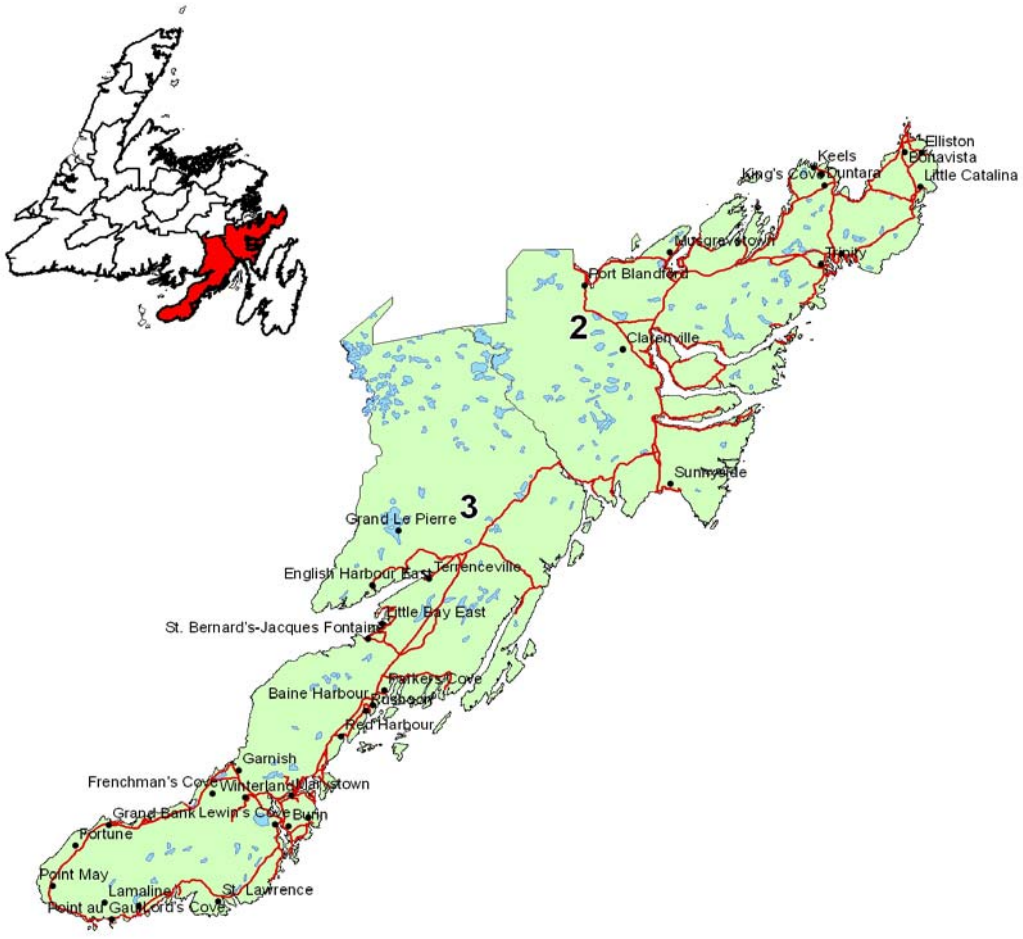
**Crown Five Year Operating Plan**
**Forest Management Districts 02 and 03 (Zone 2)**
**2012 -2016**



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# INTRODUCTION

The Department of Natural Resource's vision, as outlined in the 2003 Provincial Sustainable Forest Management Strategy (PSFMS), is to ensure the long term contribution of our forests to the well being of the citizens of this Province. The 2003 Provincial Sustainable Forest Management Strategy set the direction for moving towards this vision. That Strategy defined forest values and discussed their viability and sustainability within the context of sustainable forest management (SFM). The Newfoundland Forest Service also adopted six guiding principles to support its vision and mission statements and these principles were designed to serve as the foundation for SFM in the province, these guiding principles were;

• Forest ecosystems are to be 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 SFM.

• 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.

Through the Zone 5 submission to Environmental Assessment during the winter 2011, the Department received input from several Environmental Groups and members of the scientific community. Generally these groups and individuals supported the Department's Vision as outlined in the 2003 Forest Research Strategy but, as did the Auditor General, they pointed out that the Department failed to live up to its commitments contained within Strategy and also that the 5-year operating plan was lacking in terms of its scientific support for many of its activities.

The Department accepts these comments and is committed to addressing the concerns of these and other stakeholders on a go forward basis. The Department notes that many of the concerns expressed through the EA process for the zone 5 plan are

provincial in scope and recognizing this, we have decided that these issues will be dealt with in two ways;

1. The Environmental Protection Plan and the Sustainable Forest Management guidelines will be updated. In consultation with various stakeholders these will be reviewed and updated by March 31, 2012. The implementation of these new guidelines will begin immediately.

2. The Department will also now begin the process of revising the 2003 SFM Strategy, in preparation for the 2013 strategy (as required by legislation). The Department will soon engage in meaningful consultations with ENGO's, the academic community, the forest industry and the citizens of this Province, on this plan. We will also seek independent scientific advice on substantive policy issues respecting old growth forests, forest and wildlife habitat management, climate change, social values, and protection of soil and water. The Department believes that many of the elements of this 5 year plan are in line with the values and objectives contained within the 2003 strategy and where values conflict we have included all the necessary protections and mitigations to allow the plan to proceed.

The Department also believes that this plan will not detract in any way from meaningful implementation of new guidelines, policy changes or enhancements that will emerge as a result of its new initiatives planned for the next two years.

This Five Year Operating Plan was developed during the winter / spring 2011 and reflects changes implemented a few years ago regarding legislated planning requirements of the Newfoundland Forest Service. In the past, there were five major planning documents, which include; Provincial Sustainable Forest Management Strategy, District Strategy Document, Five Year Operating Plan, Annual Operating Plan, and Annual Report. The revised planning framework has eliminated the District Strategy Document; however its former contents are now split between the Provincial Sustainable Forest Management Strategy and the Five Year Operating Plan. Discussions that are Provincial in scope such as carbon, global warming and criteria and indicators are now dealt with in the Provincial Sustainable Forest Management Strategy. Discussions that are more descriptive or depict local conditions such as

values, forest characterization and ecosystem description are moved to the Five Year Operating Plan. This plan covers a period of January 01, 2012 to December 31, 2016. Another major change to the planning process is the creation of eight planning zones on the island which are based primarily on ecoregion composition. Districts 02 and 03 are adjacent and share common ecoregion characteristics and collectively form Planning Zone Two. The requirement for submission to the Forestry Services Branch and for environmental assessment is one five year operating plan for each owner in each zone. The past requirement was one five year operating plan by each owner in each district. This zone is comprised entirely of crown land so there will be only one submission by the crown. Throughout this five year plan, references will be made to Districts 02 and 03 individually but when combined they will collectively be referred to as Planning Zone Two or the zone. The planning team for this zone is located in Clarenville. Planning team format and structure will be discussed in a later section.

The planning process for District 02 has been well established through the completion of three previous five year plans. This document, however, represents the first attempt at developing a plan for District 03. It should be noted that the ability to accurately manage the forest ecosystem represented by District 03 is severely limited by the absence of forest inventory data for the area. However, with this in mind the decision has been made to move forward with the planning of domestic cutting blocks, roads, silviculture, and minor commercial harvests for District 03.

This document will try to fully integrate presentation of information and discussion for crown land in the zone, where possible. This will be done by combining statistics and other information from each district and reporting for the zone. However, tables and figures will be constructed such that information for individual districts will be available if a breakout is required. Discussion and information will be presented separately for each district where warranted based on unique and distinct differences in scope and content. The more descriptive sections of this plan will be generic in nature and give information for the entire zone as well as some broad comparative statistics.

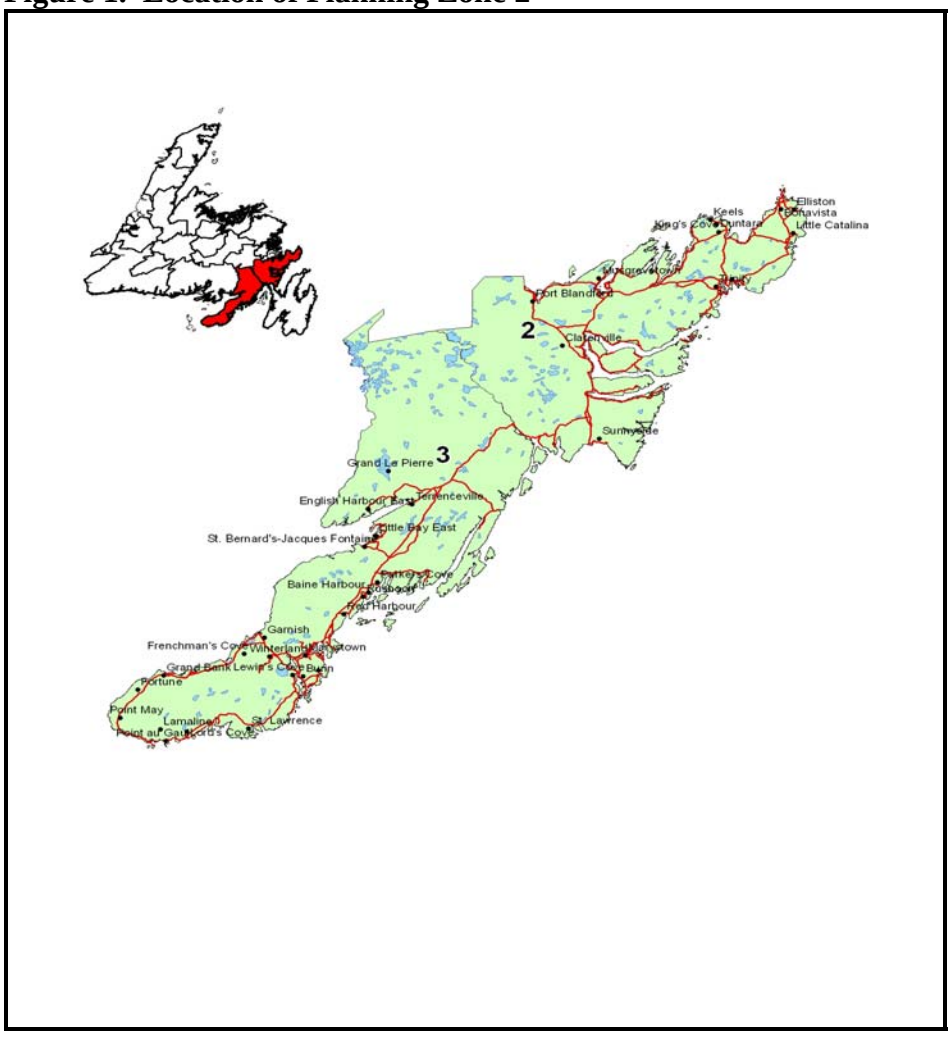
Finally, this document will attempt to build on previous documents and on efforts of previous planning teams. Information will be updated as required or new sections will be added if any new information is available. Sections from previous documents will be included if they are still relevant, even if they were not discussed by the current planning team.

# Section 1: Description of the Land Base

## 1.1. General

Planning Zone Two encompasses Forest Management Districts 2 and 3 (Figure 1). It is located in eastern Newfoundland and extends from Long Harbour River, Northwest River, and Terra Nova National Park in the west to the Come By Chance in the east and includes all of the Bonavista Peninsula, Burin Peninsula, and all the islands in Placentia Bay. Districts 02 and 03 are administered from Clarenville District office with satellite offices in Southern Bay and Winterland,

**Figure 1. Location of Planning Zone 2**



### 1.1.1. District Boundaries

Forest Management District 2 (FMD2) is known as the Bonavista Peninsula Management District. Its boundaries to the east include all the coastline from Terra Nova National Park to Sunnyside. Its northern boundary follows North West River west to the Bay Du Nord Wilderness Area. Its eastern boundary follows the Pipers Hole River south to Swift Current. The southern boundary basically is a line crossing the isthmus between Come by Chance and Sunnyside. The population of District 2 is 25 290 (census - 2004). The peninsula portion of the District is the most densely populated, with coastal communities scattered around its sheltered bays. Major service centres are located at Clarenville and Bonavista. The southeastern and western (i.e. west of the Trans Canada Highway) portions of the District are remote and unpopulated. FMD 2 has a total gross area of 474 759 hectares, and a total productive forest area of approximately 179 288 hectares.

Forest Management District 3 (FMD3) is known as the Burin Peninsula Management District. It is bounded in the east by the Long Harbour River and to the north by Pipers Hole River which flow southeast to Swift Current. Its boundaries include all the coastline from Swift Current to Long Harbour encompassing all of the Burin Peninsula and all the islands in Placentia Bay. The population of the District is 20 962. The southern end of the peninsula is the most densely populated, with communities scattered around the coast. Major service centres are located at Marystown and Grand Bank. The northern portions of the District are remote and encompass a large portion of the Bay Du Nord Wilderness Area. FMD 3 has a total gross area of 684 807 hectares.

The boundaries for these districts were originally proclaimed in Newfoundland Regulation 72/79 and filed on May 18, 1979 and revised under Consolidated Newfoundland Regulation 777/96 .

### 1.1.2 History

Typical of most rural Newfoundland regions, the economy was traditionally largely dependent on harvesting and primary processing of natural resources. Fishing and forestry have long been major contributors to local employment. The down-turn in the

fishery caused by the crash of the northern cod stocks has had a dramatic impact on the economy in the region and has contributed to out-migration of young families from the area. Local wood supplies are currently well below the productive capacity of the forest due to past damage by high populations of forest insects and mismanagement. There is strong anecdotal information that suggests that Government historically failed to adequately regulate harvest quotas. There is also abundant evidence of past wasteful logging practices found throughout the District. Illegal over-harvest and poor utilization practices have been serious concerns in the past and have received the highest priority within the District's compliance program. There is evidence, however, that these negative activities are on the decline. In addition, certain aspects of this industry appear to be strengthening due to modernization, accessing outside fibre supplies, and diversifying into higher valued end products. The Bonavista Peninsula has one of the more active and successful agricultural communities in the Province. Tourism has been a growth industry in the region as well.

### 1.1.3 Ownerships

The entire land area located in Planning Zone Two is currently managed by the crown.

## 1.2 Physical Features

The following descriptions apply only to the FMD2.

### 1.2.1 Topography and Physiography

The predominant physical feature throughout the District is rolling topography. Coastal hills dominate the landscape from Bull Arm north to Trinity and then strike north across the peninsula to Keels. The elevations of the hills on the peninsula are within a range of 150-250 metres above sea level, with the highest peak reaching 260 metres. The highest hills in the District are to the west of Clarenville and strike southwest to Swift Current. These hills reach elevations of up to 400 metres. Coastal relief is generally greater than that which occurs in the interior of the peninsula.

A relatively narrow plain is located in a transverse across the peninsula between Elliot's Cove and Goose Bay. This plain is underlain by Cambro Ordovician shales and contains most of the land within the District which is best suited for agricultural development.

A narrow swath of rolling topography runs parallel and to the south of the Trans Canada Highway between Port Blandford and Clarenville. West of this land form, the District spreads out to its western boundary in an expansive plateau of barren land and bog, with very intermittent forests occurring in narrow riparian areas and on valley slopes. Many small ponds are interspersed throughout this plateau and the eastern half of the peninsula.

### 1.2.2 Quaternary Geology

Carbon aging indicates that it has been approximately 7400 years since the last glaciation occurred on the Bonavista Peninsula. The direction of ice flow was from west to east in the northern part of the District and from west/northwest to east/southeasterly in the southern portion. Glaciation was responsible for the rolling topography prevalent in much of the District and for the glacial deposits in some of the regions valleys. Climatic change caused a relatively rapid retreat of ice flows and the unstratified deposition of glacial till. Retreat of a later glacial advance during this period caused some out wash deposits to form. Out wash material (in the form of sand and gravel deposits) is present in various locations throughout the District. These deposits have been identified in the South West and North West Arm areas; west of Georges Brook; west of Lethbridge; in the Plate Cove area; south of the Northwest River and south of the Southwest River.

### 1.2.3 Bedrock Geology

The type of rock, or parent material, underlying our forest soils is fundamental in the development of those soils. Some rock types, such as shales and slates, have many mineral elements which are essential to plant growth, and through geological time, become readily available. Generally, soils which form on parent material deriving from these type of rock group are fertile and can support favourable forestry/agricultural

development. Geologic groups forming from igneous processes, such as granite, have far less inherent trace elements and generally lead to the development of soils in which fertility is a more limiting factor to plant growth.

The geologic groups located on the Bonavista Peninsula are described in the soils report for that region by Heringa and Woodrow (1991). The peninsula contains the following geologic groups: Musgravetown, Adeytown, Connecting Point, Love Cove, Harcourt, and Granite Rocks. Brief descriptions of these groups are provided below.

*Musgravetown Group:* The rocks are chiefly red and green coarse grained conglomerates, greywackes, arkose, and acidic to basic lavas of relatively shallow water origin. Near Musgravetown and Canning's Cove, the soils have developed on a thick sequence of greenish conglomerates overlain by reddish conglomerate. Sandstone is interbedded with the conglomerate. The material in the red conglomerate is often rounded, poorly sorted, with fragments from sand size to 15 cm cobbles. The Ball Formation overlies the Canning's Cove formation west of Musgravetown as acidic and some basic lavas and pyroclastic rocks; other formations contain sandstone and red pebble conglomerate, shale, some lava and tuff.

*Adeytown Group:* A sequence of red, green, and grey shales and slates with interbedded pink, green and grey limestone, some lime nodules, some white calcareous sandstone and a granule sandstone with carbonate cement. Also prominent beds of red massive limestone may be present interbedded with red shale and shell fragments.

*Connecting Point Group:* The rocks consist largely of black and grey slates, sandy and silty greywackes, with minor conglomerates or lavas and no carbonate rocks. Argillaceous slates are common with argillites, and thin beds of siltstone. Also present are greenish grey cherty quartzites, red quartzite and conglomerates.

*Love Cove Group:* Rocks of this formation occur only in the northwest and southwest corners of the map sheet. They include a wide variety of sedimentary and volcanic rocks interbedded with each other. In the southwest they include many chlorite schists,

metamorphosed basic to acidic rocks, sandstones and conglomerates; in the northwest: feldspathized and granitized chlorite schists of metamorphosed acidic and basic rocks, sandstones and conglomerates occur. Individual bands or beds are generally less than 15 metres thick, thus many rocks types can be observed within a short distance, and in areas of scattered outcrops each outcrop is generally different from those near it.

*Harcourt Group:* A succession of alternating dark grey and black shales, silty shales, siltstone and some limestone. Numerous beds of grey siltstone are generally present and also black limestone nodules and beds with micaceous and other siltstone. Fossils may be found in thin black shale.

*Granitic Rocks:* Granite and granitic rocks occur in two small areas near the northwestern and southwestern margins of the map area. They are part of the Ackley batholith, which extends from Fortune Bay northeastward to the north side of Bonavista Bay and probably as far as Fogo Island northeast of the Island of Newfoundland. It consists mainly of an orange-pink to light red coarse grained porphyritic biotite granite. Orange-pink feldspar is generally the dominant mineral in the granite, but buff coloured sodic plagioclase is commonly present in amounts exceeding 15 percent. Small bodies of orange-red, medium-grained granite occur near Clarenville.

### 1.2.4 Soils

Soils develop over a long period of time and are influenced by the underlying parent material, topography, ground water, climate and living organisms (including plants, micro-organisms, animals and man). The soils on the Bonavista Peninsula began forming after the last glacial retreat nearly 8000 years ago and are considered to be mature. Mature soils show well defined horizontal layers with varying mixtures of organic and mineral soil materials. The percentage of organic material in the horizons generally decreases with depth.

Under the Canadian System of Soil Classification, Management District 2 has representation of three Orders of soil, podzolic, gleysolic and organic. Each order represents soils that developed as a result of similar environmental influences.

Soils of the Podzolic Order are acidic, well to imperfectly drained and developed under coniferous or mixed forest or heath in cold climates. Well formed surface litter or organic layers (L-H) are a common characteristic of soils in this Order. Beneath the surface horizon, there is usually a mixed organic ( Ah ) layer which may be leached (Ae) and of lighter appearance. Beneath that there is a Podzolic B horizon, which has a lesser amount of organic material combined with varying degrees of iron and aluminum. Podzols on the Bonavista Peninsula can be further sub-divided into Ferro-Humic and Humo-Ferric Great Groups.

Soils of the Gleysolic Order develop under hydrophytic (water-loving) vegetation and are usually saturated with water. Soils in this Order may have a deep organic surface layer and dull coloured A and B horizons. These lower horizons often show mottling which results from a fluctuating water table. The only Great Group recorded on the Peninsula is the Gleysol.

Organic soils develop from organic deposits and contain greater than 30% organic matter and 17% organic carbon. These soils are usually saturated with water for a large part of the year.

Detailed soils maps for the Bonavista Peninsula are available in a report titled Soils of the Bonavista Peninsula (Heringa, P.K. and E.F. Woodrow, 1991).

The underlying parent material has a significant role in the soil forming process. It is one of the key factors which influence the fertility of soils. The presence of shale parent material under many of the soils on the Bonavista Peninsula has helped build nutrient rich forest soils. As a result, many sites in this area are highly suitable for the development of productive forest or for agricultural development.

### 1.2.5 Climate

District 2 is located in the southeastern region of the province and lies generally between the $54^0$35' and $53^0$00' longitude and $47^0$40' and $48^0$45' latitude . Bordering the

Atlantic Ocean on the eastern extremity, its climate is largely influenced by maritime conditions. Seasonal temperatures are moderated by this influence, yet conditions during certain seasons, especially the beginning of the growing season, can be harsh due to the cooling effect from the ice laden Labrador Current.

The average mean daily February temperature in the District ranges from -5 $^0$C to -8 $^0$C with the minimum being -14$^0$C. The average mean daily July temperature ranges from $^+$13 $^0$C to +16$^0$C with the maximum being + 22 $^0$C.The growing season in the District ranges between 140 and 160 days. Average precipitation ranges from 900mm - 1300mm and average snowfall ranges from 2.5 to 3.5m.

### 1.3 Ecosystems

An ecosystem is a community of interacting and interdependent plants, animals and microorganisms, together with the physical environment within which they exist. It is important to remember that within an ecosystem, the interactions between the biotic and abiotic components are at least as important as the component themselves. Another critical characteristic of ecosystems is their overlapping boundaries. While each is definable in time and space, and distinguishable from adjacent ecosystems, each is intimately integrated with other local ecosystems. Additionally, each local ecosystem is nested within increasingly larger ecosystems. The scale at which an ecosystem is viewed is contingent on the species or abiotic characteristic under consideration. While planet Earth represents the ultimate global ecosystem, complex ecosystems also exist under fallen logs and rocks.

#### 1.3.1 The Forest Ecosystem

A forest ecosystem, as the term implies, is an ecosystem dominated by tree cover. At the coarsest level, the forests of Planning Zone Two, like all forests on the island, form part of the boreal forest ecosystem. The boreal forest is a green belt which spans much of the northern hemisphere. It stretches from the Atlantic shores of Scandinavia through Russia, across Alaska, through the mid latitudes of Canada until it reaches the Atlantic Ocean again in Newfoundland and Labrador. One of the distinguishing characteristics of the boreal forest is the phenomena of periodic, catastrophic stand replacement natural

disturbances such as fire and insect outbreaks which typically give rise to uniform, even aged forests dominated by a few tree species.

Similar to much of insular Newfoundland, the landscape in District 2 consist of a mosaic of barren, forest, and wetland. There are two types of barren (or heath) common to this area, including Kalmia (sheep laurel) and Empetrum(crowberry). Kalmia heath is the most prevalent throughout the District. The western portion of the District is dominated by heath barrens.

The morainal areas of the District, which occur primarily on the peninsula, support closed conifer stands comprised mostly of Black Spruce (Picea mariana(Mill.)B.S.P. and Balsam Fir (Abies balsamea(L.) Mill) with White Spruce (Picea glauca (Moench) Voss) and Tamarack (Larix Laricina (Du Roi) K. Koch) occurring in pockets or as individual stems throughout the forest. Broadleaf trees, such as White Birch (Betula papyrifera Marsh.) occur sporadically in pure stands throughout the District and occur somewhat more commonly, similar to Trembling Aspen (Populus tremuloides Michx.), in mixed composition forest in association with other softwood species. White Pine (Pinus strobus L.) occur in isolated pockets of individual trees scattered through the northwestern portion of the District.

Wetlands are a common part of the landscape, but increase in predominance intermixed with barrens in the western portion of the District. Generally wetlands are considered to be those land areas that have a water table at, near or above the soil surface for a major portion of the year (Meades, S.J. 1990). Wetlands contain far greater biodiversity than other parts of the landscape, are very sensitive to heavy disturbance and deserve special protection from forestry or other types of heavy developments. The Canadian Wetland Classification System was used to classify the five classes of wetland in this area, including bog, fen, marsh, swamp and shallow water.

### 1.3.2 Ecoregions and Subregions

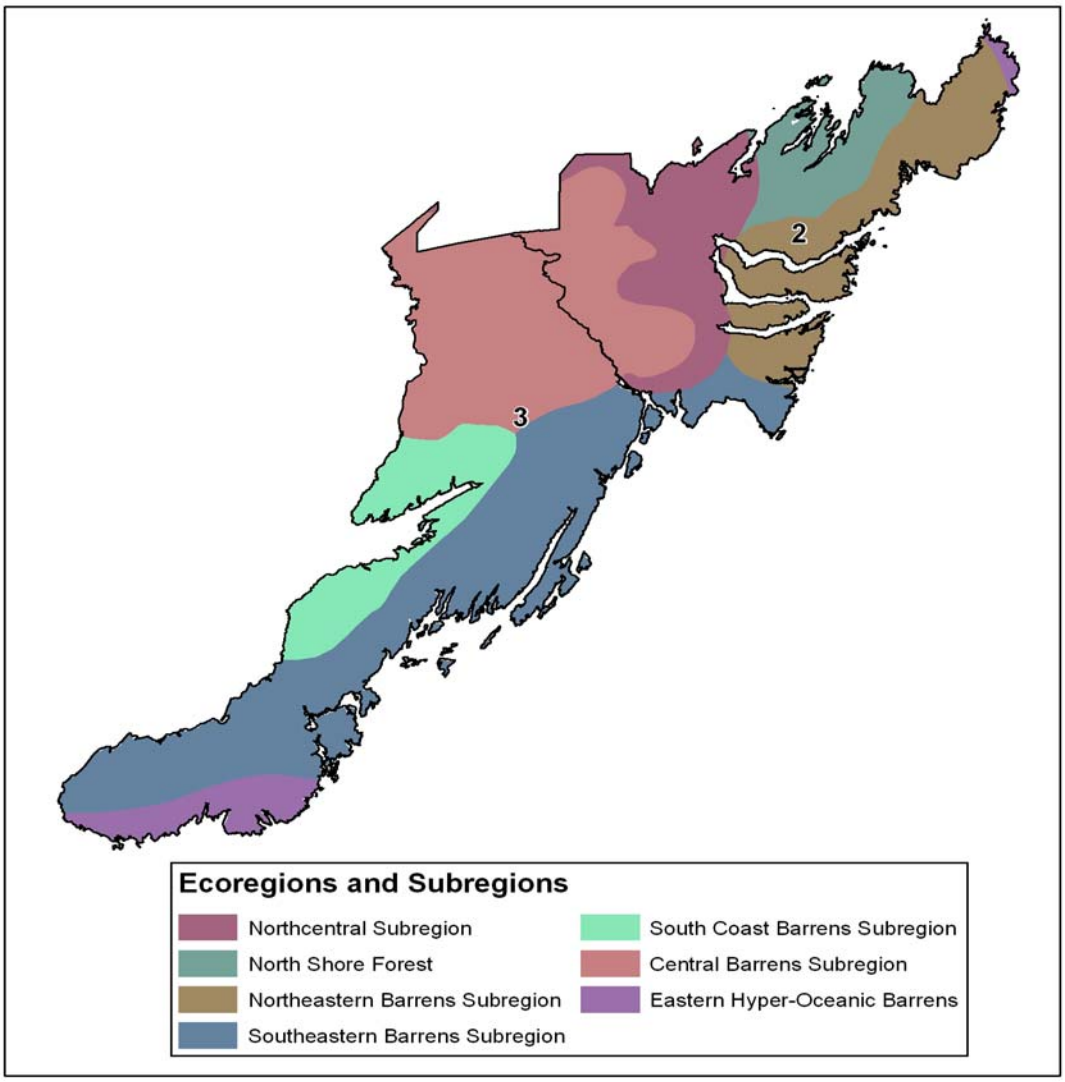
Damman 1979, defined ecoregions as areas where comparable vegetation and soil can be found on sites occupying similar topographic positions on the same parent material, provided that these sites have experienced a similar history of disturbance. Thus, an ecoregion cannot be defined in isolation from the physical landscape, but vegetation toposequence, vegetation structure, floristic composition, and floristic distributions can provide the primary criteria. According to Damman, nine ecoregions are represented in Newfoundland. Each of these is further divided into subregions (also known as ecodistricts) All of the Newfoundland ecoregions and subregions contain many of the same ecosystem variables. It is the dominance and variance of these variables (e.g., vegetation and climate) that determine their classification.

Figure 2 depicts FMD2 relative to Damman's ecoregion classification system. FMD2 is located in a transition zone between central ecoregions, which have been influenced by interior continental-like climatic conditions, and eastern ecoregions, which have a greater coastal climate influence. Also, the Bonavista Peninsula has a unique geological setting which has helped mold the ecosystem structure present there today - it has a much greater occurrence of shale and slate then is common in most of Newfoundland. As a result of the gradient climatical change as you move eastward through this District and the somewhat unique geological setting, three major ecoregions intersect on the Bonavista Peninsula (see figure 2.14) and actually come to an apex. These include the Central Newfoundland Ecoregion, the North Shore Ecoregion and the Maritime Barrens Ecoregion.

There are portions of two subregions of the Maritime Barrens Ecoregion located in FMD2, including the Northeast Barrens Subregion and the Central Barrens Subregion. In addition, the Eastern Hyper - Oceanic Barrens Ecoregion crosses the northeastern tip of the peninsula. Due to its strategic geographical positioning and the influences of climatic, geological and glacial factors, FMD2 has a diverse ecological setting with a corresponding natural diversity of plant and animal communities.

The major features of the ecoregions and subregions found in FMD2 are briefly described in this section. The following descriptions are taken from *Forest Site Classification Manual - A Field Guide to the Damman Forest Site Types of Newfoundland* (Meades and Moores, 1994).

**Figure 2. Ecoregions and subregions of Forest Management District 2**



### 1.3.2.1 Central Newfoundland Ecoregion

The Central Newfoundland Ecoregion has the most continental climate in insular Newfoundland. It has the highest summer and lowest winter temperatures. Because of the warm summers and the high evapo-transpiration losses, soils in the northern section of this ecoregion have a soil moisture deficiency. The *Hylocomium*-Balsam fir forest type occupies the zonal soils of this area. These soils are generally lighter in color and have a lower organic matter content compared to other ecoregions.

Forest fires have had an important role in the natural history of this region. Many sites have been converted to black spruce, while some of the richer sites are occupied by white birch and trembling aspen.

The Central Newfoundland Ecoregion has four subregions: IIA - Northcentral Subregion; IIB - Red Indian Lake Subregion; IIC - Portage Pond Subregion; IID - Twillick Steady Subregion. Of these, only the Northcentral Subregion is found in FMD2.

*Northcentral Subregion*

This subregion stretches from Clarenville in the east to Deer Lake in the west. It dissects District 2, forming a swath from Clode Sound on the northern boundary through the center of the District to Southwest Arm in the south, separating the interior barrens from the coastal ecoregions, and then swinging west to Piper's Hole River. The North Central Forest Subregionhas higher summer temperatures, less rainfall and a greater occurrence of fire than any other region of insular Newfoundland. Pure Black Spruce forest dominates this area because of the prevalence of fire in the natural history of the ecoregion. Due to the low moisture levels, the coarse texture of the soils and the predominance of the Black Spruce forest type, this subregion is particularly susceptible to regeneration

### 1.3.2.2 North Shore Forest Ecoregion

The North Shore Forest Ecoregion does not have any subregions. It forms a coastal band approximately 20-25 kilometres wide extending from the Bonavista

Peninsula in the east to the Baie Verte Peninsula in the west. The North Shore Forest Ecoregion occupies the northern half of the Bonavista Peninsula, bounded by the North Eastern Barrens Subregion in the south and the North Central Forest Subregion in the west. Black Spruce and Balsam Fir forest form a continuous forest except where barrens dominate on coastal headlands. The vegetation growing season is shorter and cooler than in the central part of the island, but it also has a frost free season which is several weeks longer. The summers are relatively dry and warm and soil moisture deficiencies may occur. Similar to the Central Newfoundland Forest Ecoregion, encroachment of ericaceous shrubs on drier nutrient poor sites after fire or cutting disturbance is common and presents a serious silvicultural problem. This problem is more prevalent after cutting.

#### 1.3.2.3 Eastern Hyper-Oceanic Barrens Forest Ecoregion

The Eastern Hyper Oceanic Barrens Ecoregion occurs on the extreme south coast of the Avalon and Burin Peninsulas and in the Bay de Verde, Cape Freels and Bonavista areas. In District 2, the Eastern Hyper Oceanic Barrens Ecoregion is located on the very tip of the Bonavista Peninsula. Although at low elevation, this ecoregion has very cool summers due to the oceanic influence. The landscape is dominated by exposed coastal barren and blanket bogs and is completely without forest cover, except for Balsam Fir krummholz (ie. tuckamoor or low wind-swept scrub) (Figure 2.20). Arctic-alpine species occur even at sea level and are mixed with species common to southern coastal plain. This is a very unique ecological aspect of the oceanic barrens.

#### 1.3.2.4 Maritime Barrens Forest Ecoregion

The Maritime Barrens Ecoregion extends from the eastern Peninsulas westward through south-central Newfoundland to Port-aux-Basques. It is divided into four subregions, two of which are partially located in FMD2. The Maritime Barrens Ecoregion is characterized by cool, foggy and windy summers and relatively mild winters. Intermittent snow cover is common within the coastal portions of this ecoregion but increases in accumulation and duration in the interior barrens. The landscape pattern is one of almost pure Balsam Fir interspersed throughout extensive open heath-land. Productivity of the forest is better on long slopes which occur in infrequent valleys. A

natural history of frequent wildfire occurrence in much of this ecoregion has had a significant influence in the development of this largely heath-covered landscape.

*Northeastern Barrens Subregion*

The North Eastern Barrens Subregion occupy the eastern third of the District. It is, generally speaking, that area east/southeast of a line running from Knights Cove southwest to Harcourt; and then south along the western end of Random Island and the bottoms of Northwest Arm and Southwest Arm to Queen's Cove, and then southwest to Swift Current. This subregion has a lower frequency of fog and warmer summers than the other subregions of the Maritime Barrens Ecoregion, except for the Central Barrens Subregion. Portions of the landscape are, in fact, heavily forested - but these portions are interspersed throughout large expanses of soil/rock barrens, softwood scrub forest and local heath vegetation, usually along the coast. Balsam fir is the predominant tree species that occurs in the North Eastern Barrens Subregion. Natural regeneration of forests usually occurs after natural or cutting disturbance in this subregion. Fire is less prevalent than in other parts of the District. Natural forest succession usually occurs as a result of stand replacement insect or wind disturbances.

*Central Barrens Subregion*

This area occurs south of the Central Newfoundland Forest Ecoregion and north of the South Coast Barrens Subregion. In FMD2, the Central Barrens Subregion extends from the Northwest River south to Black River Pond in a strip of land bounded by the district boundary on the west and the Central Newfoundland Forest Ecoregion on the east. This subregion has warmer summers, less fog and more persistent snow cover then the other subregions in the Maritime Barrens Ecoregion. Forest patches, predominately composed of Balsam Fir Forest, are common throughout the barrens. Fire has played a significant role in the development of the ecology of the Central Barrens Subregion. Within FMD2, this subregion is unique in that it provides the eastern range for the Middle Ridge caribou herd.

## 1.4 Ecosystem Dynamics

### 1.4.1 Ecosystem Condition

As with other parts of the Newfoundland's boreal forest, those of FMD2 have evolved in concert with a history of fire, insect attack and subsequent disease and wind throw. Human intervention in this forest has been extensive and widespread with a resultant significant impact on current landscape patterns. Landscape patterns determine the variety, integrity, and interconnectedness of habitats within a region. These landscape patterns are a direct result of the relationship between physical landforms and soils, disturbance history, and relationships among various species that makeup the ecosystem communities. These factors, while listed separately for clarity, are unavoidably interrelated. Landscape patterns play a pivotal role in determining the current conditions and health of forest ecosystems. These variables are evaluated in terms of productivity, stability and resilience.

Another important role determining the condition of a forest is change. Forests are an ever evolving entity, resisting stagnation, and constantly moving through their cycles of life, death, and renewal. The process of change over time is the essence of nature itself. It has been nature's underlying storyline since time began, and will continue to be until time ends. The main forces of change in our natural forest ecosystems are disturbance and succession. A definition of disturbance would indicate that it initiates a change in a community structure which often ends up in the replacement of one set of species by another. However, replacement is not always the end result (e.g., a species like black spruce is aided in germination by disturbances like forest fire). Disturbances range from the fall of a single tree, to the destruction of thousands of hectares by forest fires. While disturbances may be very destructive, they can often rejuvenate ecosystems and diversify landscapes. Succession involves changes in both community composition and in the ecosystem structure and process. Succession is the orderly change whereby the dominant species is replaced by another species, then another etc. until a new dominant species establishes a relatively stable community.

The following sections will discuss each of these concepts in more detail as they relate to the ecosystems of FMD2. For the most part this section will be descriptive and explanatory in nature. Specific examples of strategies and linkages to the Provincial Sustainable Forest Management Strategy will be detailed in subsequent sections.

#### 1.4.1.1 Productivity

Productivity is the accrual of matter and energy in biomass. In simple terms, primary productivity is the sum total of all biomass produced through photosynthesis. Secondary productivity occurs when this "primary" biomass is ingested and is added to that organism's biomass. Since secondary productivity is directly dependant on primary productivity, it is this primary productivity component that drives the system. The level of primary production is dependant on the ability to produce biomass. This in turn is dependent on landscape features, soil, climate etc. In general terms, the more productive (ability to grow trees) a site is, the higher level of primary productivity. For example a forested stand would have a higher primary productivity than a bog or a good site would have a higher potential than a poor site. An example of secondary productivity is the number of moose per unit area.

In practice, it is nearly impossible to measure the amount of biomass produced in an ecosystem, or the energy consumed in the process. However, in the Provincial Sustainable Forest Management Strategy, criteria and indicators to monitor productivity have been identified. One method outlined is tracking mean annual increment in m3/ha/yr of tree species by ecoregion. This can be readily measured over time and manipulated through silviculture treatments or affected by poor harvesting practices which increase soil compaction. One must also recognize the forests inherent biological limits however, when attempting to measure or manipulate site productivity.

Overall, the landscape in FMD2 has approximately 37 percent productive forest. As well, the relative proportion of site types is 2 percent good, 73 percent medium and 25 percent poor with a mean annual increment (MAI) of 2.6, 1.7, and, 0.8 m3/ha/yr respectively.

This distribution of productive sites across the landscape and range of productivity within these sites is largely dependent on landscape patterns, climate, and soils. The more productive areas of FMD2 occurs in the lowlands of the river valleys. These areas have deeper soils and less exposed bedrock. The landscape patterns are more consistent and the growing season is longer. In contrast, the eastern parts of FMD2 along the coast have soils are shallower with bedrock at or near the surface. The terrain in eastern parts is much rougher and the growing season is shorter.

#### 1.4.1.2 Resilience

Ecosystem resilience reflects the ability of the ecosystem to absorb change and disturbance while maintaining the same productive capacity and the same relationships among populations. Healthy forest ecosystems maintain their resilience and adapt to periodic disturbances. The renewal of boreal forest ecosystems often depend on these disturbances. Resilience is characterized by the forest's ability to stabilize vital soil processes and maintain succession whereby the system is returned to a community composition and the productivity level is consistent with the ecosystems physical constraints. To a large degree, a forest ecosystems' resilience is controlled by properties such as climate, parent soil, relief and flora. The potential for populations to recover from low levels following disturbance by having adequate regeneration capacity and a balanced distribution of forest types and age classes provides a reliable measure of resilience at the landscape level. Other measures include the percent and extent of area by forest type and age class and the percentage of disturbed areas that are successfully regenerated. Resilience is determined by measuring and monitoring these parameters.

Forest activities must be carefully planned to not upset the natural balance and lower an ecosystem's resilience. An example is harvesting on the more fragile sites where steep slopes and shallow soil over bedrock increase the potential of site degradation beyond repair.

#### 1.4.1.3 Stability

Nature is constantly changing and going through the unending processes of disturbance, growth, senescence, and decay. Therefore, stability of a forest ecosystem does not refer to one fixed position without variation. Ecosystem stability is more accurately defined as the maintenance of ecosystem changes within certain boundaries and the functional continuation of important potentials and processes such as energy capture. There are three levels of stability; species stability, structural stability, and process stability.

Species stability is the maintenance of viable populations or meta-populations of individual species. Structural stability is the stability of various aspects of ecosystem structure such as food web organization or species numbers. Process stability is the stability of processes such as primary productivity and nutrient cycling. To put stability in perspective, it must ensure that the system does not cross some threshold from which recovery to a former state is either impossible, (extinction) or occurs only after long time periods or with outside inputs (loss of topsoil) Some indicators of stability which can be monitored are: area of forest converted to non-forest use, area, percentage and representation of forest types in protected areas, percentage and extent of area by forest type and age class, and change and distribution and abundance of various fauna. These indicators can be measured and monitored to ensure stability is maintained and to evaluate the impact, if any, of forest activities on ecosystem stability.

#### 1.4.1.4 Disturbance Regimes and Successional Patterns

There are four main driving forces that cause disturbance in the boreal forest. Harvesting accounts for the majority of disturbance in the zone and occurs on a regular and consistent basis. Fire and insect damage are the other two major disturbances and occur on a more irregular or cyclic basis. With the exception of a major atypical windstorm, wind throw usually occurs after a stand is weakened by some other agent like insects and/or disease. For this reason success ional patterns after insect damage and wind throw will be discussed together. The following is a brief synopsis of the typical successional patterns that occur in the zone after each major disturbance type.

#### 1.4.1.4.1 Harvesting

Regeneration patterns in the black spruce type after harvesting is generally back to the black spruce type with a minor component of balsam fir and some white birch on the better sites. There is a higher regeneration failure in this forest type with average not sufficiently restocked (NSR) rates at 25-30 percent across all ecoregion and site types. Another general trend is that the poorer the site quality the higher the NSR rate. These sites would be candidates for planting with black spruce or red and/or white pine. In some instances where balsam fir does regenerate on black spruce sites it becomes very chlorotic at a young age and is highly susceptible to attack from the balsam woolly adelgid. It therefore has not been considered as acceptable softwood regeneration species on these sites, and planting has become the norm.

In the balsam fir types, regeneration failure is much lower than the black spruce types averaging 15-20 percent across all ecoregion and site types. The majority of these sites will regenerate back to balsam fir after harvesting. There is also some regeneration of these sites to mixed balsam fir/black spruce and/or mixed softwood/ hardwood types. Regeneration pattern in the mixed wood types is generally back to mixed wood that is dominated by white birch and balsam fir with a minor spruce component. There is a higher component of white birch regeneration after harvesting in types that had a higher percentage of hardwood (hS) before harvest. Generally, the better the site class the more hardwood regeneration. Regeneration failure on the mixed wood types is highest in poor sites and lowest on the better sites averaging 10-15 percent.

There are two main white birch site types in the zone. The basic difference between them is terrain which impacts site quality. The G and H white birch sites are typically located on sloped terrain resulting in continual ground water movement or seepage slopes. These sites are prone to revert to alder dominated NSR sites in the absence of very hot ground fire as the disturbance mechanism. Consequently the management prescription to ensure productivity on these valuable sites is to plant fast growing softwood species. The medium white birch sites are typically on more level terrain and will revert to white birch /balsam fir or white birch/black spruce after disturbance. Regeneration failure on these

sites is low (10 percent). The management prescription to regenerate these site to white birch is to remove the overmature birch in a seed tree cut to provide a seed source for the next rotation of birch.

Harvesting of white birch in this zone has traditionally been for firewood purposes Recently, however, some of the harvest occurring has been directed to sawmilling with the development of a value added hardwood industry, which will place added pressure on the white birch resource in the zone. Evidence from domestic cutting in these types indicates that they will regenerate to mixed wood types dominated by balsam fir and white birch.

#### 1.4.1.4.2 Fire

Since black spruce is a fire adapted species, it is not surprising that it is the most prolific regeneration species after fire across all forest types, site types and ecoregions within the zone. It regenerates as pure stands or in combination with white birch. Balsam fir is conspicuously absent after fire because most advanced regeneration in the under story is killed by the fire. Black spruce regeneration is somewhat correlated with the amount present in the pre fire stand. Generally, the higher the component of black spruce in the original stand, the higher the percentage of regeneration to black spruce. In mixed wood stands a higher component of white birch and sometimes trembling aspen is present after fire.

Regeneration after fire in white birch dominated stands is typically back to white birch, but can also include a black spruce component. Regeneration failure after fire is on average 20-25 percent across all forest types, typically being higher as sites get poorer and ground fire temperatures decrease. Generally, the poorer site types will revert to Kalmia dominated NSR and require planting to ensure adequate regeneration. When ground fire temperatures are lower, less of the humas layer is removed and regeneration failure increases due to lack of adequate seed bed.

#### 1.4.1.4.3 Insect

Balsam fir is highly susceptible to insect attack from the hemlock looper, balsam woolly adelgid, balsam fir sawfly, and spruce budworm, whereas black spruce is hardly impacted by these insects. For this reason, stands with a high component of balsam fir are more susceptible to insect attack and subsequently wind throw. Mature balsam fir types usually regenerate to balsam fir or to balsam fir hardwood mixtures.

In recent history, however, many insect killed fir stands have reverted to NSR due to the high browse rate on fir regeneration by moose in the zone. Disturbance by insect kill in young balsam fir stands can also cause succession to white spruce. Regeneration patterns in mixed wood types usually depend on the type of mixture. If black spruce is a component then it will persist and form part of the new stand. Otherwise balsam fir and balsam fir/hardwood mixtures regenerate after insect attack. Regeneration failure of fir sites after insect attack is low and only occurs approximately 15 percent of the time. Regeneration failure mostly occurs on sites where the immature balsam fir regeneration is killed by either insect attack as well, or over browsing by moose.

### 1.4.2 Biodiversity

Biodiversity is a term used to describe the variety of life on earth. A basic definition of biodiversity includes the variety of animals, plants and microorganisms that exist on our planet, the genetic variety within these species and the variety of ecosystems they inhabit. Some scientists estimate the total number of species on earth between two and 100 million, however, the best estimate is considered to be within the range of 10-30 million. This is remarkable considering only 1.4 million species have actually been given names. The largest concentration of biodiversity on the planet is found in the tropical areas of developing countries. Small areas of rainforest often contain species that are found nowhere else on earth.

Mishandling even small tracts of land could lead to extinction of several species, one of which may hold the key for the prevention or cure of some disease. While the boreal forest does not have the extent of biodiversity that some of the equatorial regions possess,

Canada does have just over 70,000 species of plants, animals, and micro organisms in its boreal and other forest regions. An equivalent number remain un-described or unreported by science. While the boreal forest has less diversity of large plants than many other forest regions, it has greater biological diversity in some micro organisms. For example, the boreal forest has fewer tree species than the tropical rainforest but 500 times as many mycorrhizal fungi. Despite the large number of organisms contained within the boreal forest, only five percent are actually plants and vertebrates. The other 95 percent remain largely unrecorded and unstudied. As a result, we need to continually be conducting surveys and studies to manage with caution so that species are not inadvertently lost. Biodiversity provides such essential services as climate control, oxygen production, purification of freshwater supplies, carbon dioxide removal from the atmosphere, soil generation, and nutrient cycling for humans. Without the species that provide these processes, humanity would be unable to survive.

There have been several international initiatives during the 1900's directed at developing strategies to protect Earth's biodiversity. Canada signed the United Nations Convention on Biological Diversity in 1992 at the Rio de Janeiro earth summit. All governments at both the federal and provincial level have agreed to meet these objectives through implementation of the 1995 Canadian Biodiversity Strategy: Canada's Response to the Convention on Biodiversity.

The three components of biodiversity are species diversity, genetic diversity, and ecosystem diversity.

#### 1.4.2.1 Species Diversity

Species diversity describes the overall range of species in a given area or ecosystem. Species are groups of animals, plants, and micro organisms capable of producing fertile offspring. An example would be all breeds of domesticated dogs are of the same species, while dogs and cats are members of different species. Species extinction is the most dramatic and recognizable form of reduced biodiversity; habitat loss the most drastic in terms of far reaching effect. The prevention of species extinction is a key factor in the

conservation of biodiversity. Changes in species population levels indicate the potential for serious changes in ecosystem integrity.

In District 02, a number of species appear to be healthy and thriving. For example, there is an abundance of moose. In fact, in some areas of the District (e.g., Lethbridge) there is a high density of moose, to the point where they are causing significant damage to farm crops due to heavy browsing.

Many of the mammalian species found in District 2 have been introduced and some present significant ecological concerns regarding potential impact on biodiversity. In neighbouring Terra Nova National Park for example, only 12 of the 21 terrestrial mammals are endemic (or native) to insular Newfoundland. Some of the concerns associated with introduced species include increased levels of predation and competition; introduction and transmission of disease; disruption of food webs and other ecosystem processes; and homogenization through loss of indigenous (native) biodiversity.

Moose (Alces alces), Snowshoe Hare (Lepus americanus), Red Squirrels (Tamiasciurus hudsonicus), Mink (Mustella vison), and Masked Shrew (Sorex cinereus) are examples of introduced species in District 2. Some of these species have very widespread and noticeable impacts on the ecosystem. For example, the herbivory habits of moose affects the composition and structure of forest understories and of future stand canopies. These altered forest structures will impact on the associations of mammalian and avian fauna at both the stand as well as the landscape level. Other species, such as Coyote (Canis latrans), are recent migrants to the Island, but can still have significant ecological impacts (on predator/prey relationships within the food chain for example).

The silviculture treatment known as pre-commercial thinning (PCT ) is an activity that reduces the number of stems on a site so that the ones remaining will have less competition for sunlight and soil nutrients. The result is faster growth and larger diameters for the remaining trees. When timber management was the focus, PCT treatments left only the species that were preferred for pulpwood or sawlog harvesting. With the shift in management approach, PCT treatments now leave a portion of hardwoods or other softwoods (e.g., Tamarack, and Pine). Leaving a variety of tree species on a site will help to maintain species diversity of both plant and animal life within a forest.

Newfoundland has two native pine species; White Pine (Pinus storbus L.) and Red Pine (Pinus resinosa Ait). White Pine used to be a significant component of the landscape during the early part of the century. It naturally occurred in individual stems or small clumps scattered throughout the landscape. Over-exploitation and disease has reduced its numbers to a fraction of what they used to be Predation of White Pine cones by the introduced red squirrel has been recorded to be as high as 85% (English-1998). This is having further impact on the regeneration success of natural White Pine in insular Newfoundland and, in fact, may be keeping the species in a predator pit. (A predator pit occurs when predation keeps the population level of a species far below the level which the habitat can support. Also, many nutrient poor sites in the Central Newfoundland Ecoregion are ecologically suited to Red Pine. Red Pine occurs naturally in Newfoundland as small pure (ie. Red Pine mono-culture) stands. However, Red Pine is practically non-existent in District 02. In the future, plantations and some naturally regenerating sites will be planted with a proportion of White Pine. Red Pine will be planted on dry nutrient poor sites. This management practice will increase both species and ecosystem diversity in the district.

The most prominent rare animal species for consideration under the forest ecosystem plan is the Newfoundland Marten (*Martes americana atrata*). This weasel-like mammal is currently classed as endangered by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC). The primary concern for maintaining the species is habitat protection and reduction of incidental snaring. Efforts to promote the reestablishment of the marten in eastern Newfoundland are centered around the release of several animals in the Terra Nova National Park ***and portions of the upper Terra Nova River watershed***, introduction of a modified snaring program in areas adjacent to the Park and restricted, or modified cutting regimes to maintain critical habitat structure. The northwestern section of District 02 encompasses part of the marten study area. A small nucleus population of 8 animals were re-introduced in the park during the early 1980's. *Since that time, further re-introductions and ongoing management efforts have seen a significant increase in that population. The Newfoundland Marten population in eastern Newfoundland is now estimated to be in excess of 35 animals.*

### 1.4.2.2 Genetic Diversity

Genetic diversity describes the range of possible genetic characteristics found within and among different species. Hair and eye colour, weight and height, are examples of genetic diversity found in humans. Genetic diversity within species is the foundation of all biodiversity. Assessing genetic diversity does not mean tracking every gene in the zone's forest. Responsible planning should design and implement measures which maintain or enhance viable populations of forest vegetation species and which use the genetic diversity of commercially important species to a maximum benefit. The genetic diversity of commercially important species can also be managed to increase economic benefit from some portions of the landscape while allowing other portions to provide greater social and ecological values. Genetic diversity is the basis by which populations (flora and fauna) can adapt to changing environmental conditions.

Forest activities have the potential to cause major changes in genetic diversity if they are practiced without due regard to the ecosystems. Clear-cutting physically removes large volumes of tree mass from a site. Some sites do not regenerate adequately due to the invasion by an ericaceous shrub known as *Kalmia* or because of some other successional pattern which precludes the reestablishment of forest conditions similar to those which existed prior to harvest. In these situations, reforestation is necessary to reestablish a new forest and to maintain the ecological function of the site. Black Spruce and White Spruce are the predominant species used in planting programs throughout most of the province and this District is no different. Historically, seed for this planting program has been collected from across the landscape in the Central Newfoundland and Northshore ecoregions and are not from genetically manipulated stock. Individual plantations have the potential to contain seedlings from seed sources scattered throughout central and eastern Newfoundland. Therefore, albeit inadvertently, the past planting program in Newfoundland probably increased the gene pool available in its forest on a site specific basis. The practice will continue into the foreseeable future.

However, the genetic improvement of Newfoundland's planting stock has been researched for over 30 years. The early thrust was to identify the fastest growing, straightest, and healthiest individual trees in the wild and either collect seed or clone

them by grafting branch tips. To date, over 850 of these individual trees representing 5 native species are planted in seed orchards located at the Wooddale Provincial Tree Nursery and in Western Newfoundland near Pynn's Brook. These orchards will soon reach seed bearing age. Now, by mating each of these superior trees with another trying to find the parent combinations that produce even faster growing trees, it is hoped that future plantations will grow as much as 20 percent faster than they are currently growing. This would mean that more wood volume would be available in a shorter period of time lessening the demand on natural ecosystems.

Some people argue in favour of selective cutting as a means of sound forest management. The main problem with this approach is that during cutting, the tendency is to take the best trees for use and leave the poorer ones to grow. From a commercial forestry perspective**,** the trees left behind are often genetically inferior to the ones that were selected for harvest. Over time, the trees that develop on the site will have been derived mainly from the poorer quality trees that were left as each selective pass occurred. The result is a forest that does not meet its full productive potential, generally with lower merchantable volumes than naturally developing stands. These situations are more prevalent around communities that have relied heavily on the forest resource for fishing material, home building, fuel, and so on. In essence, selective cutting can be compared to the genetic tree improvement program working in reverse. Instead of favouring desired commercial log characteristics it favours undesirable commercial tree characteristics such as high stem taper, large branches, slow growth rates and stem sweep. It accomplishes this by the repeated action of removing trees with the higher quality logs from an area and leaving the poorer quality trees to reproduce. Over the long term, selective cutting (or high-grading), will reduce the yield of commercial forest products from the forest.

The District 02 management plan must strive to maintain and protect the genetic diversity that exists within its boundaries. This will, in turn, translate into a variety of other benefits for forest users - not only the human element, but for wildlife as well.

### 1.4.2.3 Ecosystem Diversity

Ecosystem diversity describes the range of natural systems found throughout a region, a country, a continent or the planet. Wetlands and grasslands are examples of ecosystems in Canada. A complex and intricate mix of plants, animals, micro organisms and the soil, water, and air they occupy create virtually limitless ecosystems around the world.

A forest interspersed with barrens, marshes, lakes and ponds provide for diversity across the landscape. Each ecoregion in the province should have representative areas protected which displays the diversity where such exists. With this in mind, DNR supports the development of a Proposed Ecological Reserve in FMD 2 as a representative of the Maritime Barrens Ecosystem. These areas can serve as a benchmark from which 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 planning actions must maintain.

Old growth forests are valued for their contributions to society in the sense of heritage, culture, aesthetics, and spirituality. Old-growth forests are best understood within the general context of forest disturbance. Disturbance is ubiquitous in forest ecosystems and may be defined as any relatively discrete event in time that disrupts ecosystems, community or population structure and changes resources, substrate availability, or the physical environment. Disturbances occur over a wide range of spatial and temporal scales and normally interact one with the other to produce the complexity of forest types found across our landscapes. Theoretically, boreal forests not disturbed by fire, insect or wind disturbance for long periods of time will revert to multi-cohort, self-perpetuating, gap-driven forests. When viewed from the perspective of forest-level disturbance, it may be stated that old-growth forests are common in areas not prone to recurrent or periodic stand replacing disturbance from fire, insects or wind. In situations where stand-initiating events are rare, then old-growth will tend to dominate. The disturbance forces which would naturally recycle mature forests are absent and therefore forests will tend to grow to the old-growth stage. Old-growth forests are thus composed entirely of trees which have developed in the absence of stand replacing disturbance. Old-growth fir-spruce

forests will self-perpetuate through small-scale gap dynamics in the absence of large-scale disturbance. Old-growth conditions in the Canadian boreal forest are rare or uncommon. This is understandable given the ubiquity of landscape-level fires and recurrent insect outbreaks.

As well, logging is becoming an increasingly significant disturbance factor in the boreal forests. Wildfire is paramount in controlling the dynamics of the drier, continental boreal forests of western Canada and Alaska. In Newfoundland, fire tends to be important in the forests of central region, characterized by its continental-like climate. The occurrence of old-growth forests on the Island of Newfoundland is unknown. Except for the old-growth research conducted in the upper Main River watershed, empirical definitions of old-growth according to forest types and edaphic conditions are not available. Furthermore, the frequency of natural forest disturbances and their role in shaping landscape level forest composition and structure of the Island's forests are little understood. However, given our general knowledge of the historic occurrence of fire, insect and wind disturbance in Newfoundland's forests, as well as recognition of a century of logging activity across the Island, it is reasonable to assume that primary old-growth forests on the Island are not common. DNR does acknowledge that the older cohorts in the age class structure of a district are important from many ecosystem perspectives. Accordingly, during the 2010 wood supply modeling, the maintenance of 15 % of the overmature cohort (i.e. 81+ years) on the landscape over the forecast horizon was a requirement on a district basis. This will be discussed further in other sections.

Riparian areas are characterized by a transition from aquatic to upland vegetation. The width of a riparian area varies depending on 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 upland areas. Some species are entirely dependant on riparian habitats, while others such as humans, use them for a portion of their life aesthetic and spiritual needs. The long-term stewardship of riparian habitats 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.

#### 1.4.2.4 Mammal and Avian Distributions by Ecoregion

A variety of mammals and birds inhabit the ecoregions in District 02, many of which can often be used as indicators for measuring certain aspects of the criteria and indicators process. Representative species for each of the province's ecoregions are listed in *Natural Regions of Newfoundland and Labrador (Susan Meades,1990).* The species listed below were taken from that text and are representative mammals and birds that one would expect to find in the various ecoregions. However, all of the species are not necessarily found in the portions of those ecoregions which are located within the boundaries of District 2. Also, these lists are not inclusive of all species that occur within the ecoregion - rather the list includes representative species. These are listed as follows (taken from Natural Regions of Newfoundland and Labrador by Susan Meades, 1990):

**Central Newfoundland Forest Ecoregion**

**Barren Habitats:**

| | | | |
|---|---|---|---|
| Mammals: | Caribou (important region during migration) | | |

**Forest and Shrub Habitats:**

| | | | |
|---|---|---|---|
| Mammals: | Caribou | Moose | Lynx |
| | Pine Marten | Mink | Red Squirrel |
| | Eastern Chipmunk | Snowshoe Hare | |
| | Northern Long-eared Bat | Little Brown Bat | |
| | Deer Mouse (near human habitation) | | |
| Birds: | Sharp-shinned Hawk | Goshawk | Bald Eagle |
| | Yellow-Rumped Warbler | Osprey | Merlin |
| | Spruce Grouse | Hermit Thrush | |
| | Ruffed Grouse | Boreal Owl | Gray Jay |
| | Great Horned Owl | Willow Ptarmigan | |
| | Yellow-bellied Flycatcher | Northern Flicker | |

**Ubiquitous** - occurring in a variety of habitats:

| | | | |
|---|---|---|---|
| Mammals: | Black Bear | Red Fox | Ermine |
| | Meadow Vole | Masked Shrew | |
| Birds: | | | |

**Aquatic Habitats:**

| | | | |
|---|---|---|---|
| Mammals: | Beaver | Muskrat | Otter |
| Birds: | Green-winged Teal | Canada Goose | Ring-necked Duck |
| | Common Loon | | |
| Amphibians: | Green Frog | | |

**Wetland Habitats** - marshes, peatlands:

| | | |
|---|---|---|
| Birds: | Northern Hawk-Owl | Lincoln's Sparrow |

## North Shore Forest Ecoregion

### Forest and Shrub Habitats:

| | | | |
|---|---|---|---|
| Mammals: | Caribou | Lynx | Mink |
| | Moose | Snowshoe Hare | Little Brown Bat |
| | European Bank Vole (introduced to Yellow Fox Island) | | |
| Birds: | Bald Eagle | Osprey | Boreal Owl |
| | Gray-cheeked Thrush | Grey Jay | Blackpool Warbler |
| | Yellow Warbler | Wilson's Warbler | |

**Ubiquitous** - occurring in a variety of habitats:

| | | | |
|---|---|---|---|
| Mammals: | Black Bear | Red Fox | Ermine |
| | Meadow Vole | Masked Shrew | Blue Jay |
| | Common Redpoll | | |
| Birds: | | | |

### Aquatic Habitats:

| | | | |
|---|---|---|---|
| Mammals: | Beaver | Muskrat | Otter |
| Birds: | Common Eider | Common Tern | Common Murre |
| Amphibians: | Green Frog | | |

**Maritime Barrens Ecoregion (Northeastern Barrens Subregion)**

**Barren Habitats:**

| | | | |
|---|---|---|---|
| Mammals: | Caribou | | |
| Birds: | Rough-legged Hawk | Savannah Sparrow | |

**Forest and Shrub Habitats:**

| | | | |
|---|---|---|---|
| Mammals: | Moose | Lynx | Snowshoe Hare |
| | Red Squirrel | Eastern Chipmunk | Mink |
| | Little Brown Bat | Hoary Bat | |
| | Northern Long-eared Bat | | |
| Birds: | Bald Eagle | Goshawk | Pine Grosbeak |
| | Osprey | Blackpoll Warbler | Merlin |
| | Dark-eyed Junco | Grey-cheeked Thrush | Red Crossbill |
| | Sharp-shinned Hawk | Northern Water Thrush | |
| | Willow Ptarmigan | Yellow Warbler | |

**Ubiquitous** - occurring in a variety of habitats:

| | | | |
|---|---|---|---|
| Mammals: | Red Fox | Black Bear | Ermine |
| | Meadow Vole | Masked Shrew | |
| Birds: | Starling | Blue Jay | House Sparrow |

**Aquatic Habitats:**

| | | | |
|---|---|---|---|
| Mammals: | Beaver | Muskrat | Otter |
| Birds: | Canada Goose | Belted Kingfisher | Common Loon |
| | Ring-billed Gull | Black-backed Gull | Common Tern |
| | Leach's Storm Petrel | Atlantic Puffin | |
| | Black-legged Kittiwake | | |
| Amphibians: | Green Frog | | |

**Wetland Habitats** - marshes, peatlands:

| | | | |
|---|---|---|---|
| Birds: | Northern Harrier | Short-eared Owl | Common Snipe |
| | Swamp Sparrow | | |

**Eastern Hyper-oceanic Barrens Ecoregion**

**Barren Habitats:**

| | | | |
|---|---|---|---|
| Mammals: | Caribou (summer) | | |
| Birds: | Rough-legged Hawk | Snowy Owl | Savannah Sparrow |
| | Water Pipit | | |

**Forest and Shrub Habitats:**

| | | | |
|---|---|---|---|
| Mammals: | Moose | Lynx | Snowshoe Hare |
| | Red Squirrel | Little Brown Bat | |
| Birds: | Blackpoll Warbler | Northern Water Thrush | Dark-eyed Junco |
| | Willow Ptarmigan | Mourning Warbler | Yellow Warbler |

**Ubiquitous** - occurring in a variety of habitats:

| | | | |
|---|---|---|---|
| Mammals: | Red Fox | Mink | Ermine |
| | Meadow Vole | Masked Shrew | |
| Birds: | | | |

**Aquatic Habitats:**

| | | | |
|---|---|---|---|
| Mammals: | | | |
| Birds: | Northern Gannets | Common Murre | Leach's Storm-Petrel |
| | Black-legged Kittiwake | | Atlantic Puffin |
| Amphibians: | Green Frog | | |

**Wetland Habitats** - marshes, peatlands:

| | | | |
|---|---|---|---|
| Birds: | Northern Harrier | Short-eared Owl | Common Snipe |
| | Swamp Sparrow | | |

## 1.5 Forest Characterization

### 1.5.1 Forest Classification

There are four basic categories that currently represent how the forest within a forest management district is classified; productive forest, non productive forest, non-forest and fresh water. The total mapped area in FMD2 is approximately 0.5 million hectares. Of this approx 179 492 ha is productive forest, 123 523 ha is nonproductive, 133 754 ha is non-forest, and 40 867 ha is water. Figure 3 displays the relative percentages of each major forest class category found within the district. Productive forest is defined as forested area that is capable of producing 60 m³/ha at rotation. Essentially, this is the forested area that sustains industry in the province.

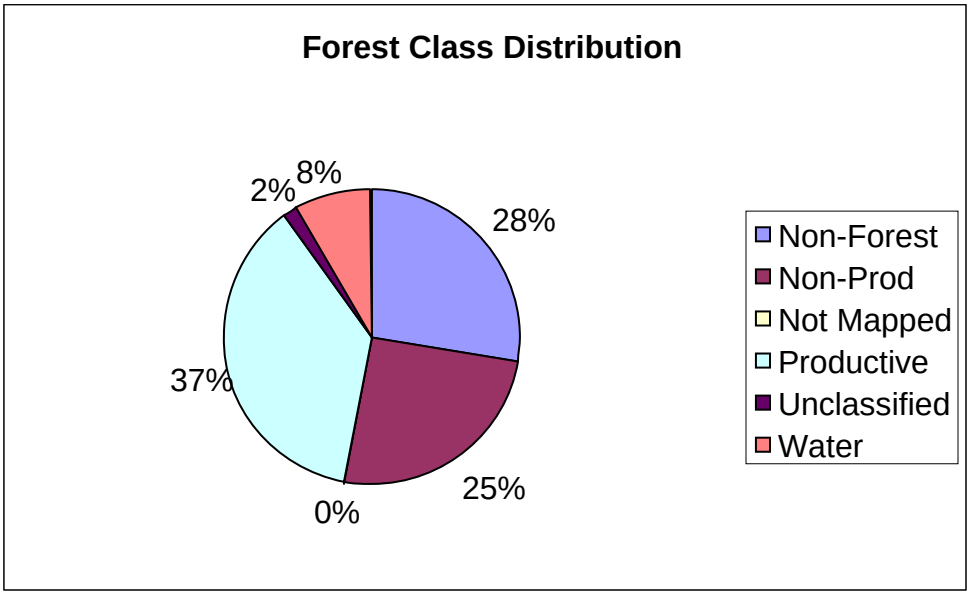



Figure 3:Forest class distribution for District 02

### 1.5.2 Age Class

Individual tree ages in a stand can all be the same after disturbance such as fire or harvesting; however in most cases the ages vary. Forest managers describe stand ages in terms of age classes which generally encompass 20 years. The age classes present in the zone are:

**Class Age (years)**

| | |
|---|---|
| 1 | 0 - 20 regenerating |
| 2 | 21 – 40 immature |
| 3 | 41 – 60 semi-mature |
| 4 | 61 – 80 mature |
| 5 | 81 - 100 over mature |
| 6 | 100 - 120 “ |
| 7 | 120 + “ |

The age class distribution in FMD2 for the entire productive forest is shown in Figure 4. In general terms, the more balanced the age class distribution in a district, the higher the potential for an even flow sustained harvest of timber, because continuous timber supply is limited by the age class with the lowest frequency of occurrence. A balanced age distribution in the forest would also allow for the highest biodiversity by making habitat available at all stages of development, with the equivalent proportions of the forest to moving from one stage of development to the next over time. This would result in an ongoing renewal of habitat. The age class structure for FMD2 is typical of the rest of the island with an abundance of area in the young and old age classes and a dip in the intermediate age classes.

The present age class structure in FMD2 is skewed as follows: Class 1 - 14 %; Class 2 - 08 %; Class 3 – 14 %; Class 4 - 21 % and Class 5+ - 42 % .The major problem in this structure is the disproportionately low percentage of the forest in lower age classes. The implication, for the future timber supply, of this shortfall is a significant reduction in the amount of available merchantable-size timber, once stands in the older age classes are either harvested or cycled through natural disturbance. It is projected this will occur within the next 20 years. In order to achieve a regulated forest, it is fundamental that measures be taken to promote a balanced forest age class structure

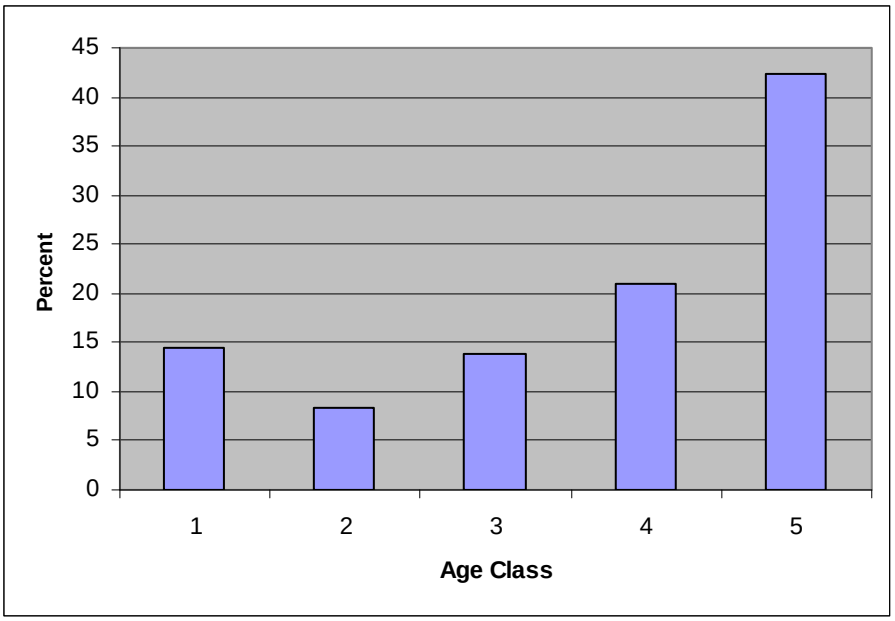



Figure 4: Age class distribution in Forest Management District 02

### 1.5.3 Site Class

The Newfoundland Forest Service has identified four site classes that refer to the potential of a given site to produce timber. These are high, good, medium and poor. The classes are based on a number of factors, some of which are soil type, moisture content, slope, and fertility. Site class is determined through air photo interpretation supplemented with field checks. The classes indicate the volume of wood fiber that a site has the capability of producing under natural conditions by the time the trees reach their rotation age (which averages, generally, between 60 and 80 years depending on the species and the location). On average, good sites are capable of producing > 2.6 m3/ha/yr, medium sites 1.7 m3/ha/yr, and poor sites 0.8 m3/ha/yr. The following indicates the average potential in cubic meters per hectare for each site class at maturity (based on the provincial average).

| **Class** | **m3 /ha** |
|---|---|
| High | 200+ |
| Good | 150 |
| Medium | 120 |
| Poor | 80 |

The medium site class is by far the largest in the districts within FMD2, holding 73 % of the total productive area found in the two major landowners. The next largest class is

poor (25 %), followed by good (2 %). Figure 5 presents the site class distribution in graphic form for the district.


Figure 5: Site Class distribution for in FMD2.

### 1.5.4 Forest Types (Working Group and Species)

Working group describes the dominant tree species present in a forest stand. This species may occupy 100 percent of crown closure of a stand or may be present in association with other species. The working group designation describes the stand in general terms based on the prevalent species whereby species composition describes specifically, the relative proportion of each individual tree species that make up a stand.

For FMD2 all known working groups and their codes are outlined below.

1. bS - black spruce is the major species in this working group making up 75 to 100% of the basal area. This means that the black spruce component has the largest merchantable volume in the stand.

2. bF - the same description for bS applies, except the major species is balsam fir.

3. wB - as above, with white birch the major species.

4. tA - as above, with trembling aspen the major species.

5. sH - in this group, the major species is a combination of softwoods (usually balsam fir and black spruce) with the minor component consisting of hardwoods.

6. hS-the working group is essentially the same as the SH group, only reversed with hardwoods being the major component and softwoods the minor.

7. DI - this designation refers to areas that are classed as disturbed. The disturbance can be the result of wind damage, fire, insects, and so on. It is currently too early to tell if the site will regenerate for this planning period.

8. NS - this refers to areas that have been disturbed but are now insufficiently restocked with a preferred species. For example, a rich balsam fir site could have been harvested and then regenerated to an alder bed.

9. CS – Coniferous Scrub. This refers to areas that have been classed as non-commercial and predominately softwoods.

10. DS - Deciduous Scrub. This refers to areas that have been classed as non-commercial and predominately hardwoods.

Figure 6, below illustrates the distribution of working groups within the productive forest in FMD2. The main feature of the table is the dominance of softwoods which comprises 77 % of the productive forest. Black Spruce ( bS ) represents the largest working group at 43 % of the district, and then Balsam Fir ( Bf ) representing the next largest at approximately 34 % of the district. Balsam fir can occur in pure stands or in association with one or more of black spruce, white spruce, white birch, trembling aspen, or larch in varying species compositions. Softwood/Hardwood and Hardwood/Softwood working groups occupy 11 and 3 percent of the productive forest area in FMD2. These working groups occur as varying mixtures of fir, spruce, birch and aspen. The hardwood softwood (hS), and white birch (wB), trembling aspen (tA), white spruce (wS) and jack pine (jP) working groups occupy less than 4 percent of the productive forest in the district. Approximately 7 percent of the productive forest is classed as disturbed (DI) and include disturbances other than harvesting, such as insect damage, fire, wind throw, and flooding. Less than 2 percent is classed as NS.

The following provides a more detailed outline for some of the larger groups, with additional descriptions of the selected accompanying forest types, as described by Meades and Moores, 1994.

**Black Spruce** - *Picea marina* (Mill.) B.S.P. Within this working group there are three main forest types that characteristically represent black spruce. These include: black spruce forest, black spruce fen, and *kalmia*-black spruce forest. A general description for the black spruce forest includes a forest that has a thick humus layer with mainly black spruce as the dominant tree species. The sites within this forest type have a wide range of moisture from dry to wet and the fertility ranges from very poor to rich. Because there is such a wide range in both moisture and fertility, this forest type had to be broken down into six specific forest types. These include: *sphagnum*-black spruce, black sprucefeathermoss/ bedrock, black spruce-feathermoss/very dry, black spruce-feathermoss/dry, black spruce-feathermoss/bog, and black spruce-feathermoss/moist. This forest types produce merchantable timber. Most of these forest types are common throughout the four districts. The second forest type, black spruce-fen is characterized by an abundance of understory that is usually described as fertile but poorly drained. Due to this poor drainage the black spruce in this forest type are usually stunted. These forests are considered important wildlife and plant habitats because of the high fertility, and usually grow in open settings. As a result of the open grown, stunted trees, this forest type is not usually merchantable from a commercial harvesting perspective. This forest type is divided into two forest types: *carex*-black spruce and *osmunda* - black spruce, both of which are not common in the four districts. The third forest type *kalmia*-black spruce represents a black spruce forest that is associated with bogs. The trees are open grown with black spruce as the dominant tree, which is usually stunted with abundant shrubs and mosses growing throughout its understory. These sites are normally infertile but range from dry to very moist. This forest type, because of small variations, can be broken down into four forest types: *nemopanthus-kalmia* black spruce, *sphagnum-kalmia*-black spruce, *kalmia*-black spruce, and *cladonia-kalmia*-black spruce. These forest types are usually considered unmerchantable and are common throughout the district. All three of these forest types are the result of regeneration on areas burned a

number of times over the years. The natural succession following fire in the Newfoundland Boreal Forest is towards black spruce with limited amounts of certain pioneer species such as white birch and trembling aspen. Sites occupied by black spruce are usually away from river valleys and any flood plains in these valleys. Most black spruce occupy hillsides, ridges, and open barrens. Areas that are generally made up of rock outcrops contain black spruce as well.

**Balsam Fir** - *Abies balsamea (*L.) Mill.

Another major forest type is the balsam fir forest. This species occupies sites that are usually fertile and moist but because this district has a recurring history of fire, balsam fir cannot become established as they do not naturally occupy burned areas. Due to the complexities of the balsam fir forest type, it can be divided into several types. These are: *equisetum-rubus*-balsam fir, *rubus*-balsam fir, *clintonia*-balsam fir, *taxus*-balsam fir, *dryopterishylocomium*- balsam fir, *dryopteris*-balsam fir, *dryopteris-rhytidiadelphus*-balsam fir, *dryopterislycopodium*- balsam fir, *hylocomium*-balsam fir, *gaultheria*-balsam fir, *pleurozium*-balsam fir, *carex*-balsam fir, and *sphagnum*-balsam fir. They normally occupy river valleys and flood plains as pure stands or mixed with hardwoods, along with side slopes to these valleys. This working group is not as prevalent as spruce in FMD2. Some are found in limited locations throughout FMD2, which include: *rubus*balsam fir, *dryopteris-lycopodium*-balsam fir, *hylocomium*-balsam fir, *pleurozium* -balsam fir, *carex*-balsam fir, and *sphagnum*-balsam fir. All balsam fir forest types have balsam fir as the main tree species, with white birch usually abundant throughout. The *rubus*-balsam fir forest type is found in low to mid-sloped areas that are moist. This forest type has an abundant herb layer but is limited to certain types which differentiate it from the *equisetum-rubus*-balsam fir forest type, which has a more diverse herb layer. The *dryopterislycopodium*- balsam fir forest type has narrow moisture regime from moist to somewhat moist that is nutrient rich. This forest type has ground cover that is dominated by ferns and certain moss types and plants that are specific to this type. The *hylocomium*-balsam fir forest type is also moist to somewhat moist but is dominated by a layer of moss instead of the ferns. The *pleurozium*-balsam fir forest type has balsam fir and black

spruce as the main tree species with few white birch. The moss layer is made up mainly of *pleurozium* schreberi and is found on dry to well drained areas such as dry ridges and outwash deposits. The *carex*-balsam fir forest type has willow found in it. The *sphagnum*-balsam fir is dominated by *sphagnum* moss on the forest floor and is poorly drained.

White Birch - *Betula papyifera* Marsh. This working group represents the major hardwood component for the forests of the province, and FMD2. White birch is normally found on the fertile sites along streams and rivers, as well as flood plains. It can also be found on fire origin locations as it is a pioneer species that seeds into an area once the forest cover is removed by fire. Pure white birch stands are not that common in the province, especially in FMD2.

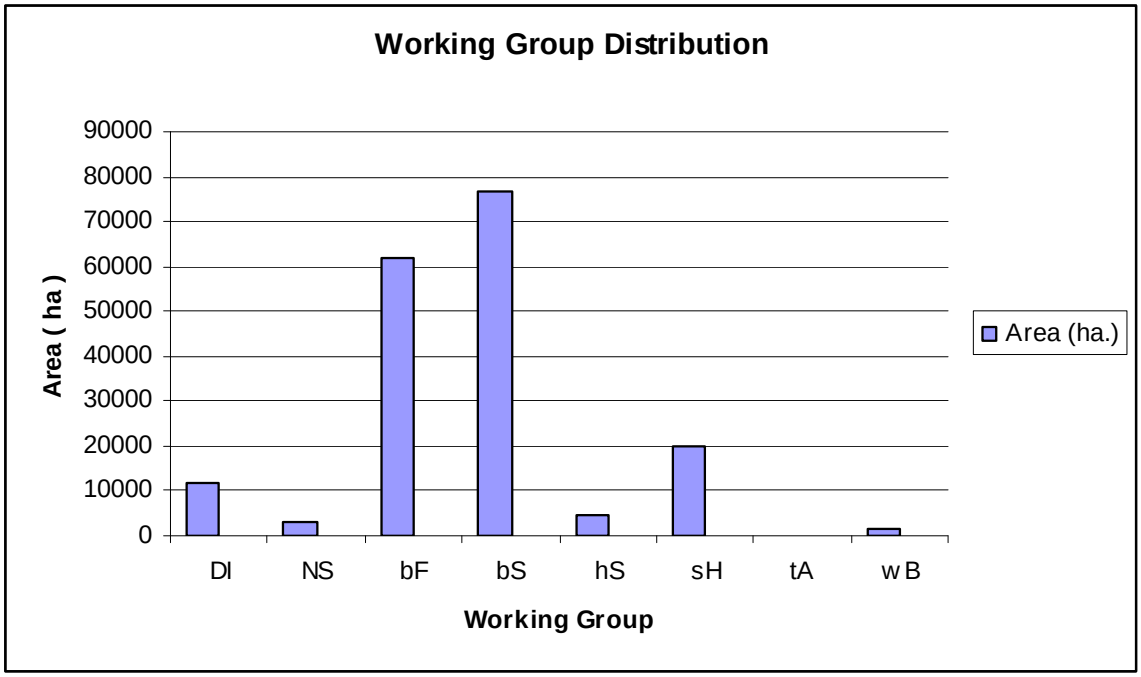



Figure 6: Working Group Distribution of Productive Forest in FMD2.

### 1.5.5 Forest Disturbances

Disturbance patterns in the boreal forest normally encompass a high incidence of wildfire combined with periodic outbreaks of insect infestations, disease, and wind throw. Human disturbance has historically been in the form of large-scale timber harvesting and forest fires due to human causes, as well as forest removal for residential, agricultural, and/or industrial developments.

The Bonavista Peninsula is very representative of these disturbance patterns. Historical records reveal that virtually all of the forest area has been swept by wildfires. Most of the FMD2 productive timberlands in existence at the turn of the century were destroyed by large forest Fires which occurred during the late 1880's and early 1900's (1907) . This accounts for the large black spruce component of the forest which re-seeded on many burnt sites. The remaining unburned portions have to some degree been affected by one or more periods of high insect populations during the late 1970's and early 1980's. The Forestry and Wildlife Branch reported that in excess of 12,900 hectares of productive forest were affected by the episodic highs of Spruce Budworm *Choristoneura fumiferana* and to a lesser extent Hemlock Looper *Lambdina fiscellaria* infestations during that period. The forests most heavily damaged by extremely high budworm populations are located near Ocean Pond, Canning's Cove, and Deer Harbour just north of Sunnyside. Hemlock Looper damage was concentrated in the Ocean Pond and Burgoyne's Cove area**.**

Wind damage has been witnessed to occur infrequently in naturally developing stands that have not had other disturbance impacts. The frequency and scale of wind disturbance in these type stands is anticipated to increase as the older portion of the District's forest moves through senescence. Insect damage during the late 1970's and early 1980's and the widespread practice of partial stand cutting has contributed to subsequent wide-spread wind throw throughout much of the District. Recent weather events, including ice storms in 2008 and 2009 and hurricane IGOR in 2010, have exacerbated the situation and have resulted in extensive damage throughout FMD2. The majority of wind throw areas exist as small-sized openings, most of which will regenerate naturally to Balsam Fir. The most prevalent forest pathogen in District 02 is heart rot

which is common to selected mature Balsam Fir stands. Sap rot and root rot are also present in these forests, but are much less common.

Human disturbance on the Bonavista Peninsula and surrounding area has been characterized by decades of extensive patch cutting, frequent man-caused Fires and to a lesser extent forest clearing for residential and agricultural development. The Bonavista Peninsula area is one of the earliest settled portions of North America, colonies having been established by the English about the year 1600.

Prior to the twentieth century, the principal occupation of the population involved some aspect of the fishery. Consequently, the only harvesting of timber was for use in the fishery for boat building, stores, stages, housing materials and for fuelwood. The wood for these requirements was taken from forests as close as possible to the coast.

After the turn of this century, forest harvesting activities increased as selective logging and patch clear-cutting were conducted to obtain boat timbers and pulpwood for export, sawlogs and firewood for domestic use and mining timbers. Patch clear-cutting was prominent near waterways to supply sawlogs to several water-powered sawmills. These mills, which were prevalent in the lumbering communities of Musgravetown, Bloomfield and Lethbridge, operated up to the 1950's, and depended heavily on the coastal forests subsequently alienated as a result of the creation of the Terra Nova National Park in 1957. Other industries utilizing smaller-diameter, sub-merchantable timber, such as biscuit box and barrel manufacturing plants were also established and flourished during this period. Since the majority of the existing timber resource included immature stands, these were the dominant source supplying these industries.

Between 1950 and 1970 the water-powered sawmills, biscuit box and barrel manufacturing plants were phased out. During the later part of this period, forest stands established prior to 1930 began to produce merchantable size sawlogs. This contributed to development of the District's current small sawmill industry. The sawmills of the Peninsula were characterized until recently by small family affairs operated by two to three men. The layout of the remaining mills of this type is essentially the same today as they were when the industry was established, consisting of a hand-operated push table, or a mechanical log carriage. Over the past ten years, several modern sawmills have been established. These are heavily dependant on raw material from outside FMD2. From the

earliest beginnings, operators of the small mills predominantly practiced selective logging, or high grading (i.e., cutting individual trees or small groups of trees). Consequently, it was necessary to cover a large area to obtain a sufficient annual harvest. This practice, as employed by in excess of 500 sawmillers over many decades has led to a widespread disturbance pattern throughout the district. As a result, the forest structure is quite broken with a much higher level of small openings or clearings than would be seen in naturally developing undisturbed stands. The many small openings present in the forest in FMD2 has created ideal conditions for the spread and establishment of kalmia. Kalmia is an invasive ericaceous shrub that quickly dominates a site given favourable conditions and prevents the normal development of the forest. It can seriously impede the ability of the forest ecosystem to provide many social and economic values. Over the past two decades this disturbance pattern has been somewhat modified through the implementation of silviculture site rehabilitation projects and increased commercial clear-cutting.

Current inventory data for FMD2 can be used to identify disturbed areas. Figure 7 illustrates the distribution of forest disturbances in the district. Harvesting represents the largest disturbance with 7462 ha of cutover identified. The approximately 2600 ha of Windthrow have become the most significant of all severe natural disturbances and contributes to 22 % of total. This is due mainly to the abundance of overmature timber on the landscape and, as a result of Hurricane Igor and other weather events, is suspected to significantly increase when the next forest inventory is completed. Severe Insect damage represents 9 % of total disturbances represented. It should be noted however that light to moderate insect damage is not represented in this distribution and likewise the level of Adelghid damage is difficult to quantify. Most of the insect damage occurred in balsam fir forest types. Fire, at 6 % of the district, has had significantly less impact than the other disturbances in recent years. It should be noted that these areas are not mutually exclusive and there is overlap between disturbances. (ie. insects may have killed a stand, resulting in wind damage to weakened trees, followed by salvage harvesting, and then perhaps fire).

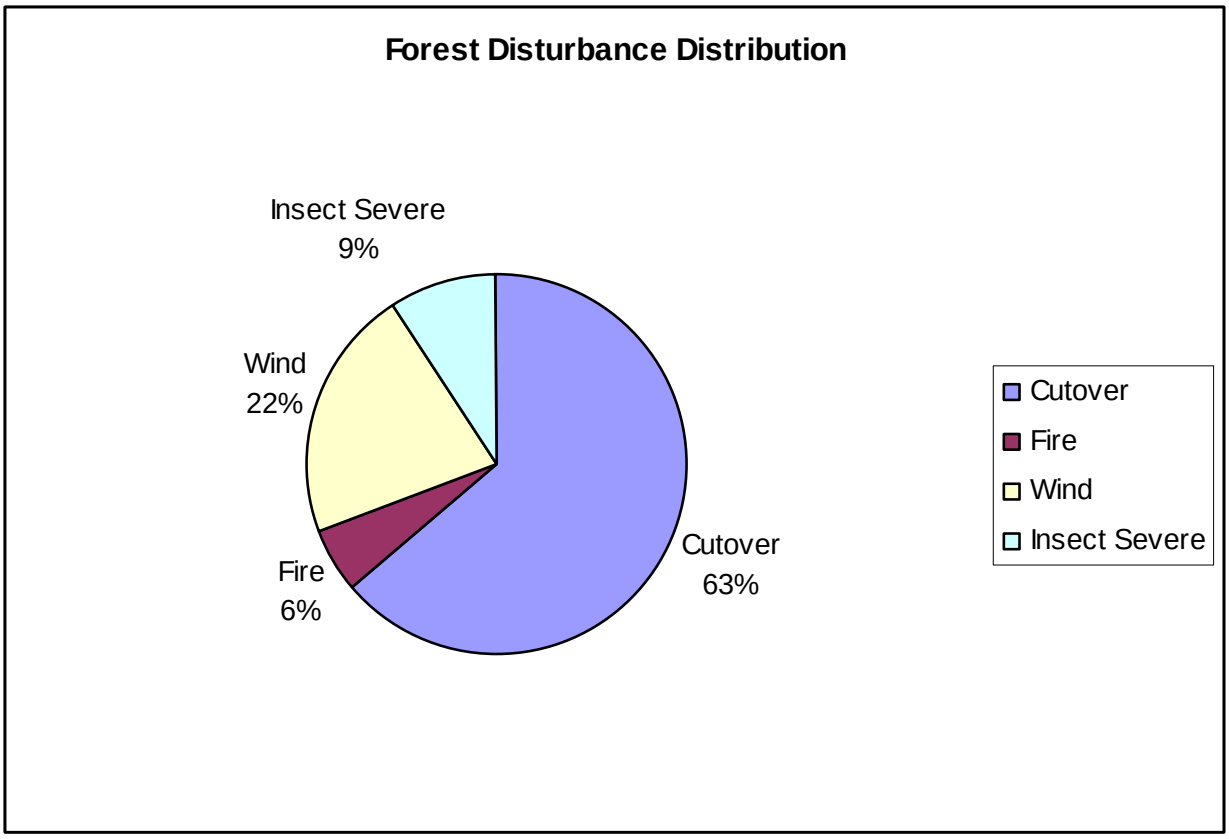



Figure 7: Disturbance distribution for Forest Management District 2.

# Section 2 Past Activities Planning Zone 2

## 2.1 Overview

For consistency purposes, the description of the past five years activities will cover the period from 2006 to 2010 inclusive. This section will indicate the activities involving harvesting, road construction, and silviculture. As well as any fire or insect activity that occurred.

## 2.2 Harvesting

Table 1 summarizes the 457 170 $m^3$ of timber harvested in Planning Zone 2 from 2006 to 2010. For the most part, the domestic harvest was equal to commercial harvest in FMD2 whereas almost all harvesting in FMD3 was done by domestic permit holders. . Approximately 97% of this harvest was softwood while approximately 3 % was white birch and other species.

Specifically in Zone 2, there was approximately 182 120 m3 of softwood, and 9 240 m3 of hardwoods, harvested under crown commercial permits. It is estimated that from the average of 2500 domestic permits issued annually in FMD2 and the 1300 in FMD3 there was over 265 810 m3 of timber harvested over the five year period in planning zone 2. For the most part all harvests were kept at or below the set AAC's over the five year period from 2006 to 2010.

Table 1: Summary of Crown Harvest in Planning Zone 2 for 2006 to 2010

| District | | 2006 ($m^3$) | 2007 ($m^3$) | 2008 ($m^3$) | 2009 ($m^3$) | 2010 ($m^3$) | Total ($m^3$) |
|---|---|---|---|---|---|---|---|
| | | | | | | | |
| 2 | Commercial Softwood | 36680 | 34960 | 32640 | 41740 | 35860 | 181880 |
| 2 | Commercial Hardwood | 850 | 2160 | 1600 | 2080 | 2550 | 9240 |
| Commercial FMD2 Total | | | | | | | 191120 |
| 2 | Domestic Softwood | 22610 | 34080 | 35710 | 40090 | 38440 | 170930 |
| 2 | Domestic Hardwood | 360 | 540 | 570 | 630 | 610 | 2710 |
| Domestic FMD2 Total | | | | | | | 173640 |
| 3 | Commercial Softwood | 0 | 20 | 40 | 100 | 80 | 240 |
| 3 | Commercial Hardwood | 0 | 0 | 0 | 0 | 0 | 0 |
| Commercial FMD3 Total | | | | | | | 240 |
| 3 | Domestic Softwood | 18070 | 16000 | 17880 | 19660 | 18720 | 90330 |
| 3 | Domestic Hardwood | 370 | 330 | 360 | 400 | 380 | 1840 |
| Domestic FMD3 Total | | | | | | | 92170 |

## 2.3 Silviculture

Table 2 summarizes the 1 915 ha of silviculture treatments completed within FMD2 from 2006 to 2010. 643 ha of site preparation, and 1 272 ha of planting was completed. The proposed Pre-Commercial Thinning (PCT) program in was abandoned in favor of a more aggressive planting program, as the sites proposed for balsam fir thinning were rejected for treatment due to adelghid infestation. Likewise the proposals for rehabilitation of adelghid damaged stands were not completed. 272 ha were harvested as part of the Disturbed Stand Volume Removal (DSVR) program which targeted disturbed and under producing stands in the district. There were no silvicultural activities carried out in FMD3 in the last five years.

Table 2: Summary of Silviculture treatments in Planning Zone 2 from 2006 to 2010

| District | Treatment | 2006 (ha) | 2007 (ha) | 2008 (ha) | 2009 (ha) | 2010 (ha) | Total (ha) |
|---|---|---|---|---|---|---|---|
| | | | | | | | |
| 2 | Planting | 471 | 67 | 213 | 313 | 208 | 1272 |
| 2 | Scarification | 0 | 188 | 188 | 209 | 58 | 643 |
| 2 | Gap Planting | 0 | 0 | 0 | 0 | 0 | 0 |
| 2 | Adelgid removal | 0 | 0 | 0 | 0 | 0 | 0 |
| 2 | PCT | 0 | 0 | 0 | 0 | 0 | 0 |
| 2 | DSVR | 99 | 40 | 13 | 30 | 90 | 272 |
| | | | | | | | |
| 3 | Planting | 0 | 0 | 0 | 0 | 0 | 0 |
| 3 | Scarification | 0 | 0 | 0 | 0 | 0 | 0 |
| 3 | PCT | 0 | 0 | 0 | 0 | 0 | 0 |

## 2.4 Road Construction

There were 38.6 km of access roads constructed in FMD2 by the Crown under Tender and by Crown forest operators under contract. Table 3 summarizes the type of roads activity in each district. All roads built during the period were required to access commercial timber. Of these, 28 km of primary road was built by the Crown and 10.6 km of operational road was built by commercial operators. Approximately 22.8 km of road was reconstruction of existing roads.

Table 3: Summary of Forest Access Road Activity in Planning Zone 2 from 2006 to 2010

| District | | 2006 (kms) | 2007 (kms) | 2008 (kms) | 2009 (kms) | 2010 (kms) | Total (kms) |
|---|---|---|---|---|---|---|---|
| | | | | | | | |
| 2 | Crown New Construction | 5 | 7.3 | 10.1 | 2.8 | 2.8 | 28 |
| 2 | Crown Reconstruction | 14.6 | 4.8 | 0 | 0 | 3.4 | 22.8 |
| 2 | Crown Decommissioning | 0 | 0 | 0 | 0 | 0 | |
| 2 | Operator Built | 0.5 | 0.9 | 1.6 | 5.1 | 2.5 | 10.6 |
| 2 | | | | | | | |
| 3 | Crown New Construction | 0 | 0 | 0 | 0 | 0 | |
| 3 | Crown Reconstruction | 0 | 0 | 0 | 0 | 0 | |
| 3 | Crown Decommissioning | 0 | 0 | 0 | 0 | 0 | |
| 3 | Operater Built | 0 | 0 | 0 | 0 | 0 | |

## 2.5 Natural Disturbance

### 2.5.1 Fire

During the period of 2006 to 2010 there were 37 fires reported in FMD2 that resulted in a total area of 44.7 ha being burnt. The bulk of the burnt area was the result of one fire at Napper,s Pond which was a 30 ha fire that mainly burned scrub and non forested area.

There were only 14 fires reported in FMD3 that resulted in a total area of 8.6 ha being burnt. This indicates a very aggressive and effective fire protection effort supplemented with a measure of good luck from nature.

### 2.5.2 Insect

There has been little insect activity in Planning Zone 2 over the period 2006 to 2010. With the exception of the balsam wooly adelgid (aka aphid), no other insect infestations have been documented by the Forest Insect and Disease Branch of the Department of Natural Resources in FMD2 or FMD3. Extensive field work by district staff was

completed in the Ocean Pond area that indicated 70 % of the fir in the area had moderate to severe adelghid damage. Reconnaissance field work and anecdotal information suggests that the majority of the remaining balsam fir stands in the district are now infected with Aphid. Wide scale treatment for eradication of this insect is yet to be developed.

# Section 3 Timber Supply Analysis

## 3.1 Introduction

The Province reviews its timber supply every five years in order to account for any changes in forest land base, growth rates, and management strategies. This schedule is consistent with the Forestry Act, 1990, which established management by Forest Management District and mandates that a wood supply analysis be completed every five years. The result of this analysis is a new set of Annual Allowable Cuts (AAC's) for each Forest Management District. These AAC's are defined as the maximum annual rate at which timber can be harvested at a sustainable level indefinitely into the future (in reality, the AAC figures are applicable for a period of 160 years into the future and not infinity). Annual allowable cuts must be calculated on a District basis, however when added together, provide the annual allowable harvest level for the island.

## 3.2 Guiding Principles and Policy Direction

The key underlying principles that guide this analysis are:

(i) the AAC must be sustainable;

(ii) the level of uncertainty (risk) associated with the AAC must be minimized by using empirical information wherever possible;

(iii) there must be conformity between information and assumptions used in the analysis and actions and decisions taken on the ground;

(iv) the analysis must be consistent with other forest values and objectives; and

(v) the timber supply calculation must consider economic factors, not solely the physical supply of timber.

In concert with the policy of establishing sustainable timber harvest levels, Government policy requires that harvesting not exceed the established AAC's. Likewise, Governments policy is to optimize forest industry opportunities from the sustainable fiber supply. Government also requires consultation be conducted during the timber analysis. The forest industry was consulted directly throughout the process. As well, there was a 30 day

consultation process whereby a draft of the gross AAC's and methodology was published on the Government web site for public review and comment.

## 3.3 Factors Affecting Timber Supply

The forests of insular Newfoundland are very variable in terms of age distribution. Typically, there are significant amounts of mature/over-mature forest and regenerating forest, but limited intermediate age forests. This imbalance is not unusual in a boreal forest where cyclic catastrophic disturbances are common. Figure 4 illustrates this age class imbalance. The insufficient amount of intermediate age forest on the island is one of the most important factors influencing AAC's, therefore it is the basis for many of our forest management strategies. Essentially; we are employing a matrix of measures designed to fill the gap in our age structure, which include: an aggressive forest protection program, harvesting programs that attempt to exclusively target the oldest stands first, and thinning the regenerating forest so that it becomes operable at an earlier age.

Another important aspect of the Province's forest posing a challenge to forest managers is the natural fragmentation of the resource. The Province's landscape is characterized by many ponds, bogs, rivers, streams, and rock outcrops resulting in relatively small pockets of timber. This makes the determination of an economic timber supply very challenging given that each stand has unique economic characteristics. Arguable the most important factor affecting present and future AAC's is land base. The land base available for forest activity is constantly being eroded by other users. There is an approximate correlation between AAC and land base in that a one percent loss of land base represents a one percent drop in AAC. It is important therefore that we minimize loss to the forest land base and continue to explore ways to grow more volume on the existing land base to mitigate this loss.

## 3.4 Timber Supply Analysis

In 2010, the Forest Service began another review of the provincial timber supply. Consistent with Department's vision, the analysis was structured to determine sustainable

timber supplies while respecting a multitude of social, economic and environmental objectives. Timber supply, in this context, refers to the rate at which timber is made available for harvesting on a sustainable basis.

The determination of supply (represented as AAC's) involved the use of computer models that forecast the sustainability of possible AAC levels. These models require three basic inputs. First, a description of the current state of the forest (forest characterization and availability), second, the growth rates associated with the current forest, and third, the management strategies applied to the forest. To arrive at these basic inputs require careful and detailed consideration of a broad range of both timber and non-timber values. More specifically, the following was considered in determining the sustainable timber supply.

### 3.4.1 Forest Characterization

To get a current description of the forest resource (or stock), the Province has invested significant resources into creating and maintaining a Provincial Forest Inventory. Although the latest inventories used in the 2010 Wood Supply Analysis for this zone, the estimate of forest stock is kept current through an annual update program. This program accounts for all natural and man-made disturbances such as: fire, insects, harvesting, and any enhancement programs, including tree planting and pre-commercial thinning. Also, each stand in the forest inventory is updated to reflect any yield changes that may have occurred since the previous inventory update

### 3.4.2 Land Availability

The updated Forest Inventory was reviewed and classified at the stand level on the basis of the availability of each stand for harvest. The classification system consists of two broad classes;

Class 1 - available for harvest under normal conditions, and

Class 3 - has restrictions for harvesting due to economic constraints.

The Class 3 has been further subdivided into:

a) area can be harvested with reasonable economic restrictions (expensive wood) and

b) area is highly unlikely to be harvested under current economic conditions.

Only the first portion of Class 3 is used to calculate an AAC for that category. The categories associated with the portion of Class 3 land, which are deemed unavailable for harvest, incorporates a broad range of timber and non-timber values. These values include:

#### 3.4.2.1 Non-Timber Related

Consideration of non-timber values has a direct impact on Provincial AAC's. It is obvious that as the amount of productive forest land available for timber management drops, so too will the AAC. With the current restrictions, the AAC land base (area where harvesting operations can occur) is only 18% of the total productive forest land base. On average, in any one year, less than 1% of the productive forest land base is influenced by harvesting operations.

##### 3.4.2.1.1 No-Cut Buffer Zones

The Province has guidelines that require all water bodies (visible on a 1:50,000 map sheet) be given a minimum 20 meter uncut buffer (from waters edge). In addition to these legislated water buffers, District Ecosystem Managers, in consultation with Planning Teams, have increased buffer zone widths beyond the 20 meter minimum to protect special values such as: salmon spawning areas, cabin development areas, aesthetic areas, wildlife habitat, outfitting camps, etc.

##### 3.4.2.1.2 Newfoundland Marten and Caribou Habitat

Habitat specialists are working in consultation with industry to study both species and ensure adequate habitat will be available for Newfoundland marten and caribou into the future. This work is examining the quantity and quality of habitat, as well as, the connectivity of habitat. With respect to Caribou, both the Forest Services Branch and the Wildlife Division are working together to develop an adaptive management strategy.

This initiative started during the development of Zone 5 planning process in 2011 and will be further explained in Section 4.2.1.1.2.

#### 3.4.2.1.3 Wildlife Corridors

As part of the evaluation process for harvesting plans, wildlife specialists sometimes recommend managed corridors to ensure various species of wildlife have sufficient cover to move around the landscape. These corridors are temporal in nature and have little impact on timber supply. Both this section and the previous work toward achieving Value 1.3, Wildlife Habitat, of the Ecosystem Diversity Element of Criterion 1, Biodiversity, in the Provincial Sustainable Forest Management Strategy.

#### 3.4.2.1.4 Protected Areas

All established and proposed protected areas are removed from the AAC calculations.

#### 3.4.2.1.5 Watersheds

For each of the forest management districts in Planning Zone 2, all of the public protected water supply areas and some of the larger watersheds were digitized and captured within the forest inventory. These watersheds were added to the database in order to address any concerns about forest management within these watersheds and to permit the Forest Service to report on proposed activities within these watersheds over time. This is in line with Value 3.1, Water, of the Soil and Water Element of Criterion 1, Biodiversity, in the Provincial Sustainable Forest Management Strategy.

### 3.4.2.2 Timber Related

Compounding the effect of downward pressure on the AAC, the Department also reduces the AAC's by taking into account other potential losses of timber:

#### 3.4.2.2.1 Insect/Fire/Disease Losses

The Department reduces AAC's to account for anticipated future losses resulting from insects, disease and fire using historical information.

#### 3.4.2.2.2 Logging Losses

Surveys of recent harvested areas are conducted each summer throughout the Province to determine the quantity and quality of fiber remaining. The estimates from these surveys are used to reduce the available AAC.

#### 3.4.2.2.3 Operational Constraints

Areas that are inaccessible (surrounded by bogs or hills), timber on steep slopes, and low volume stands are removed from the AAC calculation up front. Also, significant adjustments are applied to the Provincial Forest Inventory for stands deemed operable in the timber analysis but left unharvested within operating areas. The reasons for this are linked to the character of Newfoundland's forests; low volume, steep slopes, rough terrain, and excessively wet ground conditions etc.

Again, all these timber and non-timber related issues are applied directly in the AAC calculation to ensure harvest levels do not exceed the sustainable level. With the introduction of new values and the broader application of current values, the pressure on future AAC's will continue to increase. These factors and their impacts on timber supply will be further discussed in section 3.5.

### 3.4.3 Growth Forecasting

A key requirement for forecasting future wood supply is an understanding of how forest stands grow and develop through time. That is, as a forest stand develops, how much merchantable (i.e. harvestable) volume does it carry at any given point? These yield forecasts (referred to as yield curves) are required for each type of forest stand (called a stratum) comprising the forest under consideration. In Newfoundland, there are dozens of distinct forest strata for which separate yield curves are required. These are defined by the tree species in question (e.g., balsam fir, black spruce), the site quality (e.g., good, medium, poor), the geographic region (e.g., Central Newfoundland) and other factors likely to affect yield.

Yield curves are a key element in a wood supply analysis. In fact, the validity, or "usefulness" of the wood supply analysis is determined by the truth or "correctness" of the yield forecasts. While there is no way of predicting with certainty how stands will actually grow in the future, care must be taken to ensure that the yield projections used are realistic and reasonable. Respecting the sensitivity and importance of these forecasts, the Newfoundland Forest Service has directed a large portion of its resources and time into developing realistic yield curves. Two growth models were used, one for projecting stand development under natural conditions and the other for projecting growth under managed (i.e., silviculturally enhanced) conditions. Tree and stand development data generated from the Forest Service's Forest Inventory Program were used to make stand growth predictions. These projections were then checked against empirical data from thousands of temporary plots established throughout the Island. If the projections varied from the real life evidence, the curves were adjusted to make them more accurate. In this analysis, yield curves were developed on an ecoregion basis to more accurately portray the varied stand growth within and among the districts.

### 3.4.4 Management Strategies

With the current state of the forest described and the yield forecasts developed, the next step was to design a management strategy for each sector of the forest. The key objective was to maximize long term AAC while at the same time taking into account other forest values. This involved developing strategies that minimized fiber losses and enhance forest sustainability.

#### 3.4.4.1 Harvest Flow Constraints

An even-flow harvest constraint was used in the analysis to maximize the sustainable harvest level. This strategy produced the maximum even flow harvest but resulted in less than optimum economic use of the forest resource. If no even flow constraint is used and harvest levels are permitted to fluctuate in response to market value, the overall economic potential of the forest will increase. However, the lower economic potential is offset by stability in manufacturing plants and employment. This is in line with Goal 1 of Value

5.1, Commercial Timber, of the Economic Benefits Element of Criterion 5, Economic and Social Benefits, in the Provincial Sustainable Forest Management Strategy.

### 3.4.4.2 Spatial Analysis

A major improvement that occurred in both the previous and the 2010 wood supply analysis is manual harvest scheduling. In 2001, the harvest scheduling was an automated process where the software picked the stands to be harvested over the 25 years based on user supplied criteria. The 2001 approach was an improvement over previous wood supply analysis, however, there was no harvest scheduling was completed. Basically, the software used cannot realistically know all the operational restrictions within a forest management district. By utilizing the spatial manual process, on the ground conditions that restrict harvesting are accounted for when a spatial harvest schedule is defined.

The proposed harvest schedule is then played back through the modeling software to evaluate its sustainability and determine if non-timber objectives are achieved. In most cases, the harvest scheduling exercise has to go through several iterations before an acceptable harvest schedule could be realized. The spatial arrangement of areas for timber harvesting is especially challenging in this province because of the natural fragmentation of our forests. This model provided forest planners with the ability to mimic realistic timber harvest schedules based on current practices and identify forest stands that are considered not as accessible for harvesting.

Manual harvest scheduling has several benefits. First, it fosters the long term sustainability of our AAC's by mimicking current harvest practices and accounting for actual on the ground conditions which delay or restrict harvesting of stands. Secondly, the mapped 25 year harvest schedules build credibility into the forest management process. Every stand that will be harvested over the next 25 years must already be in the second (20-40 years old) or third (41-60) age class, can be easily identified and highlighted on the harvest schedule maps. Being able to see the wood that will be harvested in the future will help reassure people the resource is being used in a responsible manner. Next, harvest scheduling will help integrate the management of other forest resource values into timber management planning. All forest values can be typed

directly to discreet forest areas, providing the link allowing the many different forest values to be managed simultaneously. The forested areas needed for each resource can be mapped and potential conflicts can be addressed.

Finally, the harvest schedule maps developed for the wood supply analysis can be a starting point for the 5 year management planning process, especially the first two periods. The harvest schedule maps, if done correctly, can help reduce the work of the 5 year planning process. One point to note is that harvest scheduling is completed only for the Class 1 landbase. The Class 3 AAC, for the most part, is opportunistic at best and is harvested only if extra effort is applied. It is not scheduled because of the uncertainty of obtaining extra funding for access and harvesting.

#### 3.4.4.3 Planning Horizons

Given the Province's commitment to long term sustainability of our forest resource, timber supplies were projected 160 years (equivalent to two forest rotations) into the future to ensure actions and strategies applied today will result in a sustainable forest in the future. Long term planning is fundamental in timber supply forecasting and ecosystem management as well.

#### 3.4.4.4 Operable Growing Stock Buffer

The Province imposed an operable growing stock constraint in the analysis to ensure the sustainability of calculated timber supplies. The constraint imposes a condition that in any period there must be a minimum operable growing stock of two times the harvest level on the landscape. In other words, for every hectare that is harvested another harvestable hectare must exist on the landscape. The requirement for a growing stock buffer is based on a number of factors. First, several of our non-timber objectives are not explicitly accounted for in our planning process and therefore will require a growing stock buffer to achieve them. Second, we are unable to follow optimum harvest schedules explicitly due to operational restrictions on harvesting. Third, the Province is not willing to assume high risk with the sustainability of the timber supply. For these reasons a

growing stock constraint of two times was used. This constraint was used in concert with harvest scheduling to help map out a reasonable harvest for the next 25 years.

#### 3.4.4.5 Targets for the Maintenance of Older Forest

Consistent with the Forest Service's ecosystem approach, the analysis an old forest target was introduced into the woodsupply calculations requiring at least 15 percent of forests be older than 80 years. This was designed to provide a course filter approach to maintaining representative forest structure. It ensures the presence of certain amounts of old forest across the landscape into the future. With advances in modeling, this target can be tracked across a district, a zone and on a provincial basis.

#### 3.4.4.6 Operability Limits

Operability limits are the time windows in which forest management actions such as harvesting can be undertaken with forest stands. Stand growth development as measured in stand merchantable timber volume and individual piece size of trees determine a stands readiness for harvest. In some younger stands, one can have acceptable harvest volumes, but still have trees that are too small to harvest. In the 2010 wood supply analysis both stand volume and tree size were used to determine the earliest age when a stand could be initially harvested. In addition to determining the absolute earliest age a stand can be harvested, it was recognized that not all stands on the same site develop exactly the at the same rate. A small portion of a stand will develop faster than other portions, with the bulk of the stand type representing the average condition.

#### 3.4.4.7 Silviculture

Silviculture is one of the main forest management tools available to forest managers when analyzing different future forests that are generated using the wood supply modeling software. The main silvicultural actions used in the 2010 analysis include;

1) Precommercial thinning of balsam fir, black spruce, and softwood hardwood stands

2) Planting of any areas that do not regenerate naturally mainly with either black spruce, white spruce and to a lesser with red pine, or Norway spruce and larch (both eastern and Japanese).

3) Gap planting of either black spruce or balsam fir stands with either white spruce or black spruce. Gap plant is the filling of "holes" within stands that have inadequate natural regeneration of either balsam fir or black spruce.

## 3.5 Inventory Adjustments

One of the limitations of the current wood supply model is the inability to account for volume depletions outside of what is reported for harvesting operations. The model produces a gross merchantable volume (GMV) figure which requires adjustment to account for volume losses as a result of: fire, insects, disease, timber utilization practices and the presence of stand remnants.

### 3.5.1 Fire

An estimate of productive area loss as a result of fire was based on an analysis of the historical fire statistics maintained by DNR.

### 3.5.2 Insects

No forest mortality was documented by Forest Insect and Disease Surveys by DNR in FMD2 during the last five year period. Long term averages of area of timber mortality from insect defoliation were used as the deductions.

### 3.5.3 Timber Utilization

Information for this adjustment was derived from a series of intensive on-the-ground surveys, which measured the amount of wood remaining on cutovers following

harvesting. This wood was comprised of solid merchantable wood (logging losses) and wood with inherent cull (butt/heart rot). Information was analyzed by harvesting system and season.

### 3.5.4 Stand Remnants

Following harvesting operations, small fragments of stands often are left for a variety of reasons (operational constraints, low volume stands, terrain conditions). These often result in the inability of the operator to achieve volumes predicted by the computer models. A series of surveys were conducted across the province and the results analyzed to determine the amount of productive area attributed to remnants.

The total inventory adjustment for the Crown is 22 %. The Class III inventory adjustment figures are the same for all districts/tenures. Hardwood inventory adjustment figures for all tenures/districts are the same as the Class 1 softwood figures noted above. Hardwood stands are resistant to fire and it is anticipated that there will be little utilization loss due to the high value for fuelwood.

## 3.6 Timber Supply Results

The previous discussion in this chapter on woodsupply forms the basis of the 2010 analysis. As well, the 25 year spatial plan provided to the planning team during the development of this plan reflects the new analysis conducted in 2010. It should be noted that the Woodsupply allocation period (2011-2015) is offset by one year from the planning period (2102-2016).
Table 4 summarizes the calculated AAC's for the period 2011-2015 for FMD2.

Table 4: Annual Allowable Cut results for Forest Management District 02 for 2011-2015

| Class 1 Softwood | Class 3 Softwood | Hardwood | Salvage BF |
|---|---|---|---|
| 49 900 m3/year | 37 500 m3/year | 1900 m3/year | 25 000 m3/year |

# Section 4 Values

## 4.1 Guiding Principles of Sustainability

There are five guiding principles of overall sustainability, which include; environmental, economic, political, social, and cultural sustainability. Environmental sustainability looks directly at ecosystem health, both now and in the future. Ecosystem health is determined by such factors as ecosystem integrity, biodiversity, productive capacity, and resiliency. The five year operating plan must ensure these factors are intact.

Economic sustainability demands that forest resources be managed and distributed efficiently and equitably among the stakeholders, within the capacity and limits of the forest ecosystem. Economic development has been given top priority by many of Newfoundland's people and their representative, the government. However, economic development should not proceed without the incorporation of the other factors into the decision making process.

Political sustainability refers to goals and management objectives being applicable, administrable, and practical. These goals and objectives must maintain these qualities well into the future with the aid of public input and support.

Social sustainability means fairness and equity to all stakeholders.

Cultural sustainability is attained by applying Newfoundland's culture to the planning process. A forest management strategy cannot be successful without allowances within the strategy for traditional access and use of the land. For generations, many of Newfoundland's public had free range in our pristine wilderness, a fact that can not be ignored when planning for the zone. All are key interlocking components and each must be maintained if sustainable development is to be achieved.

## 4.2 Value Description

The forest ecosystems of the zone provide a wide range of values to different individuals and groups. These include consumptive values such as timber products, hunting, trapping, sport fishing, and berry picking, and non-consumptive values like skiing, snowmobiling, hiking, and bird watching. Also, there are intrinsic and intangible values such as a feeling of wilderness and peace which some people describe as spiritual. Although difficult to spatially describe or quantitatively measure, these spiritual values are considered to be a product or an accumulation of all values.

Other values such as water quality, parks and protected areas etc. provide for the protection of the forest ecosystems which can enhance the other values listed above. Many of the values in the zone were identified by this or previous or planning teams. Presentations of pertinent information on each value by knowledgeable individuals or groups provided stakeholders with relevant information to make informed decisions. Other values, while not specifically outlined by the planning team, are also identified and discussed to provide a more complete description of the range of values found in the zone. The following represents a framework for characterizing values in a clear and consistent manner. This approach consists of three components:

**Characterization**

- Description: Why the value is important, types of activities, intensity, spatial extent, employment, etc.
- Data in support: Statistical references.

**Critical Elements**

- Forest Features: Elements at risk from harvesting or enhanced by harvesting (viewscapes, adjacency to water, mountains, habitat, wilderness ambiance, road access, etc.)

**Guiding Principles**

A guiding principle is defined as "a fixed or predetermined policy or mode of action". These ‘modes of action’ would be implemented in the five year plan in the form of:

1. policies that should be in place to protect or enhance the resource value;
2. methods for negotiation or inclusion of other stakeholders in resolving potential conflicts;
3. special management provisions/strategies - such as buffer zone consideration, temporal operating periods, modified harvesting, or a best management policy; and/or
4. models and/or forecasting strategies to determine economic contribution, biodiversity impact, or community sustainability

Each individual value was discussed both at the strategic and operational level. Strategic level information (characterization, critical elements, and guiding principles) are the focus of discussion in this section. They provide a mechanism to resolve conflicts that might arise throughout or after the five year planning process. Where possible, the physical location of the value on the landscape (operational level) was also identified during the discussion of each value (appendix 6). This will help facilitate the preparation of the five year operating plan by identifying potential areas of conflicting use early into the process. In many instances, the Environmental Protection Guidelines (EPG’s, Appendix 2) form the guiding principles for a value. Quite often the spatial extent or location of all values is not known (eg., raptor nests). Specific guidelines are still listed in order to provide a direction or course of action when and if these values are encountered.

### 4.2.1 Biotic Values

#### 4.2.1.1 Big Game

##### 4.2.1.1.1 Moose

**Characterization:**

Moose are not native to the island. A pair was introduced to Gander Bay in 1878 and two pairs were introduced to Howley in 1904. Today, moose are distributed throughout the Island and the population is estimated to be about 125 - 140,000. Currently, moose are

managed on an area/quota system in the province. The Island is divided into 50 management areas and license quotas are set annually for each area. Quotas are set based upon the management objective for each area (i.e., whether it is desired that the population increase, decrease or stabilize). Generally, if an area has too high of a moose population, managers will increase quotas to bring down the population in order to prevent damage to the habitat. However, if the habitat is in good condition, and the area could support more animals, future quotas may be increased. All or portions of moose management areas 27, 28, 29 and 47 are located within the FMD2.

**Critical Elements:**
Harvesting is not expected to have a negative impact on moose populations in the zone because moose prefer the early serial stages of a forest and generally do well in areas after harvesting.

#### 4.2.1.1.2 Caribou

**Characterization:**
Caribou is the only native ungulate species on the island. Biologists estimate that prior to the railway being built in 1898 the population on the Island was approximately 100,000 animals but by 1930 the population had declined to about 10,000 animals. Between 1980 and 2000 the number of caribou has increased considerably on the Island with a population estimated at 90-100,000 animals. In the past few years however populations have declined significantly, with FMD2 being no exception. A portion of caribou management areas 64 is located in the district.

**Critical Elements:**

It is unclear how forestry activities in the immediate vicinity of calving areas during the calving period may have an impact on caribou populations. Recent studies and anecdotal information has indicated that harvesting restriction zone around caribou calving zones may be significantly larger than first thought. It has also been shown that as roads are constructed and access is improved into remote areas, there is generally an increase in the number of animals which are killed due to road-kill and poaching.

Within the Zone 5 (FMD's 10, 11, 12 & 13) five-year operating plan (2011-2015), the Department of Natural Resources (DNR) and the Wildlife Division of the Department of Environment and Conservation have committed to applying the principles of adaptive management where forest management and caribou values overlap. Both parties have tentatively agreed to assign some conflict areas for inclusion in an adaptive management study. The results of this adaptive management study will be used to inform the development of forest management-caribou guidelines that will be the basis for resolving value conflicts in future forest management planning processes. A complete description of this study is found in Section 8 of that plan.

#### 4.2.1.1.3 Black Bear

**Characterization:**
The black bear is native to the Island and is found in forested areas. Currently, the number of black bears occurring on the Island is not known (due to difficulty in conducting a census) but is crudely estimated to about 6 - 10,000 animals. All or portions of black bear management areas 27, 28, 29 and 47 are located within the FMD2.

**Critical Elements:**
- den sites for winter hibernation;
- forest cover

**Guiding Principles:**
**Big Game Management Strategy (moose, caribou and black bear)**
Management of big game species in the Province is accomplished by a planning process in which a Big Game Management Plan is prepared annually by the Wildlife Division of the Department of Tourism Culture and Recreation. This process takes into consideration information provided by the public and wildlife and forestry staff. Each year the Wildlife Division reviews all relevant data, such as recent census work, information provided on license returns, and jawbone or skull data and makes decisions on types and numbers of licenses of each species in each management area. Management of big game in the zone will continue to be addressed through this process.

**Environmental Protection Guidelines**

**Moose**

- where mature stands of timber are required for moose shelter and yards, they will be identified in consultation with the Wildlife Division.

**Caribou**

- to ensure the continued protection of these animals the following EPG's will be followed during forestry activities;
- in areas where caribou utilize lichens, a minimum amount of lichen forest must be maintained for caribou. (This amount is to be determined through consultation with IFWD);
- harvesting and road construction will be minimized during the May 15 to July 30 calving period in operating areas adjacent to known calving areas;
- forest access roads, borrow pits and quarries shall avoid, where possible: known sensitive wildlife areas such as, calving grounds, post calving areas, caribou migration routes, caribou rutting areas and wintering areas.

As stated, both the Forest Services Branch and the Wildlife Division is in the process of identifying impacts of forest harvesting on critical caribou habitat areas through a research study that is being conducted in zone 5. The results of this adaptive management strategy will be applied to the forest areas identified in this plan. However, until the results of that study are finalized, the Forest Services Branch will work closely with the Wildlife Division with respect to areas proposed within this planning document.

**Bear**

- A 50-metre, no-cut, treed buffer must be maintained around known bear den sites (winter) or those encountered during harvesting. Den sites must be reported to the WD.
- FMD2 will continue to partner with the Wildlife Division in an attempt to determine local populations of black bears in the districts through a Bear Hair Snag project which was started in 2009.

#### 4.2.1.2 Furbearers

**Characterization:**
Ten species of furbearers occur in the FMD2; lynx, red fox, beaver, otter, muskrat, short-tailed weasel, red squirrel, mink, coyote, and pine marten (will be discussed in more detail in next section). Of these, red squirrel, mink and coyote are not native.

**Critical Elements:**
- forest cover for protection;
- water quality maintenance;
- riparian buffer zones along aquatic areas;
- snags and coarse woody debris (denning, nesting sites, etc.)

**Guiding Principles:**
**Fur Bearer Management Strategy:**
Recommendations concerning the management of furbearer species are developed annually by the Inland Fish and Wildlife Division, upon consultation with provincial trappers, Newfoundland and Labrador Trappers Association, general public, and departmental staff. Like the small game management plan, the fur management plan, reviews the status of each fur bearer species annually and addresses the season dates and lengths, and if necessary closure of areas (or no open season). Management of all fur bearing species in the zone will continue to be managed
through this process.

**Environmental Protection Guidelines:**

- To protect beaver habitat, all hardwoods within 30 metres of a waterbody occupied by beaver will remain standing during harvesting operations.
- 10 trees or snags per ha (preference to diameter >50 cm) are to be left standing to provide habitat for various species.

#### 4.2.1.3 Salmonids

**Characterization:**
The Atlantic salmon and the brook trout are native to the Island and are found in waterways surrounded by forested areas. There are 13 scheduled salmon rivers in FMD2 but it is recognized that habitat for all fish species should be protected.

**Critical Elements:**
- water quality maintenance;
- riparian buffer zones along water systems

**Guiding Principles:**

**Salmonid Management (Atlantic salmon and brook trout)**
Management of Atlantic salmon and brook trout in the Province is delivered by the Federal Department of Fisheries and Oceans (DFO). DFO annually sets bag limits, season dates, and river closure dates based on extreme water temperature..

**Protection**
- DFO recommends that a 100 metre no-cut buffer zone be left in designated sensitive spawning areas

- FMD2 staff will continue to designate a 50 metre no-cut buffer zone along designated scheduled salmon rivers and rivers known to carry local salmon runs.

- under the Environmental Protection Guidelines designated protected public water supply areas (PPSWA's) also provide protection for these species through existing Environmental Protection Guidelines that apply to these areas (ie. increased buffers, usually 150 meters on intake ponds, 75 meters on main river stems, 50 meters on major tributaries and minimum 30 meter buffer regulated in the rest of the district). Strict enforcement of these buffers will be continued during this planning period

- Minimum 20 meter no cut buffer on all water bodies in FMD2.

- Minimum 30 meter no-grub zone on road approaches to brook and river crossings

- A wildlife corridor is currently, and will continue to be, maintained along the North West River that will link the Terra Nova National Park with the Bay-Du-Nord Wilderness area and the headwaters of the Terra Nova River system. This corridor will have wider no-cut buffers along water-ways than are normal throughout the District. The salmon population was weak and declining in the Northwest River for a number of years prior to 2003. The population has shown signs of recovery since then. A wider no-cut buffer will provide habitat protection for the Atlantic Salmon.

- Creel surveys have been conducted in the last five years in FMD2. The District will continue a creel survey program, in co-operation with the Inland Fish and Wildlife

Division, on a select number of ponds on the Bonavista Peninsula. This program will target ponds that were recently accessed by forest resource roads or will be accessed during the coming five year plan. Creel surveys will be conducted for an extended period of years in an effort to create a data set which will help quantify the impact on trout populations of increased fishing pressure as a result of improved access for recreational fishing.

#### 4.2.1.4 Song Birds

**Characterization:**
The distribution of songbird species in a forest ecosystem is widely considered to be a relative indicator of ecosystem health. Many songbird species are distinct to specific habitats therefore; the presence, absence, or health of a specific songbird population can indicate the health of its corresponding habitat. Songbirds are also the natural predators of our native Lepidoptera pests (ie. looper and budworm) and help to control these populations. Consequently, their value cannot be underestimated.

**Critical Elements:**
- forest cover for protection;
- water quality maintenance;
- riparian buffer zones along aquatic areas;
- variety of forest seral stages and species (nesting sites, habitat, etc.)

**Protection**
- Protection of songbird species will mainly involve protection of their habitat through the various methods discussed in earlier sections.
- 10 trees or snags per ha (preference to diameter >50 cm) are to be left standing to provide habitat for various species.
- A series of song bird surveys have been conducted during the previous planning period at a number of sites in the District. Surveys of interior forest species have been conducted by District staff near Southwest River (Port Blandford) and the Plate Cove area during

the early summer breeding season. Also, District staff take part in a shore-bird breeding survey conducted by the Canadian Wildlife Service along selected survey routes during the same period. Finally, a Christmas bird count is conducted by District staff, in co-operation with local bird-watchers. This survey focused on bird-feeders and waterfowl staging areas in a circle with a fifteen kilometre radius which stretched from Clarenville to Port Blandford to Lethbridge. Organized by the North American Audobon Society, it is part of one of the longest running and largest wildlife surveys in North America.

#### 4.2.1.5 Other Avian Species

**Characterization:**

Other valued avian species include ptarmigan, grouse, migratory birds and raptors. The former includes important game species, while the latter (ie. raptors) occupy higher trophic levels in the food chain. Higher level trophic feeders are considered important indicators of ecosystem health as they are sensitive to environmental stress. Population trends for these species as defined by the Wildlife Division and Canadian Wildlife Service (CWS) are available on a regional basis.

**Critical Elements:**
- forest cover for protection;
- water quality maintenance;
- riparian buffer zones along aquatic areas;
- snags and coarse woody debris (prey habitat)
- buffer zones on nesting sites

Protection
- Under the Guidelines for Ecologically-based Forest Management, no forestry operations are to occur within 800 metres of a raptor nest during the nesting period and not within 200 metres in the off nesting season. These guidelines are attached as terms and conditions to all commercial operator permits.
- The locations of all known bald eagle and osprey nests will be identified on all cutting maps and harvesters will be informed of their locations by Forest Services Staff. Regular

operator checks and routine patrols of domestic cutting areas by Forestry Staff will ensure compliance of these guidelines.

- FMD2 will continue to partner with the Inland Fish and Wildlife Division in an attempt to track local populations of eagles in the districts through nesting surveys, eagle chick banding, and radio harness tracking projects.

#### 4.2.1.6 Rare and Endangered Species

##### 4.2.1.6.1 Newfoundland Marten

**Characterization:**

Before 1900, marten ranged over most of the forested areas on the island. Unfortunately, today are listed as a threatened species by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC). Habitat loss, predation, disease and accidental trapping and snaring are thought to be primary reasons for marten population decline. Marten still naturally occur in three main areas on the island including: Main River watershed, Little Grand Lake and Red-Indian Lake areas. Additionally, marten also now exist at Terra Nova National Park (TNNP) and surrounding landscape. As well, in the Bay Du' Nord Wilderness Area around Lake St. John through a relocation effort by the Newfoundland Marten Recovery Team. Representatives from TNNP, Forest Services Branch, IFWD and CBPPL are represented as stakeholders of the recovery team. The purpose of this team is to set short-term and long-term population goals for the species in Newfoundland and recommend ways which this may be accomplished. The Team has been established for some time now and has worked on the process of evaluating critical and recovery marten habitat and determining which forest activities can take place within these areas. Approximately, 30 marten have been relocated to Eastern Newfoundland since the mid 1980's resulting in an estimated current population of 35-40 animals. Once listed as Endangered, COSEWIC has now upgraded the marten listing to Threatened.

It is important marten habitat is protected in this area and some remnant stands of old growth (80+) forests remain throughout the zone. To accomplish this, a landscape approach to habitat management was initiated by the Forest Service in 1999. This involved working with stakeholders to identify critical or potential marten habitat,

locating possible corridors, and identifying areas which would not be cut in the near future. This initiative has been ongoing since that time.

**Critical Elements:**
- sufficient habitat to support a viable population of marten;
- areas of known marten populations remain closed to dry land trapping;
- continued use of approved snare wire types.

**Guiding Principles:**
The basic unit for evaluation will be home range size for male ($30km^2$) and female ($15km^2$). All forest types can be considered marten habitat if they meet the following requirements:
- sufficient habitat to support a viable population of marten;
- 70% or greater of that unit must be suitable habitat;
- 40% or greater of the unit should have trees greater than or equal to 9.6m in height;
- The remaining portion of the 70% (30% or less) should have trees from 6.6 to 9.5m;
- 50% of the unit should be contiguous; stands will have to be within 50 m of an adjacent habitat to be considered contiguous.
- A qualifying stand will have to be within 150 m of another stand or habitat patch to be considered as habitat.
- minimum patch size equals 20 ha;
- basal area requirement equals 40 $m^3$/ha (~18 $m_2$);
- hardwood stands (insect kill, wind throw) will be considered where crown closure is greater than or equal to 30%;
- Softwood scrub that meets the minimum requirements (6.5 m) will be considered habitat.

Where height is not known, softwood scrub within 50 m and adjacent to a qualifying stand is considered as habitat. As stated, critical and recovery pine marten habitat is being or has been identified. The development and evolution of the marten habitat suitability model in recent years has been a useful tool in identifying potential marten habitat and evaluating impacts of harvesting on this habitat and resultant changes to population levels. Continued development and refinement of this model will provide more a reliable

means of evaluating impacts of harvesting on marten habitat in the future. There is also ongoing research into a variety of aspects of marten dynamics through the Model Forest, Canadian Forest Service, and University of Maine.

- In conjunction with the Department of Environment and Conservation, marten presence/absence will be determined in proposed harvest blocks that overlap with marten core areas.

Recommendations resulting from any of these ongoing initiatives will be incorporated into harvesting prescriptions as required.

#### 4.2.1.6.2 Red and White Pine

**Characterization:**

Provincially, the range of white pine is shrinking due to a variety of reasons including past harvesting practices and infection from blister rust. Red pine is the rarest tree species in the province with a distribution of some 22+ small stands (<15,000 trees in total). Local protection is required to maintain local and provincial biodiversity.

**Critical Elements:**

- maintenance or enhancement of stands on the landbase
- minimizing loss of trees/stands through public education
- minimize losses to fire, insect and disease
- enhancement of younger age classes through planting natural regeneration and pruning to ensure continuance of the species
- maintenance of native genetic stock

**Guiding Principles:**

- enforcement of forestry act, regulations, guidelines and policies
- gene preservation gardens for these species and a clonal orchard for white pine have been developed by DNR at Wooddale Tree Nursery. At some point, the goal is to produce seed from these gardens/orchards to grow pine seedlings of native origin.
- some native red pine stands are protected under reserve status.

- DNR has adopted a no cutting policy of pine by non traditional users and a phase out of cutting by traditional commercial users. Currently, no commercial operators harvest pine in FMD2.
- protection of these species in the district is expected to be strengthened by public education and no-cut conditions on permits (both domestic and commercial).
- implementation of silviculture treatments designed to merge pine back into the landscape.
- DNR is collecting seed from red pine stands of native origin and the collection of white pine scions for the clonal orchard at Woodale
- DNR also implements stand level silviculture prescriptions such as pruning of immature white pine to reduce the infection rate of blister rust and cone production enhancement on red pine to ensure an adequate supply of native red pine seed.

#### 4.2.1.6.3 Red Crossbill

The red crossbill, is currently listed as endangered. The Newfoundland Forest Service currently has a representative on the recovery team for this species. Any recommendations on modified forestry activities, if any, will be developed with input from all members.

#### 4.2.1.7 Water Resources

**Characterization:**

The protection of water resources has emerged as a major issue in recent years both nationally and provincially. Events such as the E.coli 0157 outbreak in Walkerton, Ontario, our own Trihalomethane (THM) controversy, and numerous incidents of giradiasis in community water supplies have heightened public awareness on water issues. While much of the current focus is directed toward drinking water, it is also recognized that an equal importance must be attached to waters which have other beneficial uses. Human impacts both locally and globally have the potential to impair water for future uses.

In FMD2, there are approximately 40 865 ha or 8.5 percent of the total area of lakes, ponds, rivers, brooks and streams. There are 91 communities within the District, many of

which derive their potable water from 18 Public Protected Water Supply Areas (PPWSA's). It is the responsibility of the Department of Environment to monitor water quality of these protected areas. Recreational waters within this zone are used for activities such as fishing, boating and as a water supply source for numerous cabin owners.

Human activity has the potential to alter water quality and water quantity. Commercial forest harvesting activity results in construction of new and upgrading existing access roads. If not constructed properly, this activity has the potential to negatively impact water quality. Mining operations within the zone are limited to mostly small quarrying operations for gravels and dimension stone and are typically associated with road construction. Some exploration activity for base metals has occurred sporadically throughout the region. Hydroelectric development has resulted in one brook diversion.

**Critical Elements:**

Forest management activities such as road construction, maintenance, timber harvesting, and silviculture may potentially alter the quality of water draining from watersheds. As well as other defining characteristics such as stream hydrology, sediment loadings, stream characteristics, and aquatic discharges from municipalities. Careless storage and handling of fuels by industrial and recreational users, stream diversions and agricultural operations are other examples.

**Guiding Principles:**

- There are numerous protective measures listed in the Environmental Protection Guidelines under the broad categories of road construction, stream crossings, road abandonment, fuel oil handling and storage, support services and structures, harvesting, silviculture, and protected water supply areas. The EPG's are listed in their entirety in Appendix 2 and specific guidelines under the above sections can be found there.
- The use of remote sensor technology will be investigated, and may potentially be available during this planning period, to monitor effects of harvesting on groundwater in Protected Public Water Supply Areas.

### 4.2.2 Human Values

#### 4.2.2.1 Timber Resource

**Characterization:**
One of the resource values is harvesting of timber to provide forest products. Historically, timber has been harvested since the first inhabitants settled in the zone. Initial uses were mainly domestic in nature to supply timber to build houses, fishing sheds, heating and cooking. With the increase in population, more commercial uses have arisen for timber, which includes: lumber, pulp and paper products, and value added products. FMD2, in the last five years has supported a combined, commercial and domestic, annual allowable cut (AAC) on Crown land of approximately 80 000 $m^3$ softwood and 3000 $m^3$ hardwood.

Domestic harvesting still provides fuelwood to heat many homes and sawlog material for residential home construction. Annually, there are approximately 2500 domestic crown permits issued in FMD2 and 1300 permits in FMD3.

Commercial activities provide many jobs in harvesting, sawmilling, trucking, pulp and paper manufacturing and related spin off industries for local residents.

Silviculture treatments are important to the forest resource because it ensures a vigorous and healthy forest is maintained. Forest renewal activities ensure productive landbase is maintained by planting areas that are not sufficiently restocked. Forest improvement activities help improve and enhance the growing stock which can reduce harvest cost, enhance forest product options and increase sustainable timber supply.

Protection of the forest from various disturbances is also a major characteristic of resource management. Because of the long fire history in the zone, protection through well maintained and/or upgraded initial attack equipment (i.e. water bombers, pumps, hose and trucks) and well trained fire management staff is required. A large fire today in the older softwood forest would be devastating to industry. While insect kill has not been

a major disturbance in recent years, protection is still critical since there is a significant area of thinned balsam fir stands, which is paramount to future AAC's. Protection of other resource values through modification of activities and enforcement is also important.

**Spruce and Fir**

Black spruce, white spruce and balsam fir are the main sawlog and pulpwood species within the province. Within this district, black spruce accounts for the majority of the softwood harvest. Black spruce fiber is valued for its strength properties in lumber and pulp and paper products. Recently, Newfoundland black spruce received the highest strength rating in North America for use in the production of wooden I-beams. Additionally, spruce and fir-dominated stands comprise more than 77 % of the available forested habitat in the zone.

These species are managed for maximum sustainable harvest levels though the harvesting and silviculture strategies referred to later in section 6. Protection and long term sustainability of these species will be achieved through strict adherence to AAC's and refinements to future woodsupply analysis.

**White Birch**

Traditionally, white birch has been a valued species for domestic fuelwood. However; it is now emerging as an important value-added species within the sawmilling and value added manufacturing industries of the province. It also has recently been researched for its ability to produce sap and the subsequent global marketability of this product.

Additionally, white birch benefits the cycling of nutrients, the structure of forest soils, and can help in the reduction of insect infestations and in the decrease in spread rates of forest fires (Perry, 1994). White birch dominated stands comprise approximately 15% of the forested land base in FMD2. With efforts to manage this species on a sustainable basis, in 2002 the first AAC's were developed for white birch and were refined in the

2005 woodsupply analysis. One of the criteria of species sustainability is its ability to regenerate. To aid in the sustainability of white birch, silvicultural prescriptions are being considered and designed to favor its regeneration. Implementation of this prescription would help facilitate a birch component on the landscape, increasing the diversity of both flora and fauna and maintaining natural processes within managed stands.

**Critical Elements:**

The overall objective is to ensure the AAC is maximized while taking into account other resource values and conducting environmentally sound operations. This is achieved by

- maintenance or enhancement of productive landbase
- planting of non-regenerating areas
- maintenance of the white birch component
- minimizing loss of landbase to other users
- minimize losses to fire, insect and disease
- timely access road construction
- enhancement of younger age classes through thinning to correct age class imbalance
- maintain both a sawlog, pulpwood and firewood industry

**Guiding Principles:**

- enforcement of forestry act, regulations, guidelines and policies
- maintenance of AAC's; adherence to harvest schedules
- minimize loss of productive land base through spatial and temporal compromises and continuous dialogue with other resource users
- maintenance of white birch sap production and harvesting activities occur at the landscape level without negative impacts to either activity
- education (staff, public, operators)
- aggressively conduct silviculture, access road, and protection activities
- implement best management practices.

The Environmental Protection Guidelines for Ecologically Based Forest Resource Management outline courses of action and mitigative measures for conducting forestry

activities. These EPG's are outlined in their entirety in Appendix 2 with some highlighted subject areas listed below:

- silviculture and harvesting activities
- mineral soil exposure
- buffer requirements
- road and bridge construction
- garbage disposal
- fuel storage

#### 4.2.2.2 Agriculture

**Characterization:**

Studies show 100,000 ha or 0.9% of the Island has mineral soils suitable for farming. There is substantial agriculture industry in the district, with considerable potential to expand and provide increased economic benefits. Commercial agriculture is concentrated in the Lethbridge and Port Blandford areas. Agricultural products produced represent a significant portion of the total agriculture industry in the province. There are 19 commercial farms in FMD2 and 8 in FMD3, which include farms in the livestock sector (poultry, beef, hogs, sheep and fur), as well as in the Crops Sector (vegetables, small fruit, forages, Christmas trees and greenhouses production). In the past few years, over 40 hectares have been developed for intensive blueberry management in FMD2, however this area is not currently in full production. Recently, in the province there has been a thrust to develop the cranberry industry. Cranberries originating from managed areas have the potential to draw a higher market value than wild berries.

**Critical Elements:**

Surveys indicate approximately five percent of soils in the province are suitable for agriculture. It is difficult to identify and plan all sites for potential future agriculture use and often this will result in conflicts with other land uses, particularly forestry because these sites are of high growing capability. Although a suitable landbase is the first critical element necessary for a successful agriculture operation, markets and the interest of individuals are also prime factors in the development and location of future farms. In the

spirit of managing the ecosystem for multiple benefits, provisions will be available for the agriculture industry to expand.

**Guiding Principles:**

Lands designated for forest management can include areas with high potential for agriculture. Consequently; the Forest Services Branch will work with the Agriculture Branch to determine where potential opportunities exist for agriculture development areas. The agriculture leasing policy initiated in 1976 ensures new or existing land allocated for agriculture continues to be used for agriculture. The leases have no provision for fee simple grants and must be used exclusively for agriculture purposes.

The following will provide guidance for the development of agriculture within the zone:

- New agriculture leases should include a business plan approved by the Forestry and Agrifoods Agency of the Department of Natural Resources.
- All merchantable timber located on proposed agriculture leases shall be harvested, in a timely manner, by existing commercial timber harvesters and that volume balanced against the current AAC.
- Where possible, existing commercial timber harvesters should be encouraged to work with farmers to clear existing leases for development.
- Existing farms be permitted to expand. Expansion will be on adjacent lands or on suitable lands within the district and area.

### 4.2.2.3 Mining

**Characterization:**

Within FMD2, there is a diverse geological environment which hosts a wide variety of both metallic and industrial minerals including, but not restricted to; copper, nickel, lead, bitumen, granite, gneiss, marble, gold, asbestos, silver, iron, limestone molybdenum, uranium and thorium. There is also granite with dimension stone potential. Some of the geologic history of the zone features rock types and rock formations which indicate the processes and geologic ancestry of the parent material, from which some of the soils of the districts ecoregions were derived. In FMD2, there are 2463 claims staked in 110 mineral exploration licenses and one mining lease for slate at Nut Cove. The majority of claims has been staked for their precious (e.g. gold, silver) and base (e.g. zinc, copper) metal and dimension stone (e.g. granite, gabbro) potential. In addition, some claims have

been staked for their industrial mineral (e.g. silica, mica, talc) potential. Exploration activities typically consist of prospecting, geological mapping, grid line-cutting, geochemical surveys, ground and airborne geophysical surveys, mechanized trenching and diamond drilling. In addition, there are 120 of active quarries in the FMD2 which generate significant royalties.

Similarly, in FMD3, there are 3053 claims staked in 204 mineral exploration licenses with 3 mining leases (all for fluorite in St. Lawerence) and 104 active quarries.

These figures are included to illustrate the significant contribution that mining has to the local and provincial economy.

**Critical Elements:**

Location of deposits close to markets is vital in controlling aggregate costs which often increase dramatically with increased transportation distances.

**Guiding Principles**:

Harvesting timber for prospecting lines must meet the same rigor as commercial harvesting. The mining industry should enact best management practices to minimize negative impact on ecosystem values.

- Ensure that quarries and open-pit mines are rehabilitated. The organic overburden should be stockpiled and stored in a manner so that it can be used to rehabilitate the site.
- Maintain updated maps of mineral potential, mineral claims and aggregate and quarry areas at the district office.
- Avoid planning silviculture activity in areas adjacent to mines or quarries.
- Make every attempt to extract timber harvested as part of exploration and development. If timber can not be feasibly extracted using conventional means then timber shall be piled so that it may be extracted during winter months by snowmobiles.
- Mineral exploration that proposes to explore or develop within a silviculturally treated area must be undertaken with minimal disturbance and provide compensation as required
- Mineral exploration and/or development on mineral licenses within the zone will not be impeded. Specific proposed harvesting activities are identified in the annual operating plan.
- Quarry permits are required for aggregate material taken outside of the road ROW for purposes of road construction

- Non-compliance with exploration permits will be passed to the District Manager and submitted to Mines Division, Dept. of Natural Resources.

#### 4.2.2.4 Historic Resources

**Characterization:**

The provincial archeology office (PAO) is the agency responsible for management and protection of archaeological sites and artifacts in Newfoundland and Labrador. This program is carried out under the Historic Resources Act, which ensures any development with potential to have adverse impacts on historic resources are investigated and monitored by a qualified archaeologist, through an archaeological impact assessment.

Archaeological sites are non-renewable resources and are considered a vital role in understanding our heritage. It is important to professionally record as much information as possible at an archaeological site to fully understand its history. To do this properly, the site must not be disturbed. Generally, archaeological sites are small, spatially bounded units. Therefore, protecting these resources usually do not have an adverse impact on forestry activities.

Archaeological surveys have been carried out in several areas within the district over the years, however many areas still remain to be surveyed. To date there are many archaeological sites within the district which are protected under the Historic Resources Act. There is potential for other historic resources to be found in the zone.

Archaeology projects provide many seasonal jobs and many of these people are successful in obtaining employment in archaeology and conservation for longer periods of time. By calling for archaeological impact assessments on projects which have potential to negatively impact historic resources the PAO is providing jobs for consulting archaeologists in the province. New businesses are created as a result of archaeological projects. These businesses include bed and breakfasts, boat tours, restaurants and gift shops.

**Critical Elements:**

Major threats to historic resources are projects involving activities which disturb soil layers and/or provide unintended public access to the archaeological resources. Forestry

activities such as construction of access roads and bridges, harvesting and mechanical site preparation have the potential to negatively impact valuable historic resources. When impact assessments are carried out and new sites found, it adds to our understanding of Newfoundland and Labrador's heritage. When archaeological sites are discovered through impact assessments, these resources are protected from damage or destruction.

**Guiding Principles:**

Any project involving land-use has the potential to adversely impact historic resources. Therefore, it is important the Provincial Archaeology Office is involved at the planning stage to ensure mitigative measures that protect historic resources. Known archaeological sites and potential unknown sites are protected by utilizing no harvest buffer zones, whereas archaeological assessments may be required in other areas. Archeological buffers are typically required along rivers and ponds, as well as, along the coastline where there is a high potential for archaeological resources to be found. Occasionally there are accidental discoveries made of historic resources. In the event this does happen, activities should cease in this area and contact be made immediately with the Provincial Archaeologists at 729-2462.

### 4.2.2.5 The Greater Terra Nova Ecosystem

**Characterization:**

The primary role of Canada's national parks is maintenance of ecological integrity. Although enshrined in policy for many years, this role has recently been given prominence in legislation by the passing of the Canada National Parks Act in October 2000. The Report of the Panel on Ecological Integrity of Canada's National Parks (February 2000) noted that parks all across the country (including TNNP) are under threat from stresses both within and outside the national parks. Ninety percent of forested parks are under stress from external forestry activities. The primary challenge for national parks in maintaining their ecological integrity is that most parks are part of larger ecosystems and the area set side for the parks is not large enough to protect the full integrity of that ecosystem. Large-scale changes on the landscape surrounding parks can

isolate the park ecologically creating an "island". Parks Canada must work with adjacent land managers in striving to achieve its mandate.

Biodiversity goes beyond the range of wildlife and plant species to include the range of habitats and landscapes. Loss of special habitats such as old-growth forest and associated species may impair the ecological integrity of TNNP in ways that are not currently understood. In recent history, the endangered Newfoundland pine marten has been relocated to the park and in some of the adjacent forest. Habitat connectivity with other core populations may be critical to long term survival of marten in TNNP. While ecological integrity has prominence regarding the management of national parks, legislation and policy dictate broader responsibilities for national parks. These include providing opportunities for Canadians and others to have high-quality experiences in a natural setting.

**Critical Elements:**
- to maintain ecological integrity
- to maintain native biodiversity and natural processes.
- to maintain viable wildlife populations

**Guiding Principles:**
The long-term effect on the park's ecological integrity can rarely be isolated to one cause and is more often due to the effects of many activities. For that reason it would be important to assess the cumulative environmental effects of all activities as part of the forest management planning process.

- maintain species composition as well as the age structure and ecological functions of the various forest-types across the landscape over the long term.
- maintain proportion of interior forest (mature forest >250 m from an “edge”)
- maintain landscape connections between the park and the surrounding landscape. This would require effective, permeable movement zones between populations and/or critical habitats.
- manage and operate according to the precautionary principle, particularly as it relates to species at risk.
- ensure landscape characteristics are maintained that allow marten to achieve

their habitat requirements at the landscape scale This could mean ensuring forest management practices allow for a continuous distribution of marten habitat and home ranges to the park boundary. A conservative approach that preserves future options should be adopted until the marten guidelines are fully developed.

- A wildlife corridor is currently, and will continue to be, maintained along the North West River that will link the Terra Nova National Park with the Bay-Du-Nord Wilderness area and the headwaters of the Terra Nova River system.

- District staff are currently committed to applying viewscape preservation principles in the Clode Sound.

#### 4.2.2.6 Recreational Trails

**Characterization:**
**Newfoundland T'Railway**

A large section of the Newfoundland T'Railway Provincial Park lies within the zone and has an impact on forestry operations. The former CNR right-of-way, which is 25 feet each side of the center line, is the main route for the T'Railway, with some minor deviations. It provides for an all season, multi-use recreation corridor developed and managed with community partners to maximize adventure tourism and recreational opportunities.

The T'Railway is protected for the present and future enjoyment of the public, as part of a system of provincially designated parks and natural areas. The Provincial Parks Act provides the legislative framework for the administration and management of the T'Railway, which constitutes the Province's contribution to the Trans Canada Trail System. It is the largest provincial park in the Province with the most users. It is used primarily for snowmobiling, skiing, hiking, walking and all terrain vehicle usage. Other new or historical uses such as commercial and domestic harvesting access, quarry and mining access and cabin access are also permitted with a special permit.

**Other Trails**

As one of the referral agencies for Crown Land development, the Department of Natural Resources has an important role in the approval of recreational trail systems.

Ultimately, the Department also plays an important role in the maintenance of the trails through enforcement of its cutting of timber regulations - which is critical in controlling indiscriminate cutting of the treed buffers and preserving the natural aesthetics of selected trail systems.

Request for recreational trails arise from a number of stakeholders: including cabin associations; cross-country ski trail associations; municipalities; snowmobile associations; and tourism development associations. In all instances, these stake-holders are interested in preserving the aesthetics of well-travelled recreational routes. Most cabin associations which seek the designation of a buffered trail are located in remote locations accessed only by an ATV trail. Cross-country ski trails are generally circular routes near communities with a strong interest in this winter sport. Municipalities often ask for protection of popular hiking trails to points of interest near their communities. All known cross-country ski trails, hiking trails, ATV trails and snow-mobile trails are shown on the Map Series in Appendix 6.0.

The Discovery Trail Tourism Association has developed a series of scenic coastal hiking trails along the northeastern end of Bonavista Peninsula in an effort to offer new attractions in the area and help an already well-established and growing local tourism industry. These trail systems are particularly sensitive to indiscriminate cutting and, if properly protected, provide an opportunity to support further economic growth in the area. It is widely recognized in the tourism industry that growth of an area as a tourist destination and the duration of stay by visiting tourists is highly dependent on the number, the quality and the diversity of attractions in the area. The Bonavista Peninsula has an abundance of very attractive seascapes that are appealing to visiting non-residents and locals alike - and deserve to be given adequate protection for economic as well as social reasons. Indeed, there are 5-star inns on the Peninsula which include these trails, some of which have been recognized as world class, as recommended attractions for visiting guests' itineraries. It is important in growing our local tourism industry that these visitors, from all corners of the globe, leave as envoys who can spread a positive word about our unique landscapes.

**Critical Elements:**

- protection of the historical landscape integrity of trail corridors
- preservation of the scenic quality along trail corridors
- control of land usage adjacent to trails

**Guiding Principles**

- coordination of activities with various other agencies responsible for land management outside the T'Railway corridor to ensure that the integrity of the park is maintained
- coordinate and build partnerships with other stakeholders and user groups such as communities, industry and recreational organizations for the long term maintenance and development of the trails
- in an attempt to preserve the natural value of the T'Railway, other land management agencies are requested to maintain a 100 m buffer and to consider viewscapes in their harvesting and development plans. Buffers of varying widths have also been applied to other trails in the planning zone.
- where access is required from the T'Railway, all roads shall be 100 meters away from the track before a landing or turnaround is constructed.
- where feasible, harvesting using the T'Rrailway shall be from May to December to avoid conflict with other user groups.
- DNR will assume a role in the future with regard to new trail approvals similar to its previous practise. During the referral process, DNR will consider the environmental impact, from an ecosystem perspective, and the impact on production forest of all new trail developments. All request for trail buffers will be carefully considered by DNR staff. Approval will be granted for protected trail buffers if the trail locations are reasonable with respect to the impact on the Districts production forest base. If there are request for recreational trail development within the District's production forest, then District staff will seek to find routes which will minimize the impact on the production forest and at the same time meet the needs of the stakeholders seeking the new trail approval. New trails will be included on the Districts GIS system as they are developed.

#### 4.2.2.7 Parks and Protected Areas

**Characterization:**

The mission statement of the natural areas program is to protect in an unimpaired condition, large wilderness examples of provincial ecoregions including their natural processes and features and rare natural phenomena, so as to preserve the diversity and distinctiveness of the Province's ecologically sustainable future for the benefits of present and future generations. Natural areas are store houses of natural diversity that exists in a wild, pristine state. They serve as ecological bench marks indicating the natural succession of forest ecosystems. They also preserve in perpetuity, provincially significant representative and special natural features and outstanding recreational environments.

There are many types of protected areas in the province. The Wilderness and Ecological Reserves Act enables the Province to establish the following; wilderness reserves (Component 1), ecological reserves (Component 2 ) and protected sites (Component 3). Component 1 reserves are defined using the critical habitat of high level, wide ranging species i.e. caribou. They generally cross ecoregion boundaries, protect complete systems and are large (> 1000 $km^2$).

Component 2 reserves protect representative samples of ecoregions (not included in Component 1 reserves) and are mid-sized (50-1000 $km^2$). Component 3 reserves protect exceptional natural features, such as, rare species or areas of unusual biological richness and are generally small (< 50 $km^2$). The benefits of protected areas are to preserve biodiversity, provide areas for scientific research, provide opportunities for environmental education and provide standards against which the effects of development can be measured. Protected areas in or adjacent to FMD2 include: the T'Railway, Terra Nova National Park, Bay Du' Nord Wildnerness Area, and Lockston Path Park. As well there is a candidate proposed ecological reserve area representing the Northeastern Subregion of the Maritime Barrens Ecoregion which currently has interim protection.

**Critical Elements:**

- preservation of biodiversity
- maintenance of protected area integrity
- maintain natural processes and features

**Guiding Principles:**

- the Province of Newfoundland's Natural Areas Systems Plan recommends that a minimum of 12% of the province's entire land base be protected.
- only allow traditional (hiking, berry picking, hunting etc.) activities, educational activities and scientific research within protected areas provided the integrity of the reserve is not compromised
- prohibit all forms of new development such as mining activity, hydroelectric projects, forestry activity, agriculture activity, roads and trails and cabins and new structures.
- where forestry operations are within one kilometre of provisional and ecological reserves, wilderness reserves or provincial parks, modified operations may be necessary
- a 500 m no roads buffer is to be maintained around all existing and proposed protected areas to reduce access and resulting damage from motorized vehicles

### 4.2.2.8 Outfitting

**Characterization:**

An economic impact study conducted in 1995 by the Department of Industry, Trade and Technology suggests a big game license has a net economic impact of $6864. By approximating this value at $7000 for 2006, it is possible to estimate the economic contributions of this industry: approximately 300 licenses * $7000 / license = $2.1 million. An additional $135 000 is estimated to be brought in from fishing. (Bear hunting has not been included in the above figures). Given that 85 percent of the hunting market comes from the United States of America, it follows that the above monetary figures are reflections of money entering the Province from elsewhere. It should be recognized that

the outfitting industry provides this revenue to the Province each season and has the potential to do so indefinitely.

Over the past ten years, a significant number of traditional hunting and fishing businesses have diversified into non-consumptive aspects of the tourism industry. Such activities include, but are not limited to: snowmobiling, dog sledding, kayaking, canoeing, nature viewing, hiking, and wildlife photography. The ability to diversify has positively impacted the viability of outfitting operations and as such, increasing numbers of operators are considering these opportunities. Diversification can lengthen seasons of operation, increase and lengthen employment and reduce dependency on a single sector of the tourism industry. Pristine wilderness settings are necessary for many of these types of diversification.

**Critical Elements:**
Remote outfitting camps are dependent on their remoteness, where forest access roads potentially impact the ability of a camp to maintain its remote status. Increasing accessibility through establishment of access roads may lead to increased hunting and fishing pressures in a given area, which may lead to decreased success rates of tourists.

Forest access roads may also lead to increased resource development, which has a potential negative impact on both remoteness and game availability. Forest harvesting may also have the potential to impact negatively upon travel corridors, bear denning areas, and caribou feeding and calving areas.

While clients of big game and fishing outfitters are primarily interested in hunting or fishing experiences, they also show a great respect and admiration for pristine conditions and a healthy looking landscape. The landscape view experienced by clients plays a large role in leaving a lasting impression of the province. The view also has a direct impact on repeat client bookings and recommending the destination to others. Viewscapes become even more important once outfitters begin diversification into non-consumptive tourism activities. With these activities, there is no trophy to bring home and that which is taken away is the experiences (i.e. sights, sounds, smells, etc.).

**Guiding Principles:**

It is necessary to ensure properly managed areas remain around outfitting camps, which have been determined by relevant parties. These types of Buffer zones can be difficult to negotiate due to varying ranges of activity from operator to operator. Some operators make use of areas that are 8 to 10 kilometers away from the main lodge.

- consideration should be given to decommissioning roads and bridges (where possible) after forestry activity is completed. This will eliminate potential negative aspects to the hunting area by reducing the possibilities of increased hunting pressure. Access to hunters will be restricted or limited when roads are actively used for harvesting purposes.

-cottage development should be prohibited in areas adjacent to outfitting operations.

- where possible, harvest areas in the winter. Winter roads are less passable in summer and fall, which will facilitate reduced traffic.

- where possible, construction of new forest access roads should occur away from existing outfitting camps. Harvesting should be restricted around hunting and fishing camps during their season of operation. At these times, harvesting should occur as far away as possible from outfitters.

- forest operations will be undertaken in compliance with existing regulations

-efforts will be made to ensure the integrity of viewscapes from outfitter cabins is maintained when conducting forest operations.

- forest operations will be evaluated to ensure any garbage is removed.

### 4.2.2.9 Recreation

**Characterization:**

The Trinity, Placentia, Fortune, and Bonavista Bay areas have outstanding scenery, interesting topography, and opportunities for viewing wildlife and flora in a natural setting. These elements represent a small list of reasons why the zone is used extensively

for recreational purposes. Hunting, sport fishing, hiking, skiing, kayak/canoeing and ATV/snowmobiling are major recreational activities in the area. Non-timber recreational values are expected to play an increasing role in forest management practices.

**Critical Elements:**

Wilderness
Backcountry recreational activities are dependent on the existence of natural pristine wilderness areas. The temporary removal or alteration of this pristine wilderness through forest harvesting practices may result in decreased recreational activities for a given period of time.

**A**ccessibility
An increase in forest access roads may increase accessibility to remote areas. In turn, this may increase the amount of traffic in an area (both vehicular and pedestrian) and decrease the value of the experience for many recreational activities.

*Viewscapes*
The majority of individuals who are involved in recreational activities are concerned about viewscapes and many of the recreational activities occur because of a particular viewscape. The destination for many individuals is a result of the viewscape in that particular region.

**Guiding Principles:**
To prevent negative ecological effects and provide positive experiences, access and levels of recreational activities can be monitored. Public surveys can be used to measure the experiences and the levels of recreation occurring in the zone.

Wilderness

If possible, forest operations should avoid wilderness areas where high concentrations of recreational activities occur. Where operations are necessary, stakeholder meetings could prevent conflicts through temporal scheduling.

Limiting Accessibility
Decommissioning of forest access roads could be a possible option when forestry activities are completed. Where possible, harvesting should be conducted using winter forest access roads, which creates less traffic and better facilitates decommissioning. If possible, the Crown Lands division of the provincial government should implement a complete moratorium on cabin development on newly developed forest access roads. Cabin development will increase traffic in areas where many recreational activities occur.

**V**iewscape
Aesthetic views using landscape design techniques will be utilized in areas where forest operations occur with high concentrations of recreational activities.

#### 4.2.2.10 Tourism

**Characterization:**
The tourism industry in Newfoundland and Labrador is based on natural and cultural resources, where protection is important for the industry to survive and grow**.** The tourism industry in Newfoundland and Labrador has experienced significant growth since 1997.

Tourism Industry has been contributing between $580 and $700 million annually to the provincial economy. Government tax revenue from tourism in 1998 was estimated to be $105 million. The worldwide growth of tourism at rate of 41 percent, the national growth of 25 percent and the provincially growth of 33 percent indicates tourism is Newfoundland and Labrador's best opportunity for economic diversification and growth.
There are many excellent tourist destinations in the district. There are historic locations including Trinity and Bonavista. as well as wilderness tourism destinations in Terra Nova National Park and the Bay Du' Nord Wilderness Area. The department of Tourism has also identified a number of coastal areas that are important for long term tourism

development, which includes adventure tourism, in Clode Sound, Sweet Bay, and Smith Sound.

**Critical Elements:**

- viewscape
- accessibility
- wilderness ambiance
- remoteness

**Guiding Principles:**

Work with TNNP, Tourism Division, local tourism operators and local town councils in the vicinity of TNNP to implement strategies that minimize visual impact of harvesting operations on the aesthetic values associated with viewscapes. Strategies can then be discussed, negotiated, and implemented to provide a balance between harvesting and the values associated with tourism.

District staff are currently committed to applying viewscape preservation principles in the Clode Sound, South West River Valley, and Princeton Pond areas. The decision has also been made to defer some previously planned harvesting in the Charleston area until such time that visible cutovers have had enough time to "green up". It should also be noted that the previously planned harvest area in Sweet Bay has been postponed for this planning period as the commitment to viewscape preservation strategies, among other constraints, resulted in the area being deemed uneconomical to harvest.

# Section 5 Public Consultation Process

## 5.1 Planning Objectives

In recent years, there has been a shift from single resource management to a more comprehensive technique of forest ecosystem management. In its attempt to provide the greatest good for the greatest number of people for the greatest period of time, sustainable forest management (SFM) must be balanced in light of social, economic, and environmental issues. In the context of SFM this shift has resulted in a move from the traditional, narrow focus of timber management to incorporate non-timber values into the management planning framework. Another term that has become closely associated with SFM is “sustainable development.” Sustainable development, or in this case “sustainable forests”, not only takes into account the social, cultural, economic, and environmental benefits of the present, but those of future generations also.

The Forestry Act of 1990 outlines its approach as providing a "continuous supply of timber in a manner that is consistent with other resource management objectives, sound environmental practices, and the principle of sustainable development."

In the 1995 Environmental Preview Report the Newfoundland Forest Service has proposed an adaptive management planning process. This process has three objectives.

1. Establish a productive planning framework to include all stakeholders. An effective planning framework must have information and issues defined at the beginning of the process.
2. Learn more about forest ecosystems while they are being actively managed (i.e., adaptive management). Adaptive management incorporates strategies which help us to learn about the forest ecosystem and to deal with uncertainties.
3. Establish an ecosystem approach to forest management which integrates the scientific knowledge of ecological relations and limits of growth with social values. This will help to attain the goal of sustaining natural ecosystem integrity and health over the long term.

Adaptive management makes decisions based on input from all the stakeholders involved, and it establishes a continuous learning program. The adaptive approach allows us to communicate, share information and learn about forests being managed. This

sharing of information, both old and new, then provides the flexibility necessary to adjust to changes and to set new goals**.** Such interaction is an absolute necessity for a subject as complex as an ecosystem.

## 5.2 Planning Framework

In previous planning processes the planning teams were established for FMD 2 only. For this plan there was one planning team and planning process and one five year operating plan submitted for Planning Zone 2, which includes Forest Management Districts 02 and 03. The lack of forest inventory data prevented accurate forest management of FMD3 which subsequently resulted in limited reference in this document. All meetings held at Clarenville.

## 5.3 Planning Team Participation

An initial advertisement was placed in local and regional newspapers, informal invitations were sent to community leaders in the zone, and an extensive email to interest groups and individuals was done to inform potential participants of initial meetings in Clarenville. A press release was done by FAA a few weeks before the initial meeting.

The initial public meeting on February 22, 2011 was designed to explain the planning framework, review and approve the ground rules for participation, and to form the new planning team for the zone. The meeting was well attended by 22 stakeholders as well as a number of others who could not attend but who indicated via email that they desired to be planning team members. A list of all planning team members and their affiliations is shown in Appendix 2. Planning team membership was not restricted to those listed and was open to anyone who wanted to join the process at any time.

There were 9 planning team meetings held approximately every two weeks from February to July, 2011. There were presentations at each meeting by different stakeholders who identified their specific value and discussed the importance and potential impacts of forestry activity on these values. Maps of potential harvest areas as identified in the harvesting scheduling exercise, were posted during these meetings and digital versions were distributed, so any areas of concern could be spatially identified. All community councils and local service districts were sent copies of domestic cutting maps located around or near their respective communities along with a letter requesting that any concerns be forwarded to the planning team by June 9, 2011. A copy of the minutes, presentations and maps were emailed to planning team members after each meeting. Draft sections of the plan were circulated to the planning team for review between in the first week of July, 2011. Comments were received from planning team members and incorporated into the draft plan that was approved by the planning team at the July 14, 2011 meeting in Clarenville. At that time, maps and descriptions of operating areas were sent to various government departments with an interest in natural resource management for review and comment.

This final plan was prepared and submitted for Environmental Assessment in December, 2011. The comments received from the internal ADM review, as well as mitigations decided upon throughout the planning process are reflected in Section 8 of this plan.

Changes to harvest areas, or identification of processes to be followed in resolving conflict, were ongoing throughout the planning process and are reflected in the final operating areas presented in this plan. These changes or modifications to areas or processes that were established will be discussed in later sections.

# Section 6 Management Objectives and Strategies

## 6.1 Harvesting

The objectives of the harvesting strategy is to more efficiently utilize our available timber resources through timely harvesting of stands to prevent further loss of wood fibre and through improving the productivity of our forest through silvicultural practices. The forest in this District is part of the boreal forest which is characterized as being disturbance driven resulting in the formation of relatively even aged stands. The clearcut silvicultural system most closely emulates this natural disturbance pattern and therefore is the most preferred method employed for harvest. The size, shape, arrangement and juxtaposition of clearcut areas vary across the landscape depending on localized topography and terrain conditions. A modification of the clearcut system takes place in domestic areas whereby the cuts are relatively small and disbursed resulting in the creation of a range of age and development classes. Although selection harvesting, the periodic removal of only damaged or overmature trees from a stand, would be the appropriate silvicultural prescription for uneven aged stands, it is technically demanding and most often not feasible for the harvester. The clearcut system is the only harvest system being considered in the zone at this time.

### 6.1.1 Commercial

Section 3 outlines in detail a general approach for the timber supply analysis and specific results and sensitivity analysis for the FMD2. The model used to calculate woodsupply is a maximization model, outlining a specific course of action and timing of such actions to maximize timber production. The harvest schedule is an example which indicates the specific forest stratums to be harvested and an indication on the timing of such harvest. The districts must follow this schedule as closely as possible in order for the AAC to remain valid. In general, the oldest timber considered in worst condition and losing volume fastest is targeted as first harvest priority. Younger stands that have been damaged by insects and disease may also receive high priority. Once managed stands are eligible for harvest, this priority may change in some cases to allow for a faster rotation on good sites that are silviculturally treated.

Currently, there are only 2 large integrated sawmills operating in the Eastern Region, where 1 sawmill mostly utilizes all material harvested in its own operations and the other utilize the sawlog material from harvested areas and sell the pulpwood and pulp chips (sawmills residue) to CBPPL. As well, this operator can exchange pulpwood from Crown cutting permits to CBPPL for sawlogs.

Specific commercial strategies are as follows:

- utilize irregular cut block sizes that follow contours and natural boundaries where possible
- consider maintenance of unharvested corridors between harvest blocks to act as wildlife travel corridors
- vary buffer widths to protect other values (ie. larger buffers on salmon rivers)
- where possible, utilize winter harvest on wet and sensitive sites
- maintain current size and distribution of clear cuts
- use landscape design techniques to mitigate viewshed impacts on areas of concern
- keep losses through timber utilization to a minimum (< 6 m3/ha)
- all stems with a diameter of 9 cm at 1.3 m above ground will be utilized at time of the harvest.
- all harvested trees must be utilized to a top diameter of 8 cm.
- continue to encourage and pursue transfers and exchanges with paper companies to ensure sawlog supply for local sawmills.

### 6.1.2 Domestic

The harvest of domestic fuelwood and sawlogs occurs from three main sources in FMD2;

- Designated domestic cutting blocks.
- Utilization of cutover residue, dead timber and scrub areas
- Landing and roadside cleanup.

For the designated cutting blocks, the harvest scheduling and priorities apply, however it may not always be practical to follow. Domestic cutting blocks are generally established near communities where concentrations of existing timber are eligible for harvest. Typically, scattered throughout these blocks there exist timber that normally would not be scheduled for commercial harvest in the planning period. Ideally, each individual domestic cutter would be issued their own harvest block to ensure harvest of optimal stands. However, this is generally not practical and domestic cutters are allowed to harvest anywhere within the designated area provided immature timber is not harvested. For this reason, the optimal harvest schedule may not always be followed in domestic areas. Utilization of cutover residue, dead timber and scrub areas which are not part of the timber supply analysis would compensate this difference. Specific domestic harvest strategies include:

- target low volume stands which have poor commercial harvest opportunities
- encourage use of under utilized firewood species (larch, aspen and maple)
- target burned and insect damaged stands that are beyond commercial salvage
- where possible, target alienation Class 3 lands that have low commercial potential
- in areas of high domestic demand encourage alternate sources (cutovers, landings, scrub etc)
- monitor stands harvested in domestic cutting areas for compliance to the harvest schedule
- all stems with a diameter of 9 cm at 1.3 m above ground will be utilized at the time of the harvest.
- all harvested trees must be utilized to a top diameter of 5 cm.

### 6.1.3 White Birch

The harvest of white birch occurs throughout the planning zone in close association with softwood harvest for sawlogs, pulpwood and firewood. In many instances, it is an integrated aspect of both commercial and domestic harvesting activities. In recent years, there has been an increase in commercial demand for white birch sawlogs, resulting in the development of several value added sawmills in the province. The value added

industry focuses on products such as cabinet stock, flooring, guard rails posts and pallet stock.

Specific harvesting strategies include:

- encourage the use of sawlog sorting by commercial harvesters
- encourage the development of relationships between harvesters and value added white birch sawmillers.
- target overmature white birch stands that are forecasted to succumb to mortality
- monitor stands harvested in all areas for compliance to the harvest schedule and AAC's for each fiber source

### 6.2 Silviculture

Section 1.4.1.4 describes regeneration patterns of major tree species by each disturbance type and generally by ecoregion. On average, there is 20 % natural regeneration failure rate (NSR) across all disturbance types. Generally, areas not regenerating naturally are renewed by some combination of site preparation and planting. Areas regenerated naturally are either left to develop naturally or may receive an intermediate stand density management treatment. In the case of balsam fir which is a prolific regenerator and usually forms an overstocked stand, some form of thinning is usually applied to improve the growth and development characteristics of the regenerating stand. However; recently in FMD2, there is concern about the type (species) of regeneration because of increased presence of balsam woolly adelghid in the area. In these areas, regeneration to balsam fir may not necessarily be acceptable on certain site types. In other areas, the presence of kalmia causes problems because of its allelopathic effect on natural and artificial black spruce regeneration. As a result of these concerns with balsam fir regeneration and kalmia, planting levels tend to be much higher in this district as compared to other areas in the province.

#### 6.2.1 Forest Renewal

Forest renewal silvicultural treatments are designed to ensure a new forest is established after disturbance by harvesting, insect, wind or fire. Working on the forest inventory

assumption that 500 ha of forest is removed annually through disturbances such as wind, fire, and harvesting, the goal in FMD2 would be to plant 350 ha per year and leave the remaining 150 ha to regenerate naturally. In most regions of the Province, prescriptions normally involve some form of treatment to prepare the site for accepting seedlings. Planting (either full or gap) is completed to ensure stocking of desired species is at acceptable levels. To ensure this, significant site preparation has been undertaken by the Crown within this distrct. Treatment of black spruce and balsam fir sites which have been harvested normally involves row scarification. This treatment of disc trenching the site one year prior to planting is required to produce an acceptable number of microsites, which, created via row scarification, are superior because they are a mixture of organic material and mineral soil.

Kalmia is an ericaceous species inhibiting growth of spruce seedlings through the production of chemicals considered toxic to spruce. As well, Kalmia restricts available nutrients on the site, causing not enough nutrients for spruce seedlings to grow properly. Where present, Disc trenching breaks up Kalmia root mats and allows the site to be better accessible and suitable for planting through the alignment of harvesting slash. The majority of the planting requirement in the district is considered full planting of disturbed sites, and without scarification, planted seedling success in FMD2 would be much lower than realized today. Depending on the site capability, the preferred planted seedling species is mainly with black or white spruce and to a lesser extent Norway spruce, larch (eastern and Japanese), red or white pine. This treatment is designed to regenerate disturbed sites to a stocking level that will produce equal or better harvest volumes than the original stand on similar tree numbers and shorter rotation lengths. Gap planting is completed with the same species as above, coupled with the natural regeneration already present on site results in a mixed softwood forest.

Where possible, seedlings are grown with seed from local seed sources. A seed orchard has been established at Wooddale Provincial Tree Nursery to produce seed from plus trees collected through out the district. Plus trees are normally selected because they have superior growth and physiological characteristics. First generation white spruce seed has already been produced at the nursery and some seedlings grown from this genetically

superior source have already been planted in the district. The ultimate goal is to establish plantations that have superior growth characteristics and thus increase yield and lower rotation lengths, while still maintaining genetic diversity.

Exotic species have been planted in operational trials at limited locations in FMD2. These mainly include Japanese larch and Norway spruce because of their superior growth capabilities on particular sites. However, it is not anticipated this will form any substantive proportion of the provincial planting program.

In some limited cases, herbicide treatment may be required. Herbicides, while used sparingly, are sometimes a necessary tool to help establishment of a new forest, particularly on the better sites. In this district, these sites are typically rated as “good or high” capability and are located on seepage slopes. These sites typically revert to NSR dominated with alder after disturbance. Reforestation of these sites is important as they are the better growing sites, and placing them back into rotation will help maintain the productive forest land base. An herbicide treatment will allow the planted crop species to “get the jump” on the competition through suppression of the alders occupying these sites. Non-crop species and other forest plants and shrubs typically rebound after suppression with herbicide, minimizing the long-term biodiversity on the area.

Natural regeneration of softwood species throughout the district, typically relied on the excellent dispersal of balsam fir after clear cutting. However, as stated earlier balsam fir in this district has become seriously infected with aphid. As a result, natural regeneration of balsam fir is seldom accepted. However, natural regeneration of white birch is becoming an issue in the province. As noted in earlier sections white birch is an emerging commercial species. To ensure the long term viability of white birch supplies, regeneration methods will have to be implemented. Planting of white birch is not seen as a realist option as the high populations of moose and rabbits in this zone would destroy seedlings as a browse source. It is recognized that replacement of white birch dominated stands after disturbance will require the establishment of a dense seedling cover. Over time the seedlings that are not browsed can be developed into valuable trees through other silvicultural techniques (e.g. thinning and pruning). One possible technique

involves leaving a specified number of white birch seed trees on applicable sites as seed sources for the next generation. Since white birch is a very prolific seed producer/ disperser, only limited seed trees are required (ie 2-10 per ha). The next phase of seed tree regeneration will involve a light broadcast scarification of harvested sites to produce as many microsites for white birch seedling establishment as possible.

### 6.2.2 Forest Improvement

Forest improvement prescriptions are designed to treat established forest stands in an attempt to enhance development. These treatments usually involve thinning overstocked balsam fir stands at either a young age 10 -15 years (precommercial thinning), or an intermediate age 25 - 35 years (commercial thinning) or cleaning/maintenance of young plantations 10-15 years of balsam fir in growth. Precommercial thinning and plantation cleaning reduce density levels in overstocked areas in order to maximize volume increment and operability (piece size) in the shortest period of time. Trees removed are not of merchantable size and are left behind to return the nutrients to the site. Balsam fir is usually thinned to favour any spruce that may be in the stand. In this way a mixed softwood stand is produced (depending on the original density of spruce) which is more diverse and less susceptible to insect infestation. As well, any hardwood species that are not in direct competition with spruce or fir are left to increase the biodiversity of the stand.

Commercial thinning activity may be undertaken on older balsam fir stands and is designed to capture mortality that would normally occur in the stand through self thinning. The trees harvested are of commercial size and are extracted and utilized. The remaining trees are left to grow, free from competition and are harvested when mature. By salvaging this eminent mortality a higher yield can be obtained in these stands. As with precommercial thinning, spruce and hardwoods are left where possible to increase the stand diversity. This treatment has hardly been used in FMD2. Both types of thinning and will produce large diameter stems in a shorter time period which should increase the percentage of merchantable volume in stands that is suitable for sawlog material. Specific silviculture strategies include:

- ensure regeneration of areas disturbed by harvest, insect, wind and fire to prevent loss of and/or increase the future productive forest land base
- use thinning/cleaning techniques in young stands to increase stand development, reduce rotation age, and improve stand quality through removal of aphid attacked balsam fir regeneration and increase the percentage of sawlogs in stands
- where possible, promote species mix, particularly with spruce and hardwoods to reduce susceptibility to insect attack and increase biological diversity
- where possible, use seedlings grown from local seed sources to protect genetic diversity
- ensure levels of planting and thinning used in the wood supply analysis are achieved
- work towards pre harvest planning to identify areas with potential balsam woolly adelgid problems so that alternate silvicultural prescriptions can be promptly employed
- continue development and implementation of silvicultural strategies designed to regenerate existing white birch dominated stands to white birch where applicable, as well as strategies designed to develop the white birch component of managed stands

### 6.3 Forest Access Roads

Timely access to harvesting areas is the key to successful implementation of harvest allocations. Roads also provide access for other recreational values such as hunting, fishing, skiing, berry picking and hiking. However, it is recognized roads can also have a negative impact both from an environmental perspective (loss of productive land base) and other value perspective (access near remote outfitting lodges).

As a general principle from both an environmental and cost perspective, the minimal amount of road required to effectively harvest available timber will be built. As well, roads are constructed to standards (eg. width of right-of-way and driving surface etc.) that are the minimum required to access the timber in a safe and effective manner. Forwarding distances are maximized to the economic limit to minimize the amount of road constructed. These principles ensure the loss of productive landbase and environmental disturbance are minimized. In sensitive and wet areas, winter harvesting and road construction are encouraged, to minimize environmental disturbance.

In many instances, forest access roads “open up” new areas which are then subject to cabin development. Forest roads also provide access to remote areas where outfitting businesses operate. This generally leads to competition for hunting areas between local

and “sport” hunters and may detract from the “remote” designation of the lodge. In such instances cabin development should be controlled to limit local access. As well, road decommissioning may also be considered, depending on cost and mitigation of conflicting uses for a particular road.

The nature of the current wood supply, particularly FMD2, is that harvestable areas or stands are becoming smaller and more dispersed. Achievement of allocated harvest is contingent on accessing these areas and stands. Therefore, more road infrastructure is required to access this timber. Specific strategies include:

- where possible, build winter roads to access sensitive and wet areas
- minimize amount of road built by maximizing forwarding distances
- use minimum road standard to safely and effectively match the logging chance
- work with appropriate agencies (crown lands) to control cabin development
- where possible, consider road decommissioning in areas of concern for other values (e.g. near remote outfitting lodges, PPWSA’s)

## 6.4 Forest Protection

### 6.4.1 Insects and Disease

While having been a major natural disturbance factor within the district, insects are now considered of lesser importance. Balsam fir is susceptible to most of the major insects and is in lower proportion throughout the district than in the past. The budworm and looper damaged fir stands of the 1970’s and 1980’s that were salvage harvested have been replaced with planted less susceptible spruce species.

The major insect found throughout the zone today is the balsam woolly adelgid. It seems to be moving further inland, causing growth problems in young balsam fir stands. As outlined in the harvesting and timber supply analysis sections, wood supply forecast is based on following a rigid predetermined harvest schedule and minimizing inventory deductions (of which insect damage is a portion). In the event of a major insect infestation, salvage efforts may change harvest priorities, resulting in the optimal harvest schedule not being followed. If insect damaged stands cannot be harvested in a timely manner, an additional harvest in the form of unsalvaged mortality may occur resulting in

inventory deductions that are higher than anticipated. In both circumstances, deviations from harvest schedules and inventory adjustment levels will be closely monitored to ensure that validity of AAC calculations are not compromised. Specific strategies include:

- use silvicultural techniques at the stand level to alter species mix and increase stand vigor, making stands less susceptible to insect attack (eg planting and cleaning).
- where possible, use harvest scheduling techniques to alter species mix across the landscape to avoid promotion for severe insect infestation
- where possible, use species conversion techniques to convert adelgid susceptible balsam fir to other less susceptible species
- in conjunction with Provincial and Federal initiatives, use pertinent and approved biological and chemical insecticides such as BTK, Mimic, Neemix4.5 and NeabNPV (virus)
- in co-operation with Provincial insect and inventory divisions, monitor and measure adelgid infested stands to help refine yield curves to be used in the next timber supply analysis

### 6.4.2 Fire

Historically, fire has been a major natural disturbance factor within this district, resulting from relatively low precipitation and high summer temperatures, combined with frequent lighting storms. A fire in an unusually dry year can have devastating effects on the forest and can exacerbate an already tight wood supply situation. The district can minimize the risk of a serious fire by maintaining a highly trained, efficient and effective fire control program and by minimizing the risk in forest stands through maintenance of health and vigor. Specific strategies include:

- ensure harvest schedule is followed targeting oldest/worst condition (and high fire risk) stands
- maintain fire control capabilities by both the Crown and Industry
- where possible, promote species mixes (white birch) in stands to minimize risk

### 6.4.3 Windthrow

Wind throw or blowdown occurs in stands that are old and decrepit or in stands that have been predisposed by some other disturbance such as insects and disease. Blowdown can also be increased in high risk stands when unnatural edges are left on cutovers such as in

the case buffers. To minimize the effects of blow down, stands will be managed to promote health and vigor mainly through silvicultural treatments and protection from insects. A number of extreme events in recent years, including ice storms and hurricane Igor, have created an unusual abundance of blowdown in FMD2.

Specific strategies include:

- avoid thinning in areas with high wind damage potential (hilltops on high elevations etc.)
- maintain forest in healthy vigorous condition through silvicultural treatments and protection from insects
- design cut blocks to follow contours and natural boundaries to minimize risk of windthrow to residual forest
-investigate techniques to minimize the risk blowdown in buffers (i.e. buffer management).
- ensure harvest schedule is followed to target the oldest worst condition (and risk) timber first.
- continue to sample overmature stands for signs of imminent breakup (e.g. windthrow and butt rot) and update harvest schedule on a 5 year basis accordingly to capture mortality.
- target blowdown and deadwood throughout the district for domestic harvest to lessen the domestic drain on the wood supply.
- Work with the DNR forest inventory section to determine the volume loss as a direct impact of recent weather events (Hurricane IGOR) on the level of windthrow since the last inventory analysis.

## 6.5 Information and Education

Information and education is important to providing for more active and effective participation in the forest management planning process. Through interaction with various user groups and the general public, we gain a better understanding of each others values and positions. Information about a stakeholder's values and the location on the landscape provides a better ability to mitigate any potential negative impacts of harvesting activity on these values. For example, learning where a cabin is located can help planners when selecting areas for harvest and provide a contact to discuss impacts and mitigations. Public Planning team meetings provide a good exchange of information and ideas about a particular piece of landbase. It is through such forums that information can be shared that provides a basis for more effective and informed participation. As a Forest Industry, other such vehicles for information and education which will be actively pursued include:

- field trips (woodlands tours, mill tours)
- school visits
- open houses
- commercial operator environmental training programs
- information meetings
- training courses
- seminars
- general day to day contact

# Section 7 Proposed Activities

## 7.1 District 02

### 7.1.1 Overview

This section will outline all forest activities that will occur on crown land in District 02 from 2012-2016. More specifically, all proposed harvesting, silviculture and access road construction activities as well as environmental protection measures, activities inside protected water supply areas, surveys, and information and education initiatives will be presented and discussed in detail.

### 7.1.2 Allocation of Timber Supply

The allocation of timber supply in FMD2 is split among industry and domestic use. Overall, the commercial harvest accounts for the majority of all AAC timber and is derived from Class I Landbase. More discussion on commercial and domestic activity is provided in the upcoming sections.

The proposed timber allocation differs significantly from the previous five year allocation. Previously, the majority of the stands in the domestic blocks were in designated as class 3 with the smaller portion designated as class 1. However the majority of the domestic drain was applied to the class 1 AAC. During the landbase exercise it was calculated that the class 3 AAC could accommodate the domestic requirement if the associated domestic areas were to be completely alienated from the class 1 landbase. Subsequently, the remaining class 1 AAC more accurately reflects the timber available for commercial use and is thus allocated.

Another deviation from the previous timber supply attempts to rationalize the harvest of mature aphid infested balsam fir stands in the districts. During the last planning period these overmature Fir stands were included in the class 1 AAC calculations and were therefore necessarily targeted through allocating 25% of each commercial permit in designated “priority harvest areas”. With new forest inventory data at our disposal, and the fact that there is a disproportional amount of overmature timber on the landscape, it was calculated that the sustainable commercial AAC would not be significantly altered

from the previous period if these overmature bf stands were removed from the available timber supply. This rationalizes the commercial AAC on a species specific basis and also allows for a low risk "Salvage Harvest" of the alienated fir stands.

Commercial harvest blocks proposed for this planning period can be subdivided into three main categories;

(1) "Regular AAC harvest areas" of merchantable stands in predominantly black spruce working groups,

(2) "Regular AAC Salvage harvest areas" identified in the Disturbed Stand Volume Recovery (DSVR) silviculture program. These areas consists predominantly of previously disturbed stands that have less than 60 m3/ha of volume and are in density class 3 as a result of the disturbance.

(3) "Balsam Fir Salvage harvest areas". These areas consist of balsam fir stands that have been alienated from regular AAC calculations and allocated as part of a separate salvage AAC. The alienation was based on stands being predominately Balsam fir, age class four and higher, and impacted by Adelgid.

#### *7.1.2.1 Commercial*

To present a more comprehensive overview of proposed activities on the entire district an overview map is presented in Appendix 3. This map shows all proposed operating areas so that operations can be viewed from a landscape perspective in District 02. Maps of individual commercial operating areas and summary sheets are also presented in Appendix 3. The summary sheets give a brief description of each area, the type of activities that will occur and any issues raised and mitigative measures employed.

Table 7 indicates the Crown's proposed harvest by operating area in FMD2. The table indicates areas identified within the first two periods in the 25 year spatial scheduled developed under the 2010 woodsupply analysis.

Table 5: Summary of Proposed Commercial Harvesting areas in FMD 02 for 2012-2016

| Name | k ID # | Area (ha) | Softwoods (m3) | Hardwoods (m3) |
|---|---|---|---|---|
| Random Island | C202 | 13 | 1 140 | 280 |
| Random Island | C203 | 6 | 430 | 10 |
| Random Island | C204 | 26 | 1 770 | 290 |
| Random Island | C205 | 15 | 1 750 | 120 |
| Random Island | C206 | 126 | 11 350 | 870 |
| Come by Chance | C207 | 113 | 7 460 | 1 416 |
| Hatchet Cove | C208 | 11 | 800 | 40 |
| George's Pond | C209 | 67 | 4 420 | 235 |
| Beaver Pond | C210 | 19 | 1 700 | 540 |
| White Hills Road | C211 | 9 | 1 460 | 20 |
| White Hills Road | C212 | 214 | 22 230 | 2 580 |
| Port Blandford | C213 | 225 | 30 660 | 1 250 |
| White Hills Road | C214 | 60 | 3 270 | 770 |
| White Hills Road | C215 | 322 | 33 860 | 3 160 |
| White Hills Road | C216 | 18 | 2 440 | 70 |
| George's Pond | C217 | 289 | 29 680 | 2 340 |
| George's Pond | C218 | 237 | 21 440 | 4 040 |
| Port Blandford | C219 | 369 | 38 840 | 4 000 |
| Bunyan's Cove | C220 | 444 | 38 160 | 4 000 |
| George's Pond | C221 | 44 | 3 150 | 200 |
| George's Pond | C222 | 16 | 1 020 | 200 |
| Bunyan's Cove | C223 | 228 | 17 710 | 2 270 |
| Harcourt Road | C224 | 232 | 18 920 | 2 530 |
| Burgoynes Cove Road | C225 | 48 | 4 300 | 480 |
| Burgoynes Cove Road | C226 | 171 | 13 394 | 1 090 |
| Burgoynes Cove Road | C227 | 13 | 910 | 20 |
| Ocean Pond/Charleston | C228 | 154 | 8 565 | 600 |
| Lethbridge Access Rd | C229 | 350 | 28 270 | 1 960 |
| Lethbridge Access Rd | C230 | 80 | 5 060 | 1 470 |
| Ocean Pond/Charleston | C231 | 58 | 5 220 | 200 |
| Ocean Pond/Charleston | C232 | 138 | 9 630 | 510 |
| Ocean Pond/Charleston | C233 | 45 | 3 650 | 840 |
| Winterbrook | C234 | 17 | 930 | 480 |
| Winterbrook | C235 | 249 | 16 380 | 4 740 |
| Winterbrook | C236 | 188 | 10 390 | 872 |
| Chance Harbour | C237 | 104 | 6 350 | 1 660 |
| Chance Harbour | C238 | 140 | 12 940 | 1 160 |
| Plate Cove | C239 | 19 | 1 920 | 80 |
| Plate Cove | C240 | 50 | 6 130 | 260 |
| Plate Cove | C241 | 540 | 60 190 | 3 090 |
| Plate Cove | C242 | 291 | 33 940 | 1 315 |

| | | | | |
|---|---|---|---|---|
| World Pond | C243 | 8 | 610 | 30 |
| World Pond | C244 | 130 | 8 700 | 730 |
| Beaver Pond | C245 | 240 | 23 840 | 1 450 |
| Harcourt Road | C246 | 19 | 1 340 | 70 |
| Harcourt Road | C247 | 151 | 9 990 | 610 |
| Ocean Pond/Charleston | C248 | 61 | 4 000 | 100 |
| World Pond | C249 | 371 | 35 900 | 1 400 |
| George's Pond | C250 | 113 | 16 000 | 1 400 |
| Lethbridge Access Rd | C251 | 29 | 2 410 | 470 |
| World Pond | C252 | 171 | 14 620 | 740 |
| World Pond | C253 | 250 | 22 760 | 1 090 |
| White Hills Road | C254 | 134 | 10 320 | 580 |
| White Hills Road | C255 | 224 | 24 570 | 1 140 |
| Hatchet Cove | C256 | 165 | 13 040 | 920 |
| Random Island | C257 | 242 | 24 680 | 1 050 |
| Lethbridge Access Rd | C258 | 171 | 10 480 | 1 620 |
| Port Blandford | C259 | 78 | 6 480 | 960 |
| Winterbrook | C260 | 123 | 6 210 | 2 820 |
| Burgoynes Cove Road | C261 | 34 | 2 560 | 120 |
| Ocean Pond/Charleston | C262 | 75 | 6 280 | 500 |
| World Pond | C263 | 78 | 6 700 | 710 |
| Harcourt Road | C264 | 140 | 6 565 | 2 720 |
| Burgoynes Cove Road | C265 | 246 | 14 340 | 730 |
| | | | | |
| TOTAL | | 9 011 | 793 085 | 74 018 |

The areas proposed are within the acceptable variance for planned harvesting since the 2010 Wood Supply Analysis is designed to ensure operable growing stock is maintained at a minimum of two times the AAC throughout the 160 year planning horizon. Simply put, under this analysis, there will always be at least twice as much merchantable timber available on the landbase than harvested in any one period. The actual total harvest volume for each Land class for the five year 2010 woodsupply period will not exceed the total allowable harvest. This means that at any given year, the proposed and actual harvest level may fluxuate from the actual AAC number, but the maximum allowable harvest over the five-year period will not be exceeded.

When determining the allocation of woodsupply areas to commercial operators, the following outlines the Forest Services Branch priority:

- First priority is given to damaged and diseased stands, where feasible.
- Second priority is to harvest merchantable, over mature stands. Most scheduled operating areas consist of a portion of stands in the 81 + year old age class.
- Third priority is to harvest merchantable mature stands.

The operating areas listed in the previous table have been proposed specifically to target the three categories of harvest in FMD2: the "Regular AAC harvest areas" of merchantable stands in predominantly black spruce working groups, the "Regular AAC Salvage harvest areas" identified in the Disturbed Stand Volume Recovery (DSVR) silviculture program, and the "Balsam Fir Salvage harvest areas" consisting of balsam fir stands that have been alienated from regular AAC calculations and allocated as part of a separate salvage AAC.

Due to the varied economic feasibility of harvesting individual stands, not all stands identified maybe able to be harvested.

#### *7.1.2.2 Domestic*

There are 66 Crown domestic areas identified in FMD2. The majority of these areas were historically created along the coastline encompassing the scattered communities. These areas were designed to provide a supply of fuelwood close to the communities. It is difficult to quantify the supply of domestic fuelwood available in each domestic area and the demand that will be required. Accurate inventory data is not always available for domestic cutting blocks due to the small size of individual harvests. Many of the identified areas contain remnants of commercially harvested forest, commercially uneconomical stands and scrub, as well as underutilized species (i.e. aspen, maple, and larch). Typically, there are approximately 2500 domestic cutting permit issued annually in FMD2 with an individual allocation of 16 m3/year. All domestic harvest blocks in FMD2 were designated as class III, during the 2010 landbase analysis, to facilitate the calculation of a domestic class III AAC.

Table 7 details the domestic areas available in the district. The distribution of all domestic areas in FMD2 is shown on a 1:150,000 scale overview map and on individual 1:50,000 scale maps in appendix 5. Summary sheets, which give a brief description of each area, the type of activities that will occur and any issues raised and mitigative measures employed, are also presented in Appendix 5.

Other opportunities for domestic harvesting, outside of domestic harvest blocks, have been identified. In an attempt to recover the significant volume affected by Hutrricane IGOR , as well as other weather events, domestic permits will allow cutting of deadwood and blowdown anywhere on crown land in FMD2 during the 2012-2016 planning period. Likewise, domestic permits will allow domestic cutting of any crown land that has been alienated from the crown as part of a “license to occupy” for remote cottages. The third opportunity to supply the domestic requirement for fiber, outside of domestic harvest blocks identified in Appendix 5, would be temporary designation of “gathering blocks” following harvest of commercial harvest blocks identified in Appendix 3.

Table 6: Summary of Proposed Domestic Harvesting areas in FMD 02 for 2012-2016

| Name | k ID # | Area (ha) | Softwood (m3) | Hardwoods (m3) |
|---|---|---|---|---|
| Goobies | D0201 | 3722 | 23855 | 1036 |
| Goobies | D0202 | 1187 | 25844 | 1743 |
| Goobies | D0203 | 1902 | 12978 | 628 |
| Smith’s Sound | D0204 | 1901 | 93427 | 8768 |
| Smith’s Sound | D0205 | 2753 | 76860 | 9599 |
| Smith’s Sound | D0206 | 1097 | 36235 | 7213 |
| Smith’s Sound | D0207 | 1685 | 70797 | 17610 |
| Smith’s Sound | D0210 | 835 | 42368 | 6797 |
| Smith’s Sound | D0211 | 296 | 18021 | 1328 |
| Smith’s Sound | D0212 | 1723 | 54734 | 5035 |
| Smith’s Sound | D0213 | 974 | 45692 | 7291 |
| Smith’s Sound | D0214 | 1015 | 68933 | 6119 |
| Clode Sound | D0216 | 200 | 4551 | 415 |
| Clode Sound | D0217 | 661 | 4610 | 405 |
| Winterbrook | D0218 | 221 | 3102 | 276 |
| Smith’s Sound | D0219 | 997 | 27679 | 1008 |
| Smith’s Sound | D0220 | 803 | 24787 | 850 |
| Winterbrook | D0221 | 211 | 6735 | 358 |
| Winterbrook | D0222 | 93 | 2602 | 319 |
| Stock Cove | D0223 | 460 | 6857 | 1274 |

| | | | | |
|---|---|---|---|---|
| Southwest Arm | D0224 | 4342 | 96689 | 9021 |
| Clode Sound | D0225 | 2009 | 51458 | 11425 |
| Southwest Arm | D0226 | 4041 | 76729 | 13754 |
| Trinity | D0227 | 562 | 7427 | 866 |
| Bonavista | D0228 | 656 | 4139 | 133 |
| Bonavista | D0229 | 184 | 1807 | 36 |
| Trinity | D0230 | 224 | 11425 | 945 |
| Clode Sound | D0231 | 719 | 24164 | 1596 |
| Clode Sound | D0232 | 1732 | 60820 | 9781 |
| Clode Sound | D0233 | 926 | 20599 | 2254 |
| Southwest Arm | D0234 | 3157 | 70111 | 3277 |
| Clode Sound | D0235 | 2968 | 83060 | 14181 |
| Clode Sound | D0236 | 690 | 14495 | 2966 |
| Southwest Arm | D0237 | 4526 | 39857 | 7174 |
| Stock Cove | D0238 | 1536 | 29197 | 1743 |
| Southwest Arm | D0239 | 3982 | 29165 | 4737 |
| Smith’s Sound | D0240 | 908 | 18753 | 5028 |
| Goobies | D0241 | 1613 | 57607 | 7323 |
| Goobies | D0242 | 1929 | 29310 | 1571 |
| Smith’s Sound | D0243 | 697 | 21714 | 1143 |
| Goobies | D0244 | 4513 | 24199 | 971 |
| Winterbrook | D0245 | 1071 | 36255 | 6713 |
| Winterbrook | D0246 | 529 | 13854 | 3841 |
| Winterbrook | D0248 | 935 | 31821 | 3139 |
| Winterbrook | D0249 | 1158 | 31391 | 2337 |
| Winterbrook | D0250 | 549 | 11947 | 886 |
| Winterbrook | D0251 | 1020 | 33270 | 3976 |
| Stock Cove | D0252 | 1193 | 45764 | 5734 |
| Stock Cove | D0253 | 1071 | 16199 | 660 |
| Stock Cove | D0254 | 2602 | 55967 | 6281 |
| Bonavista | D0255 | 623 | 14937 | 971 |
| Bonavista | D0256 | 1402 | 22810 | 940 |
| Bonavista | D0257 | 5486 | 78821 | 2820 |
| Trinity | D0258 | 2084 | 44869 | 1066 |
| Trinity | D0259 | 4581 | 124354 | 6540 |
| Smith’s Sound | D0260 | 148 | 6470 | 3242 |
| Clode Sound | D0261 | 503 | 20922 | 5772 |
| Smith’s Sound | D0262 | 717 | 55501 | 2374 |
| Stock Cove | D0263 | 158 | 3590 | 185 |
| Stock Cove | D0264 | 650 | 20217 | 1310 |
| Stock Cove | D0265 | 382 | 9598 | 937 |
| Trinity | D0266 | 1157 | 6699 | 153 |
| Bonavista | D0267 | 771 | 744 | 24 |
| Bonavista | D0268 | 1254 | 5963 | 198 |
| Clode Sound | D0269 | 67 | 867 | 288 |

| | | | | |
|---|---|---|---|---|
| Bonavista | D0270 | 793 | 21967 | 1402 |
| Clode Sound | D0271 | 50 | 1576 | 235 |
| Southwest Arm | D0272 | 987 | 2418 | 1038 |
| Southwest Arm | D0273 | 621 | 10549 | 1787 |
| Southwest Arm | D0274 | 222 | 3322 | 163 |
| Trinity | D0276 | 489 | 18325 | 721 |
| Southwest Arm | D0277 | 399 | 14550 | 1787 |
| TOTAL | | | | |

#### *7.1.2.3 Hardwoods*

The domestic harvest of birch occurs as a mixture in softwood stands and is utilized primarily as fuelwood. The commercial hardwood harvest is for sawlogs and fuelwood and occurs in some pure stands but mostly as residual in hardwood/softwood and softwood/hardwood stands. All commercial harvest blocks are assessed to determine the softwood / hardwood ratio. A volume of hardwood will be allocated on each commercial permit and will be based on, using the same ratio, the softwood volume allocated on that permit.

### 7.1.3 Silviculture

Balsam fir is highly susceptible to insect and disease attack and has less desirable fibre quality and properties than spruce for papermaking and lumber production. Since spruce is the more desirable species at this time, more aggressive approaches to maintaining and enhancing spruce content on sites will be employed in the next five years.

There are two silviculture prescriptions scheduled; planting/gap planting including site preparation (mechanical, prescribed burning and/or herbicide), where required, and thinning (pre-commercial/diameter limit and commercial). Planting is designed to return a site to a minimum stocking level with the desired species, mainly spruce. Full planting is required where there is complete natural regeneration failure and gap planting when a

site has some desired regeneration but not enough to meet minimum stocking standards. Pre-commercial thinning is conducted on regenerating stands (0 - 25 years) to reduce the high density and concentrate the growth on the remaining crop trees thus reducing the time to harvest. Diameter limit /commercial thinning is carried out on immature stands (25-40 years) and is designed to produce a sawlog crop while salvaging any trees thinned as pulpwood or fuelwood.

This district, like most districts in the province, shares the common challenge of having to contend with the growing problem associated with balsam woolly adelghid. The range and severity of this insect is increasing within the province and it continues to target balsam fir trees by severely reducing both growth rates and productivity of certain sites to the point where commercial viability is questionable. The silviculture program over the next five year period will help mitigate the impacts of this insect on sites dominated by balsam fir. As the problem with this insect is still relatively new in these districts and the extent of affected areas and rate of spread is still unknown, it is extremely difficult to identify specific areas for management at this time.

Site preparation using either mechanical methods or prescribed burning will be employed on suitable sites that have impediments to planting. On black spruce cutovers where kalmia is present, mechanical site preparation (row scarification) or prescribed burning will be used to disturb the kalmia and create suitable microsites to plant black spruce. In fir areas, burning is a preferred treatment to sanitize the site of any existing adelgid infested trees.

There have been problems in some parts of FMD2 with sites transitioning to alders after harvest. A treatment employing mulching, herbicide and planting in successive years has been conducted to try and reclaim some of these highly productive sites. The effectiveness of this treatment is still being evaluated; however it has been discontinued due to high cost. Since there is a known regeneration problem on these sites, planting with white spruce immediately after harvest is employed to allow the seedlings to “get the jump” on the alders.

Immature and regenerating stands have been identified within operating areas. If the regenerating species is balsam fir then the presence of a balsam woolly adelgid will be evaluated using reconnaissance surveys. If presence of balsam woolly adelgid is non existent or light (Codes 1and 2) then the balsam fir stands will be considered for thinning (pre-commercial, diameter limit or commercial thinning) but, if presence of balsam woolly adelgid is moderate to severe (Code 3 or higher) in the areas the stands will be left to develop naturally. The increasing balsam woolly adelgid presence has caused the pre-commercial thinning program to diminish over time in favour of planting. Root rot in the older pre-commercially thinned stands may make commercial and diameter limit thinning more important in the future. Sites not meeting required stocking levels will be either full planted or gap planted with spruce, as required, to bring them up to minimum stocking levels.

Note that while a prescription approach has been employed, stands that can be potentially silviculturally treated are explicitly identified on operating area maps. Stands that are identified as scheduled for harvest and cutovers are eligible for planting and immature stands are eligible for thinning.
A 1:150,000 scale overview map, of disturbed areas that will be investigated for silviculture prescriptions, is shown in appendix 5.

### 7.1.4 Primary Access Roads and Water Crossings

There are 47 km of primary forest access roads scheduled to be constructed in FMD2 in the next five years (2012-2016) (Table 7) to access timber for commercial purposes. These roads, as well as all roads being considered for decommissioning, have been identified in Appendix 3. All roads will be built to the specifications of the Class C standard and all pertinent Environmental Protection Guidelines will be followed. Other road development including secondary roads, operational roads, winter access roads, and upgrading of existing road will be required. These will be submitted in the annual operating plan prior to the year that they are planned to be built. As well, referrals will be

sent to all relevant agencies (including DFO and Water Resources Division) before any construction is initiated. Associated with the proposed road construction are water crossings which will require the installation of appropriate sized culverts or bridges. The size and design features of each crossing will be determined through field work prior to construction of the associated road system, and is subject to all provincial and federal legislation / guidelines.

The majority of the road construction will be conducted to facilitate access into mature and overmature stands for the primary purpose of accommodating commercial harvesting operations. As well, these forestry roads will be used to provide access for silviculture operations. Other uses of forest access roads include: domestic cutting and recreation (ie. hunting, fishing, cabin access and berry picking). Due to the variety of tourism/recreation values that exist within the boundary of FMD2, road-specific decommissioning is to be considered on an area specific basis should a conflict of values exist.

Decommissioning of specific roads to protect other ecosystem values can take the form of removing bridges and culverts, in addition to replacing excavated material from adjacent embankments back into the roadway to restore the areas as close as possible to their natural state. The degree of decommissioning will ultimately depend on the value being protected. The scheduling of road decommissioning is undertaken upon the completion of harvesting and silviculture activities within identified areas of concern. While the Forest Services Branch can adopt this approach as a goal of the plan, the implementation of this strategy will be entirely dependant upon the ability to prevent the establishment of permanent structures such as cabins along the road routes proposed for decommissioning.

While DNR can commit to refusing approval of cabin sites in areas identified through the planning process to be decommissioned, the actual authority rests with the Crown Lands Division of the Department of Government Services and Lands. During this upcoming planning period district staff will continue to liaison with Crown Lands Division in identifying operational roads requiring decommissioning (See Appendix 3 for roads to be decommissioned).

Table 7: Summary of Proposed Access Road Construction in FMD2 for 2012-2016

| Name | k ID # | Description | Length (km) |
|---|---|---|---|
| Hatchet Cove | C0256 | New Construction | 2.0 |
| White Hills Road | C0212 | New Construction | 3.0 |
| White Hills Road | C0215 | New Construction | 1.0 |
| White Hills Road | C0255 | New Construction | 0.5 |
| Random Island | C0257 | New Construction | 1.5 |
| Harcourt | C0224 | New Construction | 2.0 |
| Burgoynes Cove | C0225 | New Construction | 1.5 |
| Burgoynes Cove | C0226 | New Construction | 1.0 |
| Burgoynes Cove | C0261 | New Construction | 1.0 |
| Burgoynes Cove | C0265 | New Construction | 2.0 |
| Port Blandford | C0213 | New Construction | 2.0 |
| Port Blandford | C0219 | New Construction | 2.5 |
| George's Pond | C0217 | New Construction | 2.5 |
| George's Pond | C0218 | New Construction | 1.5 |
| Lethbridge Access Road | C0258 | New Construction | 2.0 |
| Ocean Pond/Charleston | C0228 | New Construction | 2.0 |
| Ocean Pond/Charleston | C0232 | New Construction | 0.5 |
| Ocean Pond/Charleston | C0262 | New Construction | 0.5 |
| Bunyan's Cove | C0220 | New Construction | 2.0 |
| Bunyan's Cove | C0223 | New Construction | 2.0 |
| Winterbrook | C0235 | New Construction | 1.5 |
| Winterbrook | C0236 | New Construction | 2.0 |
| Chance Harbour | C0237 | New Construction | 0.5 |
| Chance Harbour | C0238 | New Construction | 2.0 |
| Plate Cove | C0241 | New Construction | 4.0 |
| Plate Cove | C0242 | New Construction | 1.0 |
| World Pond | C0249 | New Construction | 2.0 |
| World Pond | C0253 | New Construction | 1.0 |
| TOTAL | | | 47.0 |

### 7.1.5 Activities in Protected Water Supply Areas

Forestry operations, including commercial harvesting, domestic harvesting, road construction , and silviculture, scheduled to occur in protected public water supply areas (PPWSA) in FMD2 are identified in table 8. PPWSAs are also identified on a district overview map in Appendix 3.

There are wider buffers established inside these PPWSA and the pertinent EPG's will be attached to any commercial or domestic permits issued for these areas. There will be continuous monitoring inside these areas and buffers will be flagged to ensure compliance with the guidelines. In addition, approval under the Water Resources Act must be obtained annually by the Forestry and Agrifoods Agency before any commercial harvesting, road construction, silviculture activity, or domestic harvesting commences inside the PPWSA. Approval to operate in domestic areas will be requested every five years whereas approval to operate in commercial areas will be requested annually. The corresponding conditions for cutting within each respective protected public water supply area will be attached to each crown cutting permit.

The use of remote sensor technology will be investigated, and may potentially be available during this planning period, to monitor effects of harvesting on groundwater in PPWSAs.

Table 8: Summary of Crown's proposed forestry activity in the public protected water supply areas of FMD2 from 2012 to 2016

| Proposed Activity | Area | Public Protected Water Supply Area | Community |
|---|---|---|---|
| | | | |
| Domestic harvest | D260 | Shoal Harbour River | Clarenville |
| Domestic harvest | D206 | George's Brook | George's Brook |
| Domestic harvest | D242 | Arch's Cove Pond | Garden Cove |
| Domestic harvest | D201 | Centre Cove River | Sunnyside |
| Domestic harvest | D213 | Lower Rocky Brook | Burgoynes' Cove |
| Domestic harvest | D232 | Middle Brook | Port Blandford |
| Domestic harvest | D229 | Whirl Pond | Catalina |
| Domestic harvest | D257 | Whirl Pond | Catalina |
| Domestic harvest | D228 | Long Pond | Bonavista |
| Domestic harvest | D252 | Eastern Pond | Plate Cove |
| | | | |
| Commercial harvest | CO212 | Shoal Harbour River | Clarenville |
| Commercial harvest | CO214 | Shoal Harbour River | Clarenville |
| Commercial harvest | CO254 | Shoal Harbour River | Clarenville |
| Commercial harvest | CO255 | Shoal Harbour River | Clarenville |
| Commercial harvest | CO215 | George's Brook | George's Brook |
| Commercial harvest | CO216 | George's Brook | George's Brook |
| Commercial harvest | CO218 | George's Brook | George's Brook |
| Commercial harvest | CO242 | Eastern Pond | Plate Cove |

### 7.1.6 Environmental Protection

#### *7.1.6.1 Fire*

Wildfire has not been prevalent in the district in the past number of years and as a result there have been little merchantable volume lost. There have been major fires in the past however, so the district must remain vigilant in its fire suppression program to ensure any future losses are minimized.

There are fire crews and equipment stationed at Clarenville and Southern Bay in the fire season whose direct responsibility is fire protection. In addition, support, equipment and manpower at both the regional and provincial level is available should the need arise. There are air tankers stationed at Deer Lake and Gander and helicopters in Gander that are available for initial attack.

#### *7.1.6.2 Insect and Disease*

Monitoring and protection programs for insects and disease are coordinated by the forest protection division in Corner Brook. District staff are always available however to provide assistance in detection, monitoring, and protection against insects and disease. As well, district staff can be involved in conducting reconnaissance surveys to monitor the extent and rate of spread of infestations.

#### *7.1.6.3 General Environment*

The environmental protection guidelines form the basis for protecting the environment from potential negative effects of forest activities. Such negative impacts could include: impairing water quality, soil erosion and compaction, losses to fish and wildlife habitat, impact viewscape, and disturb sensitive and rare sites etc. The guidelines are designed to provide site specific measures to minimize or eliminate these negative impacts.

Highlights of measures to avoid these impacts include: machine free buffer zones, modification of harvesting design and equipment, avoidance of sensitive sites during critical periods, consultation with other regulatory agencies and of course, monitoring. Specific measures that govern each forestry activity are detailed in Appendix 2.

### 7.1.7 Surveys

Utilization surveys will be conducted on all commercial cutovers to ensure loss of merchantable timber is minimized. Commercial operators in FMD2 are only issued 90% of their potential allocation each year until a utilization survey is conducted and demonstrates that the operators has achieved the minimum utilization standards required. These utilization surveys will be summarized to be used in the determination of utilization deduction for the next wood supply analysis in 2016. The district will also work in conjunction with the Industry Services Division in Corner Brook to implement a yield comparison study to compare the expected volume in an operating areas to those actually attained. The results of this survey will also help refine the inventory deduction described in Section 3.

As previously mentioned, reconnaissance and intensive regeneration surveys will be conducted on commercial cutovers created during the next five years as well as those created in the past five years to determine the need for planting. As well, reconnaissance surveys will be done on regenerating stands to determine the suitability for precommercial thinning.

### 7.1.8 Information and Education

The district will continue its attempt to educate the general public to ensure meaningful and effective consultation and input can be attained. This will be accomplished through planning team fieldtrips and meetings, school presentations, open houses, public meetings, Envirofest, and National Forest Week activities.

## 7.2 District 03

### 7.2.1 Overview

This section will outline all forest activities that will occur on crown land in District 03 from 2012-2016. More specifically, all proposed harvesting, silviculture and access road construction activities as well as environmental protection measures, activities inside protected water supply areas, surveys, and information and education initiatives will be presented and discussed in detail.

To present a more comprehensive overview of proposed activities in FMD3 an overview map of domestic harvesting areas is presented in Appendix 5. Maps of individual domestic operating areas and summary sheets are also presented in Appendix 5. The summary sheets give a brief description of each area, the type of activities that will occur and any issues raised and mitigative measures employed.

### 7.2.2 Allocation of Timber Supply

As there is no current forest inventory available for FMD3, no wood supply analysis was completed. It is hoped that with the compilation of forest inventory data, expected to be completed during this planning period, a more accurate allocation process can be developed.

#### *7.2.2.1 Commercial*

The timber scheduled for commercial harvest in FMD3 is all located within Domestic Harvest Blocks. There are 7 traditional commercial operators in the district with permit sizes less than 50 m3. These operations may be conducted year round and consists mainly of cutting with chainsaws and exctraction by snowmobile or ATV. These operations would normally utilize sawlogs and fuelwood.

#### *7.2.2.2 Domestic*

The timber scheduled for domestic harvest in FMD3 is all located within Domestic Harvest Blocks. All domestic cutting is done under permit which has conditions attached that outline the species, volume, location and utilization standards to be employed. Most cutting occurs in fall and winter with extraction by snowmobile or ATV. The allocation for each individual domestic permit is 16 m3.

Harvesting will occur in designated domestic cutting areas and is generally conducted on a small patch cut system. There are 21 operating areas dedicated to domestic cutting. Appendix 5 gives a detailed description of the domestic cutting areas proposed for FMD3.

#### *7.2.2.3 Hardwoods*

Hardwoods species will be harvested on a opportunistic basis within the Domestic Harvest blocks identified in Appendix 5.

Table 9: Summary of Proposed domestic harvesting areas in District 03 for 2011-2015

| Name | k ID # | Area (ha) | Softwood (m3) | Hardwoods (m3) |
|---|---|---|---|---|
| Lamaline | D0301 | 20 367 | N/A | N/A |
| Grand Beach | D0302 | 10 062 | N/A | N/A |
| Lamaline | D0303 | 19 737 | N/A | N/A |
| Lawn | D0304 | 39 484 | N/A | N/A |
| Grand Beach | D0305 | 18 286 | N/A | N/A |
| Winterland | D0306 | 18 820 | N/A | N/A |
| Winterland | D0307 | 13 649 | N/A | N/A |
| Marystown | D0308 | 6 321 | N/A | N/A |
| Marystown | D0309 | 13 478 | N/A | N/A |
| Spanish Room | D0310 | 16 408 | N/A | N/A |
| Bay de'Leau River | D0311 | 23 793 | N/A | N/A |
| Bay de'Leau River | D0312 | 6 381 | N/A | N/A |
| Fox Cove | D0313 | 8 708 | N/A | N/A |
| Fox Cove | D0314 | 11 636 | N/A | N/A |
| Terrenceville | D0315 | 8 701 | N/A | N/A |
| Terrenceville | D0316 | 11 757 | N/A | N/A |
| Grand LePierre | D0317 | 5 325 | N/A | N/A |
| Grand LePierre | D0318 | 5 605 | N/A | N/A |
| Monkstown | D0319 | 10 031 | N/A | N/A |
| Monkstown | D0320 | 13 336 | N/A | N/A |
| Sandy Harbour River | D0321 | 8 569 | N/A | N/A |
| TOTAL | | | | |

### 7.2.3 Silviculture

All stands on crown land in FMD3 can be potentially silviculturally treated but none have been explicitly identified on the operating area maps for treatment in this five year plan. Stands that are identified as scheduled for harvest and cutovers are eligible for planting and immature stands are eligible for thinning.

### 7.2.4 Primary Access Roads and Water Crossings

There are no primary forest access roads scheduled to be constructed in FMD3 in the next five years (2012-2016) to access timber for commercial purposes. There are a number of roads in the district that may require maintenance. These will be submitted in the annual operating plan prior to the year that they are planned to be repaired. As well, referrals will be sent to all relevant agencies (including DFO and Water Resources Division) before any construction is initiated.

### 7.2.5 Activities in Protected Water Supply Areas

There are wider buffers established inside these PPWSA and the pertinent EPG's will be attached to any commercial or domestic permits issued for these areas. There will be continuous monitoring inside these areas and buffers will be flagged to ensure compliance with the guidelines. In addition, approval under the Water Resources Act must be obtained annually by the Forestry and Agrifoods Agency before any commercial harvesting, road construction, silviculture activity, or domestic harvesting commences inside the PPWSA. There are no forestry operations scheduled to occur in protected public water supply areas (PPWSA) in Forest Management District 3 in this planning period.

### 7.2.6 Environmental Protection

#### *7.2.6.1 Fire*

Wildfire has not been prevalent in the district in the past number of years and as a result there have been little merchantable volume lost. There have been major fires in the past however, so the district must remain vigilant in its fire suppression program to ensure any future losses are minimized.

There are fire crews and equipment stationed at Clarenville and Winterland in the fire season whose direct responsibility is fire protection. In addition, support, equipment and manpower at both the regional and provincial level is available should the need arise. There are air tankers stationed at Deer Lake and Gander and helicopters in Gander that are available for initial attack.

#### *7.2.6.2 Insect and Disease*

Monitoring and protection programs for insects and disease are coordinated by the forest protection division in Corner Brook. District staff are always available however to provide assistance in detection, monitoring, and protection against insects and disease.

#### *7.2.6.3 General Environment*

The environmental protection guidelines form the basis for protecting the environment from the effects of forest activities. Commercial forest activities can have a significant environmental impact if not conducted properly. The guidelines are designed to provide site specific measures to ensure that these impacts are avoided. Highlights of measures to avoid these impacts include no activity buffer zones, modification of harvesting design and equipment, avoidance of sensitive site during critical periods, consultation with other regulatory agencies and of course, monitoring. Specific measures that govern each forestry activity are detailed in Appendix 2.

### 7.2.7 Surveys

It is hoped that with the compilation of forest inventory data, expected to be completed during this planning period, reconnaissance and intensive regeneration surveys will be conducted on cutovers to determine the need for planting. As well, reconnaissance surveys will be done on regenerating stands to determine the suitability for precommercial thinning.

### 7.2.8 Information and Education

The district will continue its attempt to educate the general public to ensure meaningful and effective consultation and input can be attained. This will be accomplished through planning team fieldtrips and meetings, school presentations, open houses, public meetings, Envirofest and National Forest Week activities.

## Section 8 Mitigations

| Stakeholder | Contact | FMD | Attended Process | ISSUES RAISED DURING 2011 PLANNING PROCESS | Mitigation |
|---|---|---|---|---|---|
| | | | | | |
| Town of Burin | Beth Hanrahan | 3 | letter | Domestic block D0309 – The town Council of Burin requested that there would be no cutting within 100 meters of the Town's reservoir access road (Mud Lane). | The conditions and harvest maps distributed with domestic permits to harvest in Domestic block D0309 will identify this area as a no cutting area. |
| Town of Marystown | Dennis Kelly | 3 | letter | Domestic block D0309 – The town Council of Marystown requested that there would be no cutting within 120 meters of the Clam Pond access road in Marystown. | The conditions and harvest maps distributed with domestic permits to harvest in Domestic block D0309 will identify this area as a no cutting area. |
| Town of Fortune | Norma Stacey | 3 | email | Domestic block D0301 – The town Council of Fortune requested that there would be no cutting within the Fortune Head Fossil Reserve. | The conditions and harvest maps distributed with domestic permits to harvest in Domestic block D0301 will identify this area as a no cutting area. |
| Town of Clarenville | Bob Hiscock | 2 | letter | Domestic block D0207 – In the interest of preserving slope stability and esthetics the town Council of Clarenville requested that there would be no cutting north side of the TCH in this block. | Due to the significant size of the proposed no cutting area, and the anticipated impact on local domestic cutters, FMD2 staff have met with the Town of Clarenville to discuss the concern. It was agreed by both parties to further review the proposal to more accurately identify the actual areas needing protection. |
| DNR staff and domestic permit holders | | 2 & 3 | | Local domestic cutters have made numerous requests to harvest the significant amount of deadwood and blowdown scattered throughout FMD 2 and 3 as a result of Hurricane IGOR and other weather events. Much of this timber is located outside of domestic harvest blocks and the geographic nature of the issue creates logistical challenges in creating the maps required to permit cutting. | The following condition will be added to domestic cutting permits in FMD 2 and 3. "The cutting of deadwood and blowdown is permitted in areas outside of designated domestic harvest blocks, but not within areas, designated for no harvest activity." |
| DNR staff and domestic permit holders | | 2 & 3 | | Cottage owners do not have avenues to legally obtain permission to harvest the timber located on the "license to occupy" issued by Crown Lands Division. | The following condition will be added to domestic cutting permits in FMD 2 and 3. "The cutting of timber is permitted in areas identified on a valid "license to occupy" issued to the domestic permit holder. |
| Terra Nova National Park / Discovery Regional Dev Board. | Kirby Tulk (TNNP) / Chad Holloway (DRDB) | 2 | YES | Domestic block D0261 – There was a concern that harvesting operations would have negative impact on viewscapes in the Clode Sound Area. | It was agreed by the planning team that the patchcut method employed by the traditional 20 domestic permit holders in that area would not have a significant impact at any one time. FMD2 staff will monitor the area to identify any areas that might "open up" and modify cutting area if necessary. |
| Terra Nova National Park / Provincial Dept of Tourism / | Kirby Tulk (TNNP) / Derek Stewart (DTCR) / | 2 | YES | Commercial block C0223 – There was a concern that harvesting operations would have negative impact on viewscapes in the Buyans Cove Area as seen from particular vantage points in Terra Nova National Park and Clode Sound. | DEM Tim Andrews and Kirby Tulk participated in a field trip to identify specific areas of concerns. It was agreed by both that harvesting methods utilized in the last five years have not had significant impact on viewscape. FMD2 staff have agreed to continue employing viewscape preservation principles, as previously applied in |

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| Discovery Regional Dev Board. | Chad Holloway (DRDB) | | | | the last plan, when planning at the operational level and monitor accordingly. |
| Terra Nova National Park / Discovery Regional Dev Board. | Kirby Tulk (TNNP) / Chad Holloway (DRDB) | 2 | YES | Commercial block C0220 – There was a concern that harvesting operations would have negative impact on viewscapes in the Buyans Cove Area as seen from particular vantage points in Terra Nova National Park and Clode Sound. | DEM Tim Andrews and Kirby Tulk participated in a field trip to identify specific areas of concerns. FMD2 staff have agreed to continue employing viewscape preservation principles, as previously applied in the last plan, when planning at the operational level and monitor accordingly. |
| Terra Nova National Park / Provincial Dept of Tourism. | Kirby Tulk (TNNP) / Derek Stewart (DTCR) | 2 | YES | Commercial block C0213 – There was a concern that harvesting operations would have negative impact on viewscapes in the area where South West River intersects with the TCH. | FMD2 staff have agreed to employ viewscape preservation principles, as previously applied in the last plan, when planning at the operational level and monitor accordingly. |
| Sweet Bay Residents | Thomas Philpott | 2 | YES | The residents of Sweet Bay have again requested the mitigations agreed to in the previous planning period with regard to harvesting on the Sweet Bay Peninsula. Specifically these were viewscape preservation, wider marine buffer, and alternate route for forest access road. | No harvesting activity was scheduled in this particular area for the upcoming five year planning period 21012 -2016. |
| Beaulieu's Caribou Hunts 2005 Limited | Dean Crocker | 2 | email | Commercial block C0245 – Owns/operates an outfitting lodge, Deep country Lodge, in Deep Bight area. Concerns raised include; resource road development has increased public access, timber removal will affect viewscape and habitat of big game animals, and wood trucks will have negative affect on client experience during spring and fall hunting seasons as well as winter snowmobiling. . | FMD2 staff have recommended that no cottage development be permitted in the operating area, to employ viewscape preservation principles when planning at the operational level, and committed to not harvesting during winter snowmobile season. |
| Resident of Shoal Harbour | Don Pelley | 2 | letter | Shoal Harbour River Protected Public Water Supply Area - There was a concern that clearcutting and other activities would result in less vegetation leading to increased runoff, and subsequently, low water levels. | Permits to carry out forest activities within the Shoal Harbour River PPWSA will be obtained annually from Water Resources Division on the Department of Environment and Conservation.<br>DNR will continue to apply the Environmental Protection Guidelines for forestry operations within Protected Public Water Supply Areas. |
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| **ADM REVIEW PROCESS** | | | | | |
| **AGENCY** | | | | **CONCERN / ISSUE** | **RESOLUTION / ACTION** |
| **Department of Environment and Conservation<br>Water Resources Division<br>Protected Public Water Supply Areas** | | | | There were some concerns with conducting forestry activity within various Protected Public Water Supply Areas and that all development activities in PPWSAs would require prior approval. | Forest Service Branch has agreed and has sent a formal response to Water Resources Division of DEC. |
| **Department of Natural Resources<br>Agrifoods Branch** | | | | Some comments surrounded the lack of discussion around cranberry industry in the text. As well, the ongoing discussion surrounding | Forest Service Branch has considered the comments and has sent a response to Agrifoods Branch of DNR. |

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| | potential areas for agriculture development. | |
| **Department of Environment and Conservation Lands Branch** | The review identified very few conflicts or concerns. General comments included the need for 120 meter buffer around waterbodies where cottage development areas exists (15 meter shoreline and 90 meter cottage lot and a 15 meter road right of way). | Forest Service Branch has agreed and has sent a formal response to Lands Branch of DEC. |
| **Department of Environment and Conservation Parks and Natural Areas** | There was some concern around obtaining proper permits to use the T'railway Provincial Park for the purpose of transporting timber. As well, within the text there was some concern about making reference to specific areas being considered under the Natural Areas System Plan. | Forest Services Branch has had consultations with Parks, where resolution to concerns has been identified as through correspondence through ADM process. |
| **Department of Environment and Conservation Wildlife Division** | There were some concerns raised regarding proposed harvesting activity within Stewardship zones, waterfowl areas, and Newfoundland Marten Core Habitat areas. | Forest Service Branch has had consultation with Wildlife Division where resolutions to concerns have been identified as per correspondence through ADM process. |
| **Department of Tourism, Culture, and Recreation Tourism Branch** | There were some concerns raised regarding buffers along highways and rivers, viewscapes, and outfitting industry. | Forest Service Branch has had discussions with TCR and resolution has been agreed upon regarding issues raised. TCR and DNR agree to have an ongoing dialogue, and will work together cooperatively, to identify areas of concern and address viewscape issues. If remodeling work is required, DNR will take the lead where possible. |
| **Department of Environment and Conservation Sustainable Development and Strategic Science Div.** | There were some concerns raised regarding statements made in the plan regarding caribou and the adaptive management project undertaken in Zone 5. | Where indicated, the text has been revised and SDSS will be provided with details of the adaptive management project. |
| **Department of Natural Resources Mines Branch** | General comments regarding mines and energy development. Their plans are expected to change annually and reserves the right to not be impacted or restricted by forestry activity. | Forest Service Branch has reviewed the concerns identified and has agreed through formal correspondence from the ADM review process. |

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| **Other items that were identified from previous planning processes, but not discussed at this one.**<br><br>**DNR still considers important to maintain in this planning period** | **<u>Refer to specific Operating Sheets in Appendices for specific details</u>** |
| **<u>Tourism</u>** | • Tourism, Culture and Recreation requested that tourism assets be identified within the District. In addition to well-known tourist destinations such as the Trinity Bight, Bonavista and the Port Blandford area, this exercise also identified other key features important to the tourism industry, such as popular travel corridors, hiking trails, iceberg viewing points, popular boating/kayaking routes, golf courses, parks and sensitive wildlife habitat.<br>This is referenced when making forest management decisions and designing appropriate mitigation. |
| **<u>Tourism</u>** | • The Discovery Trail Tourism Association expressed concern about the impact of regulated domestic cutting near, or visible from, a series of hiking trails developed around the District. The District has established a minimum of **50 metre no-harvest buffers along these hiking trails** and, in some instances, has amended domestic cutting blocks to remove particularly sensitive areas from future harvesting. |

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| **Tourism** | • Tourism, Culture and Recreation expressed concern about the impact that domestic harvesting would have on viewscapes near strategic tourism assets. DNR has been monitoring domestic harvesting activity and has agreed to practice landscape management in areas key to tourism development. Critical portions of domestic harvest blocks (from a viewscape perspective) will be closed for a period of years once 30% of the landscape is clear (patch)-cut. Domestic Block 76 (immediately north of Trinity Bight) is an example of a domestic cutting block that has been modified to conform to this commitment. Although the period of time for which the block will be closed to further cutting is not defined, generally, it will be closed until green-up occurs in the harvested section. |
| **Cottage Areas** | • Cabin owners in the Princeton Pond cabin area are concerned about how logging may impact their use of the area. They are mostly concerned about the visual impact of large-scale clear-cutting on the landscape. DNR has consulted with the cabin owners and has committed to adopt landscape design principles. Through consultation, DNR staff have identified other issues that are also being addressed.<br>• DNR will leave appropriate buffering on a case-by-case basis around all cabins with legal title. |
| **Cottage Areas** | • Concern was expressed during the 2007-11 planning process with respect to the opportunity to develop new cabin areas in the District and the impact of unplanned cabin development on other values. There are no guidelines to organize development, so many requests come forward on an ad-hoc basis and are dealt with individually.<br>• District 02 has committed to work with Crown Lands to develop a cottage development plan for the District. This will provide a better public service to the people of the District. In addition to clearly identifying areas where cottage development can occur, it will also identify areas where development can not occur. |
| **Parks and Natural Areas** | • DNR will maintain a **100m no-cut buffer around Lockston Path Provincial Park**.<br>• DNR will maintain a **100m no-cut buffer on either side of the centre line of the T'Railway Provincial Park.** |
| **Parks and Natural Areas** | • Parks and Natural Areas have identified a candidate ecological reserve under its proposed Natural Areas Plan. DNR has instituted a no-cut designation within this proposed ecological reserve and has removed all inventoried timber within the proposed reserve from the District 02 wood supply. |
| **Agricultural Development** | • During the last two planning processes, Agrifoods Branch expressed concerns about opportunities for the agrifoods industry to expand within District 02. As a result, both the 2001-06 and the 2007-11 documents had a strategy to deal with agricultural development. Forestry Branch has on many occasions agreed to agricultural developments which have led to the loss of productive forest land and AAC reductions. Forestry Branch will continue to work with Agrifoods to support Agriculture Development in the District and at the same time utilizing forest land for maximum benefit of fibre resource. |
| **Recreation** | • The **Clarenville Nordic Ski Club** have expressed concern regarding the impact of forestry activity on their facilities as well as the impact that increased logging traffic in the area would have on public safety and the condition of a section of the White Hills road that had been upgraded (paved) as part of the White Hills Development. DNR has established a large "no-cut" reserve around White Hills to protect the recreational value present there. DNR has also constructed an alternate route to access the timber in the area and relinquished its right to use access road infrastructure that had originally been constructed by the agency (during the 1980's) to access the forest resource and abandon (or restrict to light traffic only) another section of road that had been upgraded during 2006. |
| **Community relations** | • **North Pond** is the home of provincial camps for the Girl Guides of Canada and Scouts Canada. A number of times in the past, national jamborees have been hosted at this site. During the 2001-06 planning process, leaders of these organizations expressed |

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| | concern about proposed logging activity around North Pond and referenced an unofficial commitment that previous administrations had given to establish a no-cutting reserve around the pond. This reserve, consisting of 1700 ha within a 750m no-cut buffer, was established in the 2001-06 plan. The reserve forms part of the wildlife corridor established along the Northwest River. A commitment to the maintenance of the reserve was renewed again in the 2007-11Five Year Plan and will be carried forward into this planning period. |
| **Wildlife** | • During the previous environmental assessment review process, concern was expressed that coastal logging proposed within the 2007/11 Five Year Plan would negatively impact **bald eagle/osprey nesting sites** and, consequently, populations. The District is conducting coastal surveys to monitor activity in known nesting sites for these two large raptor species and to identify new nesting locations. Environmental Protection Guidelines developed to protect bald eagles and osprey will be followed during the implementation of forest management activity. |
| **Wildlife** | • During the previous two planning processes in District 02, there was considerable debate about how the presence of moose should be factored when making forest management decisions. Discussion ranged from the need to modify activity in areas with high moose densities to concern about the impact of moose browsing on forest dynamics and stand development. District 02 has partnered with Memorial University and Terra Nova National Park in a long term study to evaluate the impact of moose herbivory on forest dynamics and stand development. A series of 22 **moose exclosures** have been established on natural and man-made disturbances within TNNP and Management District 02 and will continue to be monitored on an annual basis. |
| **Endangered Species ( Marten)** | • TNNP is playing a key role in the Newfoundland Marten recovery program in eastern Newfoundland. The agency expressed concern during the District 02 2001-06 planning process with respect to landscape management considerations to support the marten recovery efforts in this region. In response, DNR established a Newfoundland Marten corridor along the Northwest River, which works in conjunction with a similar area established along the east side of Terra Nova River (between Terra Nova Lake and Mollygujeck Lake).This corridor provides connectivity between TNNP and the Bay-du-Nord Wilderness Area. Both areas have substantial protected marten habitat. In addition, the corridor provides connectivity with an extensive area surrounding Mollygujeck which has been proposed as critical habitat for marten. The status of the corridor was maintained during this planning period. |
| **Endangered Species ( Boreal Felt Lichen)** | • As a result of an amendment to the 2001-06 Five Year Plan, concerns were expressed about the presence of Erioderma lichen in a proposed extension to a domestic cutting block in the Come by Chance area. A field survey for Erioderma was conducted in the proposed cutting block. Areas in which Erioderma thalli were determined to be present were removed from the domestic cutting block. These no-cutting zones will be carried forward to this planning period. |
| **Biodiversity** | • During the 2007-11 planning process, concern was expressed that DNR reforestation efforts were creating monocultures. DNR advises that white pine are mixed in with white and black spruce through all plantations (within its normal range). Additionally, DNR matches planting species and site to ensure the best ecological configuration (e.g., red pine on dry, poor, coarse textured soils; white spruce on rich sites). As well, DNR has adopted a practice within the District of allowing naturally occurring hardwood to mix through plantations. One of the primary reasons for doing this is to increase the biodiversity within future forests.<br>• Old growth forest is important. DNR commits to leaving a minimum of 15% of the productive forest land in each Forest Management District in an old growth condition (i.e., 80+ years old) through time. |
| **Salmonids** | • DNR will maintain a 100m buffer on all scheduled salmon rivers. |

# Section 9 Plan Administration

## 9.1 Monitoring

Monitoring of planned activities is critical to ensure objectives and operations are carried out in a manner consistent with various guidelines and provincial and federal legislation. Monitoring occurs at the operational level and the planning level.

### 9.1.1 Operational Level

All harvesting activity is regulated using a permitting system and all activities are inspected and monitored on the ground by conservation officers to ensure compliance with the Forestry Act and regulations, cutting permit conditions, and Environmental Protection Guidelines. Permit holders and contractors are also subject to financial penalties if work does not meet specifications. Conservation officers conduct inspections on a weekly or monthly basis depending on the level of activity. These inspections may entail surveys such as utilization assessment to ensure compliance with permit conditions.

### 9.1.2 Planning Level

The planning team has established a monitoring committee (which is the planning team) whose primary role is to monitor implementation of this five year operating plan. This is a crucial role, as many implementation commitments are stated in the plan. The primary function of the monitoring committee is to:

- monitor plan implementation for consistency with commitments in the plan
- identify concerns with plan implementation to team members
- review annual operating plan before implementation
- provide recommendations for plan changes
- establish protocol for concerns reported to and/or identified by monitoring committee

The monitoring committee should meet at least once a year to review the annual recommendations should changes be required as a result of a catastrophic event such as

fire which may precipitate changes to the plan. Field trips to view on the ground activities has proven effective by monitoring teams in the past and will be encouraged during the implementation of this plan.

## 9.2 Amendments

Due to the dynamic nature of forest activities, amendments are often required because of changes in the forest, operational realities, imposition of addition requirements or guidelines, or some other unforeseen circumstance. These changes to the five year operating plan must be submitted as amendments and approved before they are implemented. There are two types of possible amendments for this plan, one that can be approved internally by the Forestry and Agrifoods Agency and one that must be submitted to the Environmental Assessment Division for public review. Changes to this plan can be approved by the Forestry and Agrifoods Agency if they are:

-within one kilometer of an operating area described in the five year operating plan, an additional area for timber harvesting that is, in total, not more than 50 hectares in each year of the plan

- within a forest management district, an additional areas for silviculture treatment of not more that 20 percent of the total operating area described in the five year operating plan over the five year term of the plan

- within an operating area described in the five year operating plan, not more than one kilometer, in total, of new primary forest access road in addition to existing and proposed primary forest access road in each year of the plan

- adjacent to an operating area described in the five year operating plan, not more that half a kilometer, in total, of new primary forest access road in each year of that plan.

Changes that are not covered by the above must be submitted for Environmental Assessment (EA) in the form of an amendment to the five year operating plan. Prior to approval through EA, the amendment has to be approved by the Ecosystem Management Division of the Forest Service.

Amendments will be reviewed by the monitoring committee if the District Manager deems that they represent a significant change to the plan.

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# APPENDIX 1

## List of Planning Team Members and Planning Process Information for Zone 2

**APPENDIX 2**

**Environmental Protection Guidelines for Ecologically Based Forest Resource Management**

**APPENDIX 3**

**Proposed Crown Commercial Harvesting and Road Construction Maps for Planning Zone 2 for 2012 -2106 and Operating Area Description Sheets**

**APPENDIX 4**

**Proposed Crown Silviculture Maps for Planning Zone 2 for 2012 -2106 and Operating Area Description Sheets**

**APPENDIX 5**

**Proposed Crown Domestic Harvesting Maps for Planning Zone 2 for 2012 -2106 and Operating Area Description Sheets**

**APPENDIX 6**

**Map Identifying Values in Planning Zone 2 for 2012 - 2016**