt to maintain water quality, there will be no domestic or commercial harvesting within them and buffers on forest activities will be applied as per the environmental protection guidelines. - Minimum requirement for 30m forested buffer around all waterbodies identified on latest 1:50,000 topographic maps and on all waterbodies that are 1.0m in width or greater.
4) DE&C – Environment Pesticide use	- Must comply with Environmental Protection Act, Pesticides Control Regulations	Any proposed spray program planned for D21 will be registered as separate undertakings with the Environmental Assessment Division of the Department of Environment and Conservation for environmental assessment and further public review.
5) DE&C – sustainable development and strategic science	- No comments	

Dept./Issue	Proposed Mitigation	Site Specific Mitigation (FMD 21)
6) DE&C - Lands	<ul style="list-style-type: none"> - Requesting a 120m buffer around waterbodies where cottage developments exist. Includes a 15m shoreline reservation, 90m cottage lot and a 15m road right of way. - Requesting individual remote cottages should have a minimum of 20m no-cut buffer around cottage. - no cutting on private land. Should contact the regional lands office for up-to-date titles issued and their knowledge of private land claims prior to harvesting. - ATV and snowmobile trails should be left undisturbed and an adequate buffer should be maintained. Recommend consultation with local ATV/Snowmobile clubs. 	<ul style="list-style-type: none"> - Invited Crown Lands to participate in process, no response. - Contacted regional lands office for locations of cottage development areas. No response to date, however I don't foresee any conflict in applying such a buffer to these areas. - Current environmental guidelines require a 50 meter treed buffer between existing approved cabin development areas and any forest operation. These guidelines are currently under review. - Not anticipating any cutting on private land. - Currently there are no commercial operating areas that identified on or near snowmobile trails groomed by the Labrador Winter Trails. To protect the aesthetic value of the trails a minimum of 30 meter no cutting buffer will be implemented for all domestic and commercial harvesting along the trail systems.
7) DE&C - wildlife	<ul style="list-style-type: none"> - Rare plants occur in several domestic harvest blocks. Contact wildlife division to discuss mitigations. 	<ul style="list-style-type: none"> - Commercial areas are identified further in Annual Operating Plans. Any conflicts with rare plants can be buffered at that time. Domestic harvesting impact is very light especially during winter and will have little impact on rare plants in the district.
8) DE&C - Parks	<ul style="list-style-type: none"> - Request to remove domestic harvesting area overlap with Red Bay Barrens NASP study area. - Requested to remove all references to proposed protected areas under the NASP. Specifically pg. 35 remove section on Red Bay Barrens Study Area 	<ul style="list-style-type: none"> - Under agreement, domestic harvesting will be grandfathered in within existing domestic harvest blocks in the NASP Study Areas and no new domestic harvest blocks be added. No new harvest trails will be constructed to reach domestic blocks - No problem to remove any reference to NASP sites including section on pg. 35.

Dept./Issue	Proposed Mitigation	Site Specific Mitigation (FMD 21)
9) DT&C - Tourism	- Advise and consult with Tourism with regard to the initiation of the plan over the next four years.	- The reason DNR prepares 5 year plans is to plan ahead. Agree with advising Tourism on an annual basis of activities by copy of the annual operating plan; however do not see any benefit to opening the plan to consultation every year. All operations are outlined within 5 year plan and anything outside of this requires an amendment.
10) DT&C – culture & recreation	- no response to date	
11) DMA – municipal support and policy	- no response to date	
12) DMA – municipal engineering and planning	- no response to date	
13) DLAA – aboriginal affairs	-prefer to have the domestic cutting areas reduced to those that are actually needed -essentially no new commercial cutting in districts 21 and 22 except in areas adjacent to areas that have already been cut, I see this matter as being routine pursuant to MC 2011-0053. Therefore, I do not foresee the need to consult Quebec Aboriginal groups on the district plans for 21 and 22. These groups may decide to send in comments as part of the EA process	- No need to change domestic areas at this point. There are numerous cabins scattered throughout the district and numerous areas are required to manage the domestic cutting.
14) DLAA – Labrador affairs	- Suggests several text edits. No significant changes required.	- make appropriate text edits.

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APPENDIX I

Legal Description - Forest Management District 21

Port Hope Simpson

All that piece or parcel of land situate and being in Eastern Labrador in the Electoral Districts of Cartwright – L'anse au Clair and Lake Melville abutted and bounded as follows:

At a point on the north shore of Hawke Bay, latitude $53^{\circ} 1' 20''$ longitude $55^{\circ} 53' 17''$, on the east coast of Labrador and sharing a common boundary with Management District 20;

Then following the Management District 20 boundary in a generally westerly direction until it meets a point where Management District 20 boundary and Management District 19C boundary meet on the Paradise River;

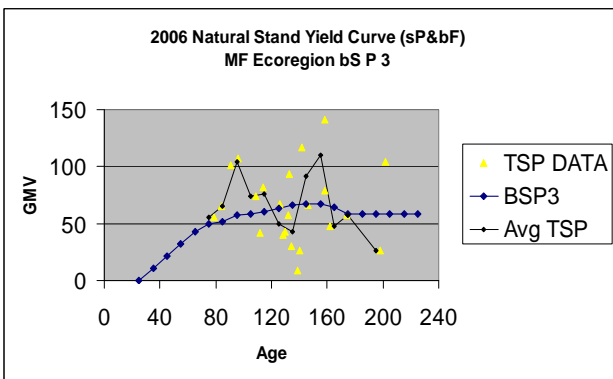
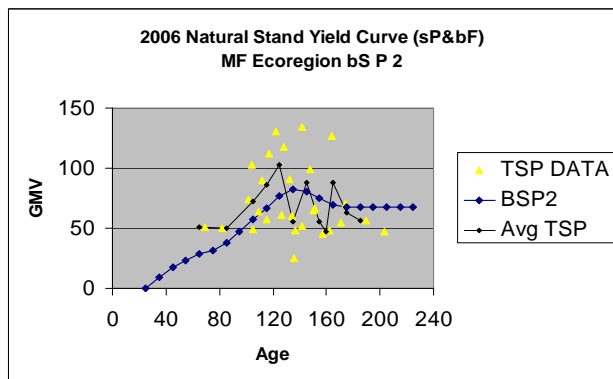
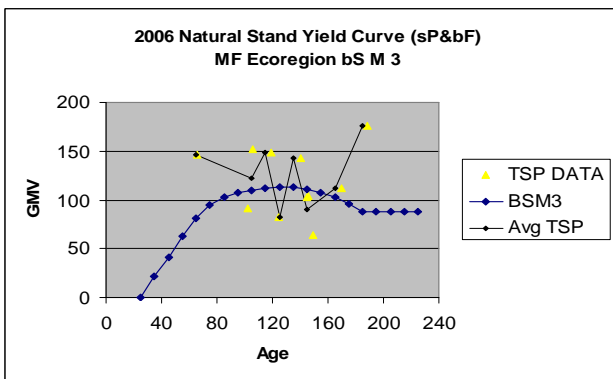
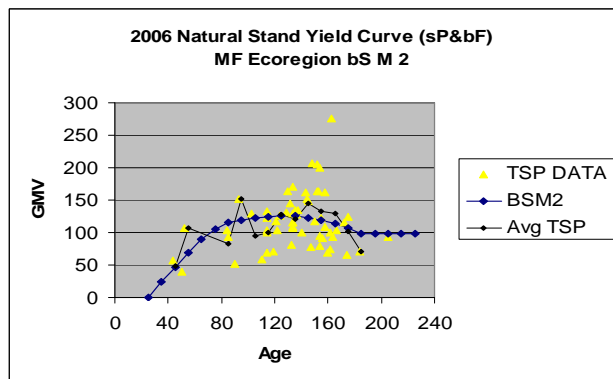
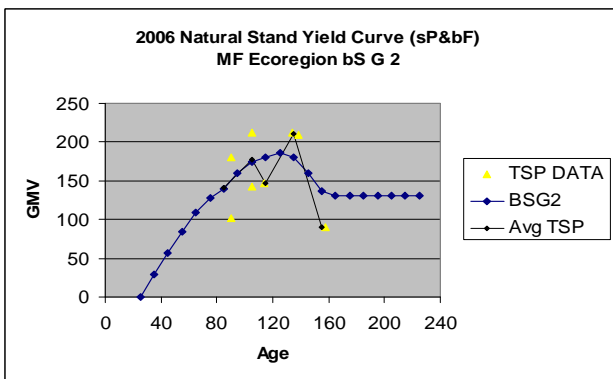
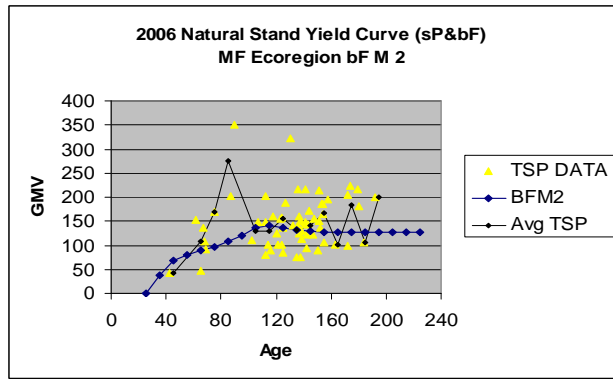
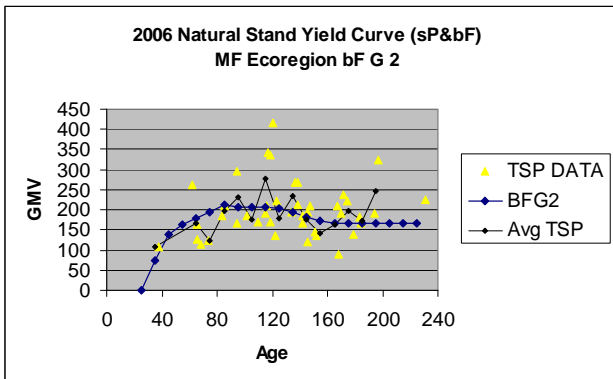
Then following Management District 19C boundary south along Paradise River and south along St. Pauls River to where Management District 19C meets the Quebec – Newfoundland and Labrador border;

Then east and south along the Quebec – Newfoundland and Labrador boundary to where it meets the coast at the Strait of Belle Isle;

Then following the coast line in a northeast direction along the Strait of Belle Isle and north along the Labrador coast including all islands to the place of commencement at Hawke Bay.

APPENDIX II

District 21 Stand Yield Curves



APPENDIX III

Protected Water Supply Areas by Community

Planning Area	Community	Water Source	Area (ha)
Charlottetown	Charlottetown	Middle Pond	784
Port Hope Simpson	Port Hope Simpson	Arnolds Brook & Pond	945
Pinware River	Lanse an Clair	Park Pond	354
Pinware River	Forteau	Trout Brook	220
		Total	2303

APPENDIX IV

Environmental Protection Guidelines for Ecologically Based Forest Resource Management (Stand Level Operations)

ENVIRONMENTAL PROTECTION GUIDELINES

"Forests are interconnected webs which focus on sustaining the whole, not the production of any one part or commodity. Trees, the most obvious part of a forest, are critical structural members of a forest framework. However, trees are only a small portion of the structure needed for a fully functioning forest." (Hammond, 1991)

This ecologically based approach to forest resource management requires that resource managers shift their focus from managing components of the ecosystem to managing the three-dimensional landscape ecosystems that produce them. Primary concern becomes the maintenance of landscapes and waterways as complete ecosystems because the only way to assure the sustained benefit of forest values, now and in the future, is to keep them and all their parts in a healthy state. This is the foundation for an ecologically based approach to forest management. It means that everyone attends to the conservation and sustainability of ecosystems instead of sharply focusing on the productivity of individual or competing resources which has been our traditional mode of operation.

The Newfoundland Forest Service is committed to the concept of forest ecosystem management, which is captured in the Twenty-year Forestry Development Plan (1996-2016) vision statement:

"To conserve and manage the ecosystems of the Province which sustain forests and wildlife populations and to provide for the utilization of these resources by the people of the Province under the principles of sustainable development, an ecologically-based management philosophy, and sound environmental practices."

There are five strategic goals in the Twenty-year Forestry Development Plan (1996-2016) which provide the foundation upon which ecologically based resource management will be developed.

1. Manage forest ecosystems so that their integrity, productive capacity, resiliency, and biodiversity are maintained.
2. Refine and develop management practices in an environmentally sound manner to reflect all resource values.
3. Develop public partnerships or networks to facilitate meaningful public involvement in resource management.
4. Promote adaptive ecosystem management and conduct research that focuses on ecosystem processes, functions, and ecosystem management principles.

5. Establish and enforce conservation and public safety laws with respect to managing ecosystems.

The environmental protection guidelines provide specific "on the ground" tasks for loggers and gives management direction to planners. Individually, the guidelines appear as specific rules; however, when implemented collectively they will facilitate ecologically based forest resource management.

1.0 GENERAL GUIDELINES

These guidelines are generated from impacts described in the literature and from discussions with resource managers. As new information and management techniques become available the guidelines will be changed to reflect this improved information base. Consequently, the guidelines will be reviewed on an annual basis to incorporate any necessary changes. The "General Guidelines" applies to all forestry activities (i.e., silviculture, harvesting, and road construction). These guidelines form Schedule IV of the Certificate of Managed Land. They are conditions of Crown commercial permits and they form the basis for the voluntary compliance program.

1.1 Planning

1. The location and type of all water body crossings must be submitted to the Department of Environment and Labour and the Department of Fisheries and Oceans. Certificates of Approval are required from both departments for water body crossings. A water body is defined as any water identified on the latest 1:50,000 topographic maps. Appropriate protection is still required for streams greater than 1.0 m in width (at its narrowest point from the high water mark) not found on the 1:50,000 topographic maps.
2. All waste disposal sites require a Certificate of Approval from the Minister of Government Services.
3. Excessive bulldozing is not permitted and no more than 10% of the total forest within an operating area can be disturbed. In situations where specific operating areas require more than 10% disturbance to capture available timber, the operator is required to rehabilitate the area to reduce the total net disturbance to the 10% maximum. Where disturbance has been excessive, a rehabilitation plan will be developed with the Forest Service District Manager. Disturbance is defined as per the Ground Disturbance Survey Guidelines developed by the Newfoundland Forest Service.
4. When an archaeological site or artifact is found, the *Historical Resources Act* requires that all development temporarily cease in the area and the discovery be reported to the Historical Resources Division (709-729-2462).

The Historic Resources Division will respond immediately and will have mitigation measures in place within seven days as agreed to by the Historical Resources Division and the operator. Forestry activity can then continue.

The Historic Resources Division will be contacted during the preparation of five-year operating plans to determine the location of historic resources and appropriate mitigation measures will be designed. These measures will include such things as buffer zones and modified operations or surveys.

5. Should an oil or gas spill in excess of 70 litres occur, the operator must make every effort to first contain and second clean up the spill after reporting the spill to the appropriate authorities

Government Services Centre
Spill Report Line
(709)772-2083 or 1-800-563-2444

6. The Parks and Natural Areas Division will be contacted during the preparation of five-year operating plans. Where operations are within one kilometre of provisional and ecological reserves, wilderness reserves or provincial parks, modified operations may be necessary.
7. In areas where caribou utilize arboreal lichens during the summer and/or winter, and terrestrial lichens during the summer, a minimum amount of lichen forest must be maintained for the caribou. Forestry activity will be designed in consultation with the Wildlife Division where this situation has been identified.
8. Areas identified as containing rare and/or unique flora (through literature review) are to be protected from forestry activity by avoiding these areas.
9. Where mature stands of timber for moose shelter and moose yards are required, they will be identified in consultation with Wildlife Division.
10. The impacts of forest operations on pine marten have been an ongoing issue. Until appropriate guidelines are developed for pine marten habitat, forestry activities within high-density pine marten areas and dispersion areas required for pine marten recovery will require consultation with the Wildlife Division.
11. During the preparation of five-year operating plans, areas identified as “Sensitive Wildlife Areas” in the Land Use Atlas require consultation with the Wildlife Division prior to any forestry activity.

1.2 Operations

1. A 20-metre, treed buffer zone shall be established around all water bodies that are identified on the latest 1:50,000 topographic maps and around water bodies greater than

1.0 metre in width that does not appear on the maps. Where the slope is greater than 30% there shall be a no-harvest buffer of 30 m + (1.5 x % slope). All equipment or machinery is prohibited from entering water bodies; thus, structures must be created to cross over such water bodies. Every reasonable effort will be made to identify intermittent streams and they will be subject to this buffer requirement. The District Manager of Forest Ecosystems is permitted to adjust the specified buffer requirements in the following circumstances:

- the no-cut, treed buffer can exceed the 20 m for fish and wildlife habitat requirements.
 - a 50-metre, no-cut, treed buffer will be maintained around known black bear denning sites (winter) or those encountered during harvesting. These den sites must be reported to the Wildlife Division.
 - no forestry activity is to occur within 800 metres of a bald eagle or osprey nest during the nesting season (March 15 to July 31) and 200 metres during the remainder of the year. The location of any raptor nest site must be reported to the Wildlife Division.
 - all hardwoods within 30 metres of a water body occupied by beaver are to be left standing.
 - a minimum 50 metre, no-cut, treed buffer will be maintained from the high water mark in waterfowl breeding, moulting and staging areas. The Canadian Wildlife Service and/or the Wildlife Division will identify these sites.
2. Heavy equipment and machinery are not permitted in any water body, on a wetland or a bog (unless frozen) without a Certificate of Approval from the Department of Environment and Labour and without contacting the DFO Area Habitat Co-ordinator.
 3. No heavy equipment or machinery is to be refuelled, serviced, or washed within 30 metres of a water body. Gasoline or lubricant depots must be placed 100 metres from the nearest water body. All fuel-storage tanks (including JEEP tanks) must be registered with the Department of Government Services and Lands and installed in accordance with the *Storage and Handling of Gasoline and Associated Products Regulations*. Fuel storage within protected water supplies is more stringent. Please refer to “Guidelines for Forest Operations within Protected Water Supplies” for more information.
 4. Used or waste oil shall be collected either in a tank or a closed container.
 5. Above ground storage tanks shall be surrounded by a dyke. The diked area will contain not less than 110% of the capacity of the tank. The base and walls of the dyke shall have an impermeable lining of clay, concrete, solid masonry or other material, designed, constructed and maintained to be liquid tight to a permeability of 25L/M²/d. There shall be a method to eliminate water accumulations inside the dyke.

6. Wherever possible, place slash on forwarded trails while forwarders are operating in an area. Skidding timber through any water body (as defined in Section 1.2.1) is prohibited.
7. Any forestry operation that directly or indirectly results in silt entering a water body must be dealt with immediately (a government official must be notified within 24 hours). Failure to comply will result in the operation being stopped.
8. Woody material of any kind (trees, slash, sawdust, slabs, etc.) is not permitted to enter a water body. Woody material on ice within the high water floodplain of any water body is prohibited.
9. To minimize erosion and sedimentation, water body crossings shall:
 - i) have stable approaches;
 - ii) be at right angles to the water body;
 - iii) be located where channels are well defined, unobstructed, and straight;
 - iv) be at a narrow point along the water body;
 - v) allow room for direct gentle approaches;
 - vi) have all mineral soil exposed during bridge construction and culvert installation seeded with grass.
10. Garbage is to be disposed of at an approved garbage disposal site. Prior to disposal it must be contained in a manner not to attract wildlife. All equipment is to be removed from the operating area where operations are completed.
11. Where safety is not an issue, a minimum average of 10 trees or snags per hectare (average on a cut block) or a clump of trees is to be left on all sites (harvesting and silviculture). Preference will be given to trees over 50 cm dbh.

2.0 TIMBER HARVESTING GUIDELINES

2.1 Planning

1. There will be corridors to connect areas of forest that will not be harvested (isolated stands within cutovers are not considered forested areas). These corridors connect wildlife habitat, watersheds and minimize fragmentation. Acceptable corridor vegetation includes productive forest areas (all age classes) and softwood/hardwood scrub. These corridors do not have to be continuous (i.e., breaks in vegetation are permitted) and will be determined in the five-year operating plan and identified in the annual work schedule.
2. Complete utilization of harvested trees is required. (Complete utilization is harvesting trees to a top diameter of 8 cm and stumps to a height of 30 cm). The District Manager can modify the stump height requirement to accommodate snow conditions. Where markets exist, non-commercial tree species that are harvested should be brought to roadside. This will be determined in consultation with the District Manager.

3. Preplanning is required on all forest operations (Industry/Crown) at the request of the District Manager (for Industry) and the Section Head i/c Management Planning (for Crown). Preplanning will include:
 - boundaries of protected water supplies (if applicable);
 - existing and proposed access roads;
 - skid trails and landing locations;
 - areas sensitive to erosion;
 - buffer zones around water bodies;
 - approved stream crossings;
 - fuel storage locations;
 - wildlife corridors.
4. Harvesting is not permitted within caribou calving areas from May 15 - June 15 (calving period). Harvesting is not permitted within post-calving areas from June 15 to July 31. These areas will be identified by the Wildlife Division.
5. Harvest scheduling should be modified during the migration of wildlife (e.g., caribou) and during temporary wildlife concentrations (e.g., waterfowl staging). Wildlife Biologists will identify the areas of concern, and in conjunction with district or company foresters, aid in the modification of forestry operations.

2.2 Operations

1. When skid trails and winter roads are to be constructed, soil disturbance and impacts on water bodies are to be minimized. The operator will use culverts and/or log bridges depending on the conditions. The objective is to minimize erosion and sedimentation to avoid restricting stream flow, and to ensure fish passage in fish-bearing streams. Erosion control measures (e.g., laying down brush mats and the construction of diversion ditches for water run-off) are to be maintained while the skid trail is in use. All temporary crossings are to be removed at the end of the operating season unless the District Manager agrees to extend the life of the crossing for more than one season.
2. A minimum 50 metre, no-cut buffer is to be left between operations within approved cabin development areas.

3.0 FOREST ACCESS ROADS GUIDELINES

3.1 Planning

Forest access roads, barrow pits and quarries shall avoid:

- i) wetlands, deltas, and floodplain or fluvial wetlands;
- ii) terrain with high erodibility potential;
- iii) known sensitive wildlife areas such as;

- calving grounds, post calving areas, caribou migration routes, caribou rutting areas, and winter areas,
 - waterfowl breeding areas and colonial nesting sites,
 - established moose yards by one kilometre,
 - eagle and osprey nest sites,
 - where site conditions and engineering permits, main haul roads should be one kilometre from permanent water bodies and all other roads by not more than 100 metres,
 - endangered or endemic species or subspecies of flora or fauna and other areas to be determined by qualified authorities;
- iv) known sensitive fish areas such as:
- spawning and rearing grounds;
- v) historically significant areas such as:
- archaeological sites;
- vi) existing reserves such as:
- parks (municipal, provincial, national);
 - wilderness areas and ecological reserves;
 - rare and endangered plant sites and habitats.
2. With respect to borrow pits and quarries, the operator shall:
- i) minimize the number of new borrow areas opened for construction and/or maintenance;
 - ii) use existing barrow areas whenever practical.
 - iii) be in possession of a valid quarry permit from the Department of Mines and Energy prior to aggregate extraction activities;
 - iv) not locate pits and quarries in sensitive areas as identified by planning processes.
3. Forest access roads will not obstruct wildlife migration routes. The following guidelines will be followed to ensure the road is as unobstructing as possible:
- i) roads should be of low profile (less than 1 m above the surrounding terrain);
 - ii) slash and other debris shall be removed;
 - iii) the slope of ditches and road banks should not exceed 1½ horizontal to vertical.
4. Culverts and bridges are to be installed in accordance with the manufacturer's specifications and the specifications attached to the Certificates of Approval received from the Department of Environment and Labour and from the Department of Fisheries and Oceans. Culvert ends will be properly rip rapped.
5. Where road construction is to occur around identified waterfowl breeding, moulting and staging areas the Canadian Wildlife Service is to be consulted.
6. Road construction is not permitted within any buffer zone except with the permission of the District Manager.

7. When a skid trail is on steep ground and is no longer in use, cut-off ditches and push lanes must be created. The frequency will be determined by the District Manager.
8. When disturbance is over 10%, the conditions in 1. 1.3 will apply.
9. There shall be no bulldozing of standing merchantable timber or poor utilization of merchantable softwoods and hardwoods during cutting of the right-of-way.
10. Excavations required for the construction of piers, abutments or multi-plate culverts shall be completed in the dry. (Where exceptions occur, consultation with District Manager is required).
11. On a site specific basis, roads can be decommissioned and/or rehabilitated as directed by the District Manager. Decommissioning is defined as barring access; rehabilitation means to re-vegetate the road.

3.2 Operations

1. A "no-grub" zone of 30 metres of undisturbed ground vegetation must be maintained around any water body crossing to minimize the damage to the lower vegetation and organic cover, thus reducing erosion potential. Manual clearing at water body crossing sites should be used to remove or control vegetation. Right-of-way widths at water body crossings should be kept to a minimum.
2. Fill materials for road building must not be obtained from any water body or from within the floodplain of any water body.
3. Trees are to be felled away from all water bodies, and slash and debris should be piled above the high water mark so that it cannot enter water bodies during periods of peak flow.
4. Equipment activity in water crossing areas is to be kept to a minimum. Whenever possible, any work is to be carried out from dry stable areas.
5. Unnecessary side casting or backbiting in the vicinity of water bodies is not permitted. Where topographical constraints dictate that the roadbed must be constructed adjacent to a water body, road slope stabilization is to be undertaken at the toe of the fill where it enters the water (an area where active erosion is likely). The placement of large riprap or armour stone is recommended in such areas.
6. Side casting must be carried out in such a manner that sediment does not enter any water body.
7. Where borrow pit or quarry activity is likely to cause sediment-laden runoff to contaminate a water body, sediment control measures such as filter fabric berms or

sedimentation ponds are to be installed. Contact is to be made with the District Manager prior to construction where such conditions exist.

8. Stabilize cut banks and fill slopes in the vicinity of water bodies.
9. When using ditches, especially on long slopes, baffles and culverts are to be used at frequent intervals.
10. When constructing ditches near streams, the ditch itself is not to lead directly into the stream.
11. Keep ditches at the same gradient as the road.
12. In side hill and similar areas, install ditches on the uphill sides of roads to intercept seepage and run-off.
13. Borrow pits are to be located 50 metres from the nearest water body.

4.0 SILVICULTURAL PRACTICES AND FOREST REGENERATION GUIDELINES

4.1 Scarification

1. Select scarification methods best suited for preparing the area for planting and for minimizing ground disturbance.
2. Where slash is piled into windrows, ensure the windrows are placed where slash cannot be washed into streams at peak flooding conditions.
3. To minimize erosion, do not direct scarification equipment straight down slope.
4. Where safety is not an issue, a minimum average of 10 cavity trees or snags per hectare, or a clump of trees, will be left on all sites.
5. Whenever possible, white pine regeneration will not be disturbed.

4.2 Planting

1. Landings will be stabilized through seeding (grass) or planting at time of plantation establishment.

4.3 Pre-commercial Thinning

1. Where possible, do not carry out pre-commercial thinning in important wildlife areas during the period of birth and/or hatching. These areas and times will be identified by the Wildlife Division.

2. Where white pine regeneration is present, the District Manager will determine how the pine will be thinned.
3. Trees cut will not be felled into water bodies.

5.0 FOREST PROTECTION GUIDELINES

1. A pesticide application licence must be obtained from the Department of Environment. This licence will determine planning and operational requirements.

6.0 GUIDELINES FOR FORESTRY OPERATIONS WITHIN PROTECTED WATER SUPPLY AREAS

The primary function of a protected water supply area is to provide the public with an adequate quantity of safe and good quality water on a permanent basis, to meet its present and future demands. Any other activity within water supply areas is considered secondary, and if permitted, must be strictly regulated and monitored to ensure that the water supply integrity is not threatened and the quality of the water is not impaired.

In Newfoundland, forestry operations are permitted in protected water supply areas on a limited and controlled basis provided the proposed operations have no, or minimal, water quality impairment potential.

The following permits and approvals are required prior to the beginning of forestry operations within a protected water supply area:

- 1) Approval of the forest operating plan by the Newfoundland Forest Service.
- 2) Approval of the forest operating plan by the provincial Department of Environment and Labour and issuance of a Certificate of Approval under *Section 10 of the Department of Environment Act*.
- 3) Quarry permits from the provincial Department of Mines and Energy for all borrow areas and ballast pits on unalienated Crown lands and alienated Crown land (i.e., leased and licensed land).
- 4) Stream crossing permits under *Section 11 of the Department of Environment Act* and from the federal Department of Fisheries and Oceans.
- 5) Other permits or approvals as required by natural resource management and regulatory agencies.

6.1 Planning

1. Prior to beginning any work, a forest operating plan must be prepared and approved by the Newfoundland Forest Service and the Department of Environment and Labour, and a Certificate of Approval must be obtained under Section 10 of the Department of Environment Act for site specific activities such as road construction, commercial harvesting, silvicultural operations, and other activities associated with forestry operations.
2. In addition to the information normally contained in a forest operating plan, the plan must include maps to show:
 - the boundary of the protected water supply area;
 - existing and proposed access roads;
 - proposed harvesting areas;
 - areas sensitive to erosion;
 - buffer zones around water bodies; approved stream crossings,
 - proposed landing and skid trail locations;
 - proposed fuel storage locations;
 - peat land and other wetlands;
 - nearby communities;
 - other relevant information.

The plan must also contain a written section describing the harvesting techniques to be used, the equipment required for the operation, and the schedule of the operation.

3. Locate roads to avoid all water bodies and areas of sensitive terrain.
4. The forest operating plan must identify an Operations Manager who shall have the responsibility for ensuring that the special protection measures are followed. The Operations Manager is responsible for co-ordinating clean-up efforts in the event of a fuel or oil spill.

6.2 Forest Access Road Construction

1. A "no-grub" zone of 30 metres of undisturbed ground vegetation must be maintained around any water body crossing to minimize the damage to the lower vegetation and organic cover, thus reducing the erosion potential. Manual clearing at water body crossing sites should be used to remove or control vegetation. Right-of-way widths at water body crossings should be kept to a minimum.
2. Clear-cutting up to the perimeter of any water body is not permitted. In all areas where road construction approaches a water body, a buffer zone of undisturbed vegetation must be maintained on both sides of the right-of-way using the buffer zone criteria outlined in Section 6.6.
3. Fill materials for road building must not be obtained from any water body or from within the floodplain of any water body.

4. Provide adequately designed arid constructed drainage ditches along forest roads to allow for good road drainage.
5. Take-off ditching can be used on both sides of the road, or in conjunction with culverts, to divert the ditch flow into the woods or into stable vegetated areas above the no-grub zones. Where take-off ditches are unstable or cannot be constructed, the use of check dams and settling basins in the ditches is required until the ditches become stabilized.
6. Trees are to be felled away from all water bodies, and slash and debris should be piled above the high water mark so that it cannot enter water bodies during periods of peak flow.
7. Equipment activity in water crossing areas shall be kept to a minimum. Any work will be carried out in dry, stable areas.
8. When working near sensitive areas such as streams or lakes, road building operations causing erosion or siltation are to be followed as per Section 1.2.7.
9. Unnecessary side casting or backfilling in the vicinity of water bodies is not permitted. Where topographical constraints dictate that the roadbed must be constructed adjacent to a water body, road slope stabilization is to be undertaken at the toe of the fill where it enters water, an area where active erosion is likely. The placement of large riprap or armour stone is recommended in such areas. Contact is to be made with the District Manager prior to construction when such conditions occur.
10. Side casting must be carried out in such a manner that sediment does not enter any water body.
11. Maintenance support sites must be located outside the protected water supply area.

6.3 Forest Access Road Stream Crossings

1. Stream fording is prohibited in protected water supply areas.
2. All stream crossings, whether culverts or bridges, require written approval under *Section 11 of the Department of Environment Act*.
3. The operator must comply with all terms and conditions of a Certificate of Approval for stream crossings.

6.4 Harvesting

1. Harvesting or other heavy equipment will not be used on wetlands or bogs.
2. Steep areas with high potential for erosion should not be harvested.

3. Wherever possible, skid trails should run along contours and never cross wetlands and water bodies.
4. Landings will be few in number with a maximum size of less than 0.25 ha. All landings should be located at least 100 metres from a water body.
5. In sensitive areas prone to erosion, equipment must have wide tires, or harvesting must occur during the winter when the ground is frozen.
6. Harvesting equipment shall not enter a buffer zone or any water body without permission of the District Manager.
7. The operator must implement erosion control and rehabilitation measures in areas where soils have been unduly disturbed by harvesting activity. In addition to general erosion control measures presented in other sections of these guidelines, the following should also be considered in protected water supply areas:
 - undertake contour furrowing;
 - construct diversion ditches to lessen the possibility of forming new drainage channels;
 - seed or plant areas that are difficult to stabilize by other means;
 - plough or rip prior to seeding any surfaces which have been compacted

6.5 Buffer Zones

The Newfoundland Forest Service on unalienated Crown land and the appropriate company on leased, licensed, private or charter land will provide the operator with a map indicating the harvesting area and no-cutting buffer zones, and will ensure that the operator is familiar with the boundaries.

No forestry activities are permitted within the following buffer zones.

Water Body	Width of Buffer Zone
1. Intake pond/lake/reservoir	A minimum of 150 m
2. River intake	A minimum of 150m for 1 km upstream and 100 m downstream
3. Main river channel	A minimum of 75 m
4. Major tributaries/lakes/ponds	A minimum of 50 m
5. Other water bodies	A minimum of 30 m

6.6 Fuel/Oil Handling and Storage

Fuel storage and the operation of fuel storage equipment are regulated by the *Storage and Handling of Gasoline and Associated Products Regulations* (1982) under the Department of Environment and Lands Act. According to the regulations, the owner or operator of a fuel

storage system must submit a Schedule "A" Storage Tank System Application to the Department of Environment. The applicant must be in receipt of a Certificate of Approval for the system before the system is used for fuel storage. Section 9 of the above Act states: *"No owner or operator shall directly or indirectly cause pollution of the soil or water by causing, suffering or permitting leakage or spillage of gasoline or associated products from a storage tank system or vehicle."*

In addition to the above regulatory requirements, the following guidelines are to be followed:

1. Bulk fuel is to be stored outside the protected water supply area. If fuel must be stored in the protected area, it must be in the least sensitive area and be approved by the Water Resources Management Division of the Department of Environment and Labour.
2. Fuel must be stored in self-diked, above-ground Jeep Tanks, which have been approved by the Department of Environment and Labour.
3. A maximum of seven days fuel supply can be stored within a water supply area.
4. Refuelling must not take place within 100 metres of a water body.
5. Daily dipping of tanks and weekly reconciliation are mandatory. Visual inspection of the dykes and the surrounding area must be carried out daily and inspection records must be maintained.
6. Each unit must be fitted with a locking valve system for the elimination of water inside the outer tank. The valve must be closed and locked except to drain precipitation.
7. Each person involved with fuel handling must be cautioned that any spillage is to be cleaned up immediately.
8. Each person involved with fuel storage must exercise extreme caution when refuelling equipment.
9. All waste materials and waste oil on the site must be collected in enclosed containers and removed to an approved site, at least weekly.
10. Contaminated soil or snow must be disposed of at an approved waste disposal site.
11. Any spill in excess of 70 litres must be reported immediately through the 24 hour Spill Report Number (709-772-2083) or the Government Services Centre (1-800-563-2444).
12. All self-diked Jeep Tanks must be located at a minimum distance of 500 metres from any major water body.
13. A fuel or oil spill cleanup kit must be kept on site within the protected area to facilitate any cleanup in the event of a spill. This kit must include absorbent pads, loose absorbent

materials such as dried peat, speedy-dry or sawdust, and a container such as an empty drum for recovering the fuel or oil. If there is a bulk fuel storage facility within the protected area, the cleanup kit must include the following list of fuel or oil spill cleanup equipment:

- Fire pump and 100 metres of hose
- Two hand operated fuel pumps
- Six recovery containers such as empty drums
- Four long handled shovels
- Two pick axes
- Ten metres of containment boom
- Twenty-five absorbent pads
- One hundred litres of loose absorbent material.

When any fuel spill occurs, stop the fuel flow immediately. This may entail repairing a leak, pumping out a tank, or shutting off a valve. If fuel or oil is spilled onto soil, diking may be necessary. If fuel or oil enters water, absorbent booms or barriers such as fencing or netting with loose absorbent or straw must be used to contain the spill. If necessary, culverts may be blocked off by earth or wooden barriers to contain the fuel or oil provided the threat of flooding is addressed.

All recovered fuel or oil must be stored in containers. Contaminated soil must be removed and placed in containers for transport and disposal. Extensive soil removal may cause problems such as erosion and the subsequent siltation of water bodies- therefore, the affected area must be backfilled and sloped and revegetated as required by the Department of Environment and Labour.

Recovered fuel or oil should be reused or collected by a waste oil company for recycling. Oily debris and contaminated soils must be disposed of at an approved waste disposal site with the approval of the disposal site owner or operator. Contact must be made with the appropriate regional office of the Department of Environment and Labour before disposal.

6.7 Support Service and Structures

1. Storage of any type of pesticide, chemical or other hazardous material is prohibited within a protected water supply area.
2. Dormitory camps, garages or any other structures are prohibited within a protected water supply area.
3. The establishment of new sawmills is not permitted in protected water supply areas.
4. Wherever possible toilet facilities must be provided in all work areas.
5. Garbage cans must be located in all work areas and garbage is to be collected regularly and disposed of at an approved waste disposal site outside the protected area.

6.8 Silviculture

1. Chemicals are to be used within a protected water supply area only under the approval of the Division of Water Resources.
2. Scarification must be minimized and restricted to the trench or spot types.
3. If scarification leads to erosion or sedimentation of small streams or water bodies, scarification operations must be suspended and remedial measures must be taken.

6.9 Abandonment

When forestry operations in a protected water supply area have been completed, an abandonment plan for the area should be developed. This will involve input from the Newfoundland Forest Service, the Community involved, and the Water Resources Management Division of the Department of Environment and Labour. In general, the purpose of the plan is:

- (i) to ensure that the post-harvest conditions do not lead to water quality impairment, and
- (ii) to discourage activities or use of the area that could lead to water quality impairment.

An important question will be whether access roads will remain open. This will be decided on a case-by-case basis in consultation with the municipality, Water Resources Management Division and the operator. Issues such as the rehabilitation of cutover areas, landing sites, skid trails, and the abandonment of roads are to be discussed during the consultation process to control post-harvesting environmental impacts and activities.

The following are recommended precautionary measures if roads are to be closed to control post-harvesting access to the area:

Use water bars (trenches 8-10" deep dug across the road) to intercept and deflect surface roadside ditches rather than have it flow into a water body. Water bars can be placed 500 metres apart in gentle to moderate terrain (up to 10% slope), but should be no more than 150 metres apart in terrain greater than 10%. In most cases, it is sufficient to limit water bars to one kilometre on each side of a stream crossing.

Roadside ditches should flow into the woods or into stable, vegetation covered areas.

Stable bridge abutments and erosion protection works at crossings need not be removed.

Bridge decking, culverts and other easily removable structures should be transported out of the watershed area.

All disturbed areas of river banks will be stabilized and seeded.

6.10 Monitoring and Inspection

1. Forestry operations approved under Section 10 of the Department of Environment Act will be inspected from time to time by the staff of the Water Resources Management Division to ensure the operator's compliance with the environmental protection guidelines and the terms and conditions of the approvals.
2. In case of an oil spill, the sedimentation of a water body, or any other water quality impairment related issue, the operator might be required by the Department of Environment and Labour to undertake water quality monitoring to assess the extent of the damage and to select appropriate mitigative measures to correct the harmful conditions.
3. Any water quality impairment problem should be reported to the Water Resources Management Division.

7.0 PROCESSING FACILITIES AND SUPPORT SERVICES GUIDELINES.

1. If possible, use previously disturbed sites (e.g., barrow pit).
2. Minimize the size of the area cleared for the establishment of any camp, processing or support structures. Wherever possible, these facilities should not be established within 100 metres of a water body.
3. All sumps containing effluent from a kitchen or washroom facility must be properly treated on a daily basis in compliance with Department of Health regulations.
4. Sewage disposal must be carried out in compliance with the Public Health Act.
5. A permit to occupy is required for Crown Land developments.
6. Facilities will not be located within known sensitive wildlife areas. These areas will be identified by the Wildlife Division.
7. A permit is required for a firearm.

8.0 PLANNING AND MUNICIPAL AREA GUIDELINES

1. Timber harvesting, resource road construction, silviculture, processing facilities, and support services are developments under the Urban and Rural Planning Act. Where these activities occur within a planning area boundary or within 400 metres of a protected road, a development permit is required before any activity takes place.

Consultation with the planning agency (usually municipality, but also the Development Control Unit of the Department of Municipal and Provincial Affairs) is to be made at the planning stage so that regulatory requirements can be made known and taken into account. This should occur

three months before the desired commencement of the development and the permit obtained about one month before the development

APPENDIX V
Summary of dominant strata on the landbase.

