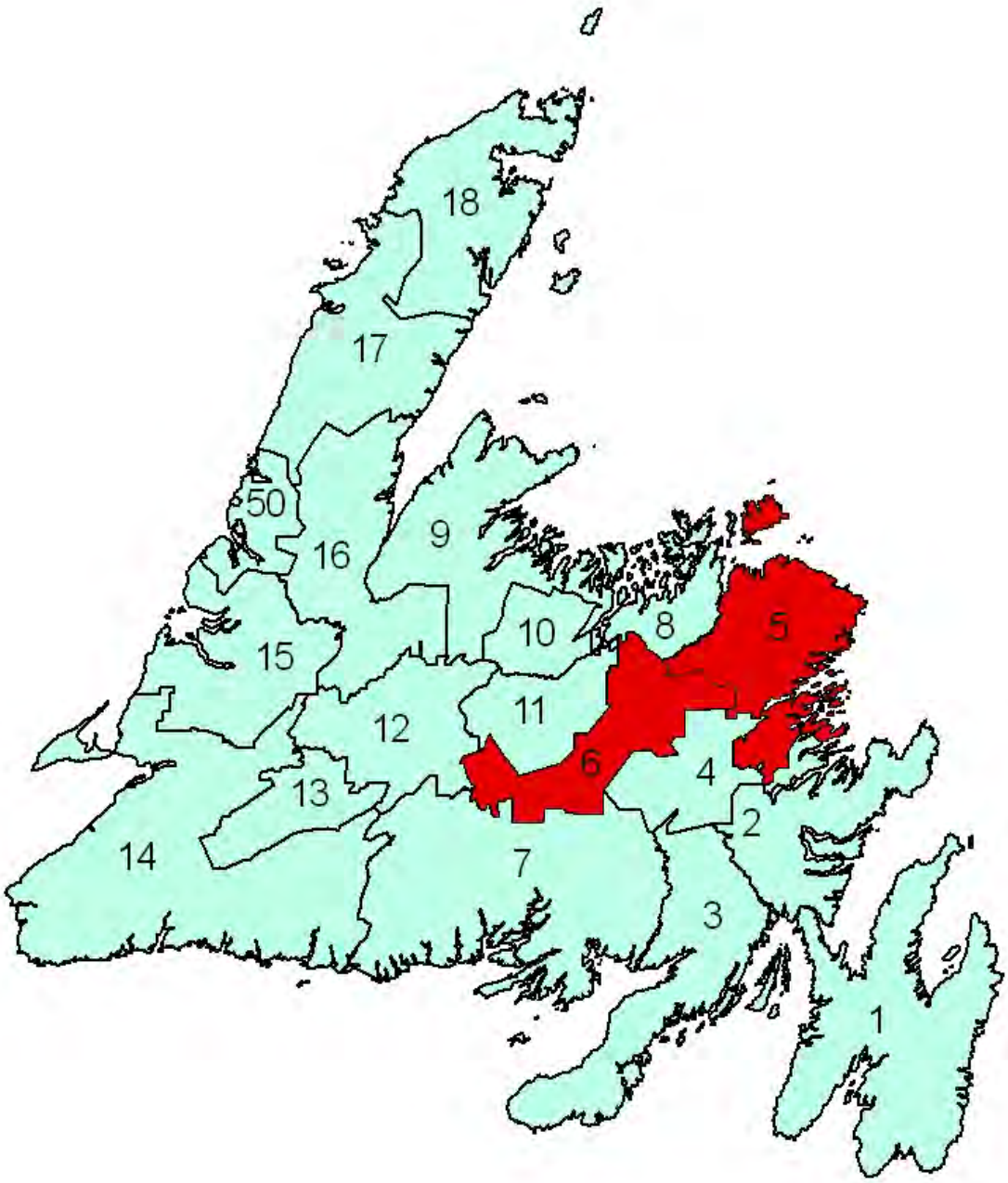
Kruger Publication Papers

Corner Brook Mill

# Corner Brook Pulp and Paper Limited
# Five-Year Operating Plan
# Forest Management Districts 5 and 6

## January 1, 2012- December 31, 2016



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Planning Zone 3 Five-Year Operating Plan (2012-2016)

## INTRODUCTION

Please visit www.env.gov.nl.ca/env/env_assessment/projects/Y2011/1595/1595_amendment.pdf for amended Introduction.

## 1.0 Description of Forest Management Districts

### 1.1. General

Planning Zone 3 encompasses FMD's 4, 5, 6 and 8 (Figure1). It extends from Seal Bay in the northwest, easterly along the coast to New-Wes-Valley in the northeast, then southerly to Terra Nova National Park in the east and then west along the northern edge of the Bay Du' Nord Wilderness Area to the general area of the Bay D'Espoir Highway near Great Gull Lake.

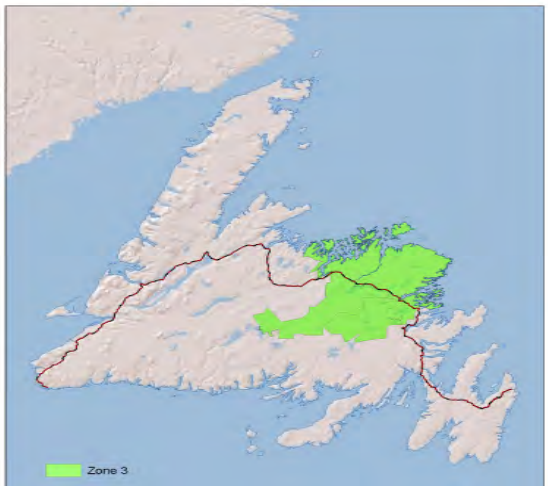



**Figure 1. Location of Planning Zone 3**

#### 1.1.1. District Boundaries

Forest Management District 4, known as the Terra Nova Management District, basically encompasses both the Terra Nova and Gambo River watersheds. Its boundaries follow tenure lines north of Mint Brook to the south shore of Gambo Pond, then extends south (including Terra Nova Lake) to the Bay Du Nord Wilderness Area, and continues as far west as Little Gander Pond. The western boundary generally follows a northeasterly direction passing just east of Dead Wolf Pond to a point near the headwaters of Mint Brook. The district also includes Kepenkeck Lake, Lake St. John and Deer Pond. FMD 4 has a total gross area of 297,147 hectares, and a total productive forest area of approximately 82,785 hectares.

Forest Management District 5, known as the Bonavista North Management District, is located on the north side of Bonavista Bay. Its boundaries include the Gander River to the west and Gander Lake, Gambo Pond, and Terra Nova Lake to the south. To the east, the district is marked by Bonavista Bay and Terra Nova National Park. To the north, it ends to the Atlantic Ocean. The

district also includes Fogo Island. FMD 5 has a total gross area of 581,040 hectares, and a total productive forest area of approximately 214,254 hectares.

Forest Management District 6, commonly referred to as the Glenwood Management District includes that parcel of land extending generally south and southwest of Gander Lake and the TCH to Great Gull Lake. The southern boundary extends from Great Gull Lake, west to Sitdown Pond and Great Burnt Lake. The western boundary extends through the headwaters of Great Rattling Brook northeast to the Bay D'Espoir Highway near Miguels Lake, and then continues on passing just south of Crowe Lake through to the TCH near Notre Dame Junction. FMD 6 has a total gross area of 408,098 hectares, and a total productive forest area of approximately 152,818 hectares.

Forest Management District 8, also referred to as the Exploits Bay Management District, is located on the northeast coast, covering the geographical area, which can generally be defined as that located north of the former Canadian National Railway line (49th latitude) between the Gander River in the east and Seal Bay in the west. The northern boundary extends into Notre Dame Bay to include Twillingate, New World Island, Change Islands and Exploits Island, along with many other smaller islands. Major communities within the district are primarily located along the coast with population centers around Gander Bay, Twillingate - New World Island, Birchy Bay, Lewisporte, Norris Arm, Botwood and Point Leamington. FMD 8 has a total gross area of 283,000 hectares, and a total productive forest area of approximately 162,474 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. The FMD's 4 & 5 headquarters is located in the town of Gambo, while FMD's 6 & 8 fall under the jurisdiction of District Office in Lewisporte. There are also satellite field offices in Gander, Wings Point and Northern Arm. Administration of forest management activities in FMD 4 is shared between the Gambo and Clarenville district offices, while in FMD 6 they are shared between Gambo, Lewisporte and Bishop's Falls. This arrangement results from the existing road access points to FMD's 4 and 6 in relation to DNR offices.

### 1.1.2 History

With the exception of Gander, the major communities within the planning zone area were built around the fishery, the railway and lumbering. Approximately 62,200 people live in this zone and most are located in communities of various sizes that follow the coastline. However; the largest single concentration is found inland at Gander, where the population is around 9,500.

The districts in this zone have a history that is both rich and varied. In FMD 5, Gander's existence stems from the need of a stopover point for transatlantic flights in the mid 1930's. Its development took on major importance during World War II because of the towns' strategic location, where, as many as 10,000 military personnel were stationed. Still, in spite of its contribution on the global and local scene, the Town of Gander was not established until 1951. This is a stark contrast to centers like Fogo Island, which began to settle around 1680 by French, Spanish, and Portuguese summer fishing stations.

The Wesleyville-Badgers Quay area is the birthplace of many great sealing captains. Greenspond, a small fishing community today, can trace its origins back to 1698. It was once a bustling community of 1,726 persons (1901) and was once known as the "Capital of the North"(Windsor, 1979). This community was very important to fishing industry by the late 1700's and by 1850 was heavily involved with the seal fishery. Gambo, whose heyday centered on the now defunct Newfoundland railway, is the birthplace of the last Father of Confederation, the late Premier Joseph R. Smallwood. Gambo was also the site of extensive lumbering activities in the 1800's. Another noteworthy railway and lumbering town in the region is Terra Nova. The Terra Nova River watershed, which essentially constitutes FMD 4, was extensively logged for pulpwood and lumber during the 1940's and 50's. Norwegian developers, who in 1920, started construction on a sulphite pulp mill at Glovertown, originally secured the timber limits associated with most of that district. Devaluation of the Norwegian Kroner disrupted the financing of the project and it was eventually abandoned (Munro, J.A., 1978). Subsequently, the Anglo-Newfoundland Development Company (the predecessor of Abitibi) obtained the rights to the Terra Nova limits in 1923 to support an expansion of the Grand Falls mill.

FMD 6 encompasses the watershed of both the Northwest and Southwest Gander Rivers and the area immediately adjacent to Glenwood, has a similar history. While the Corner Brook mill was still under construction, the Reid Newfoundland Company was also trying to promote a

newsprint mill on the Gander River (Munro, J.A., 1978). The Gander Valley Power and Paper Company Limited was formed by the Reid's and the most of the area which constitutes FMD 6 was conferred along with water power rights by the government in 1924. The Hearst publishing organization in the United States was involved with the financing and had tentatively agreed to take the full output of the mill. This deal fell through and eventually the Reid's negotiated a deal which allowed the Bowater interests in England to acquire the Gander Valley and other properties for the Corner Brook mill in 1938, in what became known as the Gander Deal.

As with most areas of rural Newfoundland, historical settlement of communities in FMD 8 developed around the fishing and shipping industries. The community of Twillingate recorded settlers as early as 1700, making it one of the Provinces oldest seaports. During the early 1900's, Campbellton was an industrial town with a lumber mill, pulp mill and its own miniature railway. Over the past 30 years, commercial forestry activities have increased to the point where they now account for a significant portion of employment in the area. Small-scale farming is carried out in the Comfort Cove, Laurenceton and Northern Arm areas. Lewisporte; the largest community in the district is a service town with a large wholesale distribution center. It is also a main port for the coastal service to Labrador. These four districts have strong ties to the development of the forest industry in Newfoundland. In more recent years, the infrastructure, especially the network of forest access roads originally used to support the logging industry, is cited as an important component of other industry developments such as hunting and fishing.

### 1.1.3 Ownerships

There are two major ownerships in the zone that comprise of Crown and Corner Brook Pulp and Paper Limited (CBPPL) (Figure 2). Crown land accounts for 67.7 % of the timber ownership that comprise of all FMD 04 & 08, and portions within FMD's 05 & 06. During the fall of 2010, CBPPL sold some of its land base in FMD's 08 & 06 to Crown. As a result, within the whole zone CBPPL now only represents 21.6 % ownership. These holdings are in the form of long term licenses that are not due to expire until 2037. Finally, miscellaneous timber holdings (e.g. private, DOT, parks, etc.) account for 2.1 %.

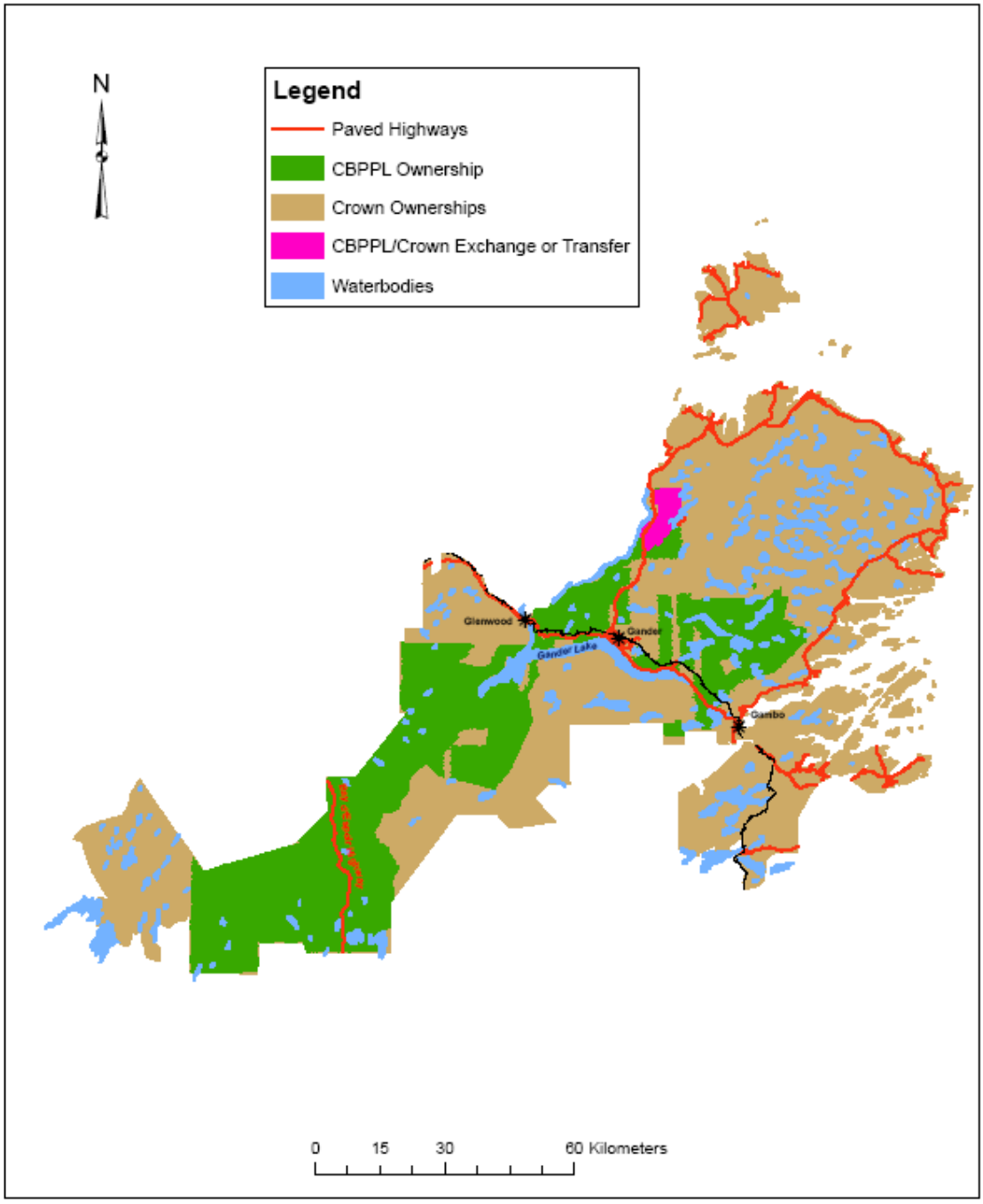



**Figure 2. Ownership Map of Planning Zone 3**

### 1.2 Physical Features

The planning zone is a large area (approx 1.6 million ha) covering much of northeastern Newfoundland. Physical features vary a great deal over such a large landscape. The following descriptions apply generally to the districts in the planning area.

#### 1.2.1 Topography and Physiography

Planning Zone 3 contains a diversity of terrain types. The area has generally rolling topography dissected by several large valleys including: Southwest Gander River, Northwest Gander River and Gander River valleys. These rolling hills are commonly between 100 and 200 metres (asl) and rarely extending above 300 metres (asl). Hillsides drop steeply into the major valleys. Broad lowland, below 100 m elevation, is found between the Exploits River and Botwood, and north of Norris Arm. The area has an extensive coastline dominated by bedrock with scattered pocket beaches. Another exception is the area west of New-Wes-Valley that is generally low relief lowland (less than 100 m asl) dominated by numerous lakes and wetland areas. The physiography is largely controlled by bedrock structure, shown by the numerous southwest northeast trending valleys, lakes and ridges. Hills are commonly orientated northeastward, reflecting bedrock lineation. The highest point in the management area is Mount Peyton (482 m asl) near Glenwood in FMD 6.

This region contains Gander Lake, which is one of the largest lakes in the province. The lake is 47 km long, an average of 2.0 km wide, has a surface area of 11,200 ha (EDM et. al., 1996), and a surface elevation of 25m asl. A bathymetry survey of the lake was completed in 1995 during the development of a watershed management plan for the Gander Lake Watershed Monitoring Committee (EDM et.al., 1996). Soundings in the Fifteen Mile Brook area recorded depths of 274 m (249 m below present sea level) and depths of 250 m off Little Harbour, decreasing to 60 m off Kings point and 27 m at the extreme eastern end of the lake. The field survey confirmed the maximum Lake depth at 290 metres.

In general, the drainage of the planning area is in a northerly direction and is characteristically poor with many large peat bogs throughout. The main rivers include: Gander, Gambo, Campbellton, and Terra Nova. Other rivers (Indian Bay, Dog Bay and Ragged Harbour), while smaller in size, drain large watersheds. In the past, many of these rivers were important

transportation routes for water-driven saw logs and pulpwood. This is evident by the remnants of a number of large dams as well as the occasional man-made channel.

### 1.2.2 Quaternary Geology

The area was completely glaciated during the last glacial period (Late Wisconsinan). Surficial geology mapping has been completed on parts of the area at scales of 1:50 000 (Batterson, 1991, 1999a,b; Mackenzie, 1993; Munro, M., 1993) and 1:250 000 (Liverman and Taylor, 1993, 1994a,b). Mapping of ice flow indicators identify three major flows. Early ice flow was eastward from a source in the Long Range Mountains, and subsequently by north to northeastward flowing ice from the main Newfoundland ice center.

This region shows abundant evidence of glacial activity, and is dominated by areas of bedrock and till. Bedrock that comprises much of the coastal area and the higher ground is smoothed, commonly showing roche moutonée forms. Drumlins are found at the head of Lewisporte Harbour, and crag-and-tail hills are found south of Loon Bay. Areas adjacent to the coast show large area of bedrock exposure, particularly west of New-Wes-Valley and north of Gander. Much of the area is covered by glacial till, commonly as a veneer (less than 1.5 m thick) or as a blanket (thicker than 1.5 m). Rogen moraines, oriented perpendicular to flow, are generally rare, although some are found in the Island Pond/Dans Pond area and near Sunday Pond and Frozen Ocean Lake These were deposited by north to northeastward flowing ice, consistent with the regional ice flow direction.

The valleys of the lowlands were the main channels for melt waters created by retreating ice. In these valleys are found the glaciofluvial landforms of terraces eskers, kames and valley trains. Gander Lake was likely a conduit for local ice flow. Ice contact gravel and eskers at the eastern end of the lake show that ice flowed through this area and into the sea at Freshwater Bay. Eskers are also found in the Caribou Lake area south of Gander Lake the Mint Brook area near Gambo and the Terra Nova area. Areas of non-glacial sediment are generally confined to the valleys. The Great Rattling Brook, Southwest Gander River, Northwest Gander River and Gander River valleys all contain moderately to well sorted, stratified sand and gravel deposited in a glaciofluvial or fluvial environment. These systems were the routes of melt water during de-glaciations. The Southwest and Northwest Gander River valleys are up to 6 km wide, with flat

valley floors. They contain sand and gravel deposited by glaciofluvial outwash. The present channel into an alluvial plain up to 1 km wide has reworked some sediment. Melt water outflow from the Southwest Gander, Careless Brook valley and from the Northwest Gander River valley flowed northward through the outflow into the modern Gander River valley.

Evidence of higher water levels was found in the Gander Lake valley (Batterson and Vatcher, 1991). Beach sediments up to 39 m above Gander Lake have been identified. It is possible that higher water levels were the result of marine incursion. Raised marine features on the coast have not been examined in detail, but Munro and Catto (1993) reports Late Wisconsinan marine limits near Carmanville on the north coast at 43 m asl. Marine limit at the coast at the eastern end of the lake has been reported at about 30 m asl (Jenness, 1960; Grant, 1980). Undated marine shells have also been reported from the Gander River valley, north of Gander Lake. Higher water levels drained through the modern Gander River valley. During the Holocene, organic deposits developed in the poorer drained areas, and colluvial deposits formed at the base of the steeper slopes. Both these processes continue today, although vegetated slopes have retarded the rate of colluviation.

### 1.2.3 Bedrock Geology

FMD's 4, 5, 6 and 8 straddle three technostratigraphic zones of the Newfoundland Appalachians. These are, from east to west, the Avalon, Gander and Dunnage zones (Govt of NL, 1987). The Avalon Zone lies in FMD 5 east of a line drawn from Terra Nova Lake northward to the Dover area. This zone is characterized by thick successions of upper Precambrian volcanic, plutonic and sedimentary rocks that are overlain by fossiliferous mudstone, quartzite, limestone and shale of Cambrian age. These various rock types are well exposed in the areas around Bonavista Bay. Granitic and gabbroic rocks of late Precambrian age occur east of Traytown.

Granitic rocks of Devonian age occur in the Terra Nova Lake area. The Gander Zone lies in parts of all four districts. Its western boundary lies roughly along a line that extends from Great Gull Lake northeastward to the Ragged Harbour area. The western part of the Gander Zone consists of a thick sequence of quartz greywacke, quartzite, siltstone and shale. This grades eastward into metamorphic rocks consisting of schist, gneiss and migmatite. These rocks were intruded by massive and foliated biotite granites and by massive and foliated two-mica, garnet-bearing

granites. The age of the sedimentary and metamorphic rocks is early Ordovician and older. The granitic rocks are as young as Devonian. The Dunnage Zone is situated in the western part of FMD 5 and covers most of FMD's 6 and 8. A thin sliver of Dunnage Zone rocks is located in FMD 4. Rocks within the Dunnage Zone are composed of Ordovician marine mafic volcanic, intrusive and sedimentary rocks that represent remnants of oceanic crust. These are overlain by oceanic basalts and subaerial felsic volcanic rocks. The volcanics are interlayered with and grade laterally into clastic sedimentary rocks. As is the case in the other zones, intrusive rocks of middle Paleozoic age intrude rocks of the Dunnage Zone and consist of granite, granodiorite, diorite and gabbro.

### 1.2.4 Soils

Portions of the districts have been surveyed with respect to soil profile but information is lacking in other areas, particularly near the coast. A soil survey was conducted in the Gander – Gambo area and the following information relates to that location. The remainder of the districts should not vary greatly with regard to these soil types due to similar parent materials mentioned above (Wells and Heringa, 1972). The survey concluded that the soils developed from glacial till. These include mainly ground
terrain deposits ranging from a few inches to over 20 feet thick and are composed largely of material derived from locally underlying rock. Podzolic soils are the main soils in the area with some orthic gleysols which are characterized by the lack of aeration and poor drainage.

There are some large areas of organic soils which may be broadly divided by the degree of decomposition and the vegetation apparent on the site. Sphagnum peat is the predominant type of organic deposit. Other types of organic soils found in the districts would be ericaceous peat and muck peat, both of which are less shallow in depth when compared to sphagnum peat. In relation to tree growth, the podzolic soils support the following species: black spruce – *Picea mariana* (Mill.) B.S.P.; balsam fir - *Abies balsamea* (L.) Mill.; white birch - *Betula papyrifera* (Marsh); and others of lesser importance than the three mentioned. The orthic gleysols support mostly black spruce, the growth of which is somewhat retarded due to the lack of available nutrients. Little, if any, tree growth is supported by the organic soils. The organic mucks support some vegetation depending on slope. Some shallow mucks occur on lower slopes under mixed forest and alder.

### 1.2.5 Climate

The climate of the four districts can be broken down into two main categories, in accordance with the two larger ecoregions of this area. The Central Newfoundland Ecoregion has the most continental climate on the island. As a result it has the warmest summers and the coldest winters. The mean daily temperatures for July and February are +15oC to +16oC and -4oC to -8oC, respectively. The precipitation ranges from 900 mm to 1300 mm annually with 3.0 m to 5.3 m of snowfall. This ecoregion also has the least wind and fog for the island. Due to the warm summers and the highest rates of evapo-transpiration, the soil moisture in this area is considered one of the driest on the island. A result of this is the high frequency of fire in this ecoregion due to its summer dryness. The North Shore Ecoregion has the warmest summers of all the coastal regions on the island, and the winters are cool. The mean July temperatures range from +15oC to +16oC, while the February mean temperatures range from -5oC to -7oC. The precipitation for this area is between 900 mm and 1200 mm with snowfall amounts ranging from 2.5 m to 3.5 m.

Due to its exposure, the high winds and high summer temperatures the high evapo-transpiration rates cause the soil in this ecoregion to be the driest for the island. The cold Labrador Current flowing from the north, especially with its pack ice in the spring, also influences this region. This causes the growing season to be delayed when the ice is heavy. For additional information about the climate of the four districts refer to Meades and Moores, (1994).

## 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 3, 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 phenomenon 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. The tree species, which characterize the Canadian boreal forest, include black spruce, white spruce, balsam fir, eastern larch, trembling aspen, white birch and jack pine. All of these, with the exception of jack pine, commonly occur on the Island. However, by far the dominant species are black spruce and balsam fir; together they represent more than 90 percent of the growing stock on the island. Spruce is most abundant in north central Newfoundland where a climate characterized by relatively dry, hot summers has historically favored this fire-adapted species. In western Newfoundland the climate is somewhat moister and fires are far fewer in this region resulting in the ascendance of balsam fir, a species that is poorly adapted to fire. Like the rest of the Province, the forests of Planning Zone 3 (FMD's 4, 5, 6 and 8) are part of the larger boreal forest ecosystem. The moraine areas, which are extensive in Zone 3 support, closed stands of conifers, largely black and white spruce *Picea mariana* (Mill.) B.S.P. and *Picea glauca* (Moench Voss), balsam fir *Abies balsamea* (L.) Mill. and tamarack *Larix laricina* (Du Roi) K. Koch. Broadleaf trees, such as white birch *Betula papyrifera* (Marsh.) occur in pure stands on richer soils, but it and trembling aspen *Populus tremuloides* (Michx.) are more prevalent in mixtures with the other conifers. Other needle-leaf trees, notably white pine *Pinus strobus* L. occur in spots scattered throughout the forest while Red pine *Pinus resinosa* (Alt.) is considered rare as it is only found in seven separate natural stands in FMD 5, concentrated in the Gambo-Glovertown area, two stands in FMD 4, two very small stands in FMD 8 and one stand in FMD 6.
Soils of the boreal forests in FMD's 4, 5, 6 & 8 are predominantly classed as podzols although brunisols are also present. Throughout the contrasting areas of exposed bedrock, moraine deposits and low lying sphagnum bogs, this mosaic of soils and non-soils tends to be occupied by a range of plant communities dominated by lichens, shrubs and forbs. Climatic conditions of

this region are heavily influenced by the proximity to cold Arctic air masses and the Labrador Current in the north and warm moist air and the Gulf Stream in the south. The interaction of these phenomena results in moderate annual precipitation, high evapotranspiration rates during warm summers and overall the most continental climate on the Island of Newfoundland; with the warmest summers, coldest winters and the least wind and fog.

The primary natural disturbance factors attributed to boreal forests are fire and insects. Forest fires were frequent and extensive in north-central Newfoundland and resulted in specific successional trends depending on site type. More often than not, the spruce component is increased following fire, whereas other disturbance types such as insects and cutting often results in an increase in the fir component. Repeated burning and cutting of dry, coarse-textured black spruce-feather moss site types can result in ericaceous species such as sheep laurel *Kalmia angustifolia* invading the site to produce heath-like conditions. Successional patterns on other forest cover types vary with site and type of disturbance. These are discussed in greater detail in subsequent sections of this report.

Forest development class, successional pattern and site type, influence the understory plant community throughout the district. The species composition and structure of these plants significantly impact on suitability of a site as wildlife habitat for various species. Some animals are very general in terms of habitat requirements and can occupy a wide range of site conditions, yet have specific seasonal requirements that can determine habitat quality. For example, the moose requires wintering areas with suitable combinations of available cover and browse. It is widely accepted that a variety of forest age classes can provide increased habitat and sustainability for many wildlife species. On the other hand, some species require a specific age class or habitat condition to maintain healthy populations (e.g., Newfoundland marten (*Martes Americana atrata*)).

Aquatic ecosystems of the boreal forest are heavily dependant on forest cover for temperature regulation, nutrient cycling and stream flow regulation. Consequently, forest harvesting activities adjacent to riparian areas are critical to sustainability of fish habitat and maintenance of fish migration routes. Suitability of various streams and ponds as waterfowl breeding, feeding and resting areas are also dependent on adjacent forest cover. Biological production in streams is based on a combination of internal and external nutrient and energy pathways. Streamside

vegetation has a strong influence on both since they are so closely linked to surrounding terrestrial events. Small streams in forested areas receive much of their materials from the surrounding terrestrial ecosystem. Detritus in the form of needle and leaf litter, twigs and branches, forms the major energy base for consumer organisms. In highly shaded headwater streams, algae production is often low and yields only a small and seasonally variable contribution to the overall energy budget. As streams become larger further downstream, sufficient light penetrates the forest canopy, and consumer populations can take advantage of both particulate detritus and algae (Toews and Brownlee 1981). For these reasons, maintenance of suitable riparian zones for protection of aquatic ecosystems, as well as providing wildlife travel corridors is a primary consideration of any forest management strategy.

Major watersheds within the Zone include portions of the Gander River, Exploits River, Indian Arm Brook, Jumpers Brook, Ten Mile Lake, Big Lake, Campbellton River, Dog Bay River, Indian Bay River, Terra Nova River, Ragged Harbour River, Mint Brook and Traverse Brook. Many of these are associated with protected water supplies for communities within the districts. Small to medium sized lakes and ponds are common throughout the zone.

### 1.3.2 Ecoregions and Sub regions

With the evolution of an ecosystem approach to forest resource management, it would be advantageous to have a standard framework to classify combinations like general climate and regional physiography, as well as the other components of an ecosystem, into distinguishable regions. Fortunately, such a framework exists, in a publication entitled *Ecoregions and Sub regions of Insular Newfoundland* (after Damman, 1983).

Damman defined ecoregions as areas where a 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 (Damman, 1979). According to Damman, Newfoundland consists of nine ecoregions, which can be further divided into several sub regions. Labrador has ten ecoregions. Each of the Newfoundland and Labrador ecoregions and sub regions 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.

FMD's 4, 5, 6 and 8 contain four of the ecoregions outlined by Damman (1983). They are:

II - Central Newfoundland Ecoregion (which contains IIA - the North central Sub region); III - North Shore Ecoregion;
VII - Eastern Hyper-Oceanic Barrens Ecoregion and
VI - Maritime Barrens Ecoregion (which contains VID - the Central Barrens Subregion) (see figure 3).

Of these, IIA contains the largest portion in the district. 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).

#### 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 white birch and trembling aspen occupy some of the richer sites.

The Central Newfoundland Ecoregion has four sub regions: IIA - North central Sub region; IIB - Red Indian Lake Sub region; IIC - Portage Pond Sub region; IID - Twillick Steady Sub region. Of these, only the North central Sub region is found in District 4, 5, 6 and 8 and contains, by far, the largest area of land relative to the other three ecoregions.

*North central Sub region*

This sub region has the highest maximum temperatures, lowest rainfall and highest forest fire frequency than anywhere else in Newfoundland. The sub region extends from Clarenville to Deer Lake with a mostly rolling topography of less than 200 meters (asl.). The history of fire is evident by the pure black spruce forest and trembling aspen stand that dominate the region.

#### 1.3.2.2 North Shore Forest Ecoregion

The less prevalent North Shore Ecoregion is essentially a 20-25 km wide coastal zone that extends from Bonavista Bay to the Baie Verte Peninsula. Here, a continuous forest of black spruce and balsam fir dominates except on the coastal headlands where barrens prevail. White spruce is more common here than in central Newfoundland. The quality of growth diminishes as you approach the coastline. There are no sub regions in this ecoregion.

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

This ecoregion occurs on the extreme south coast of the Avalon and Burin peninsulas and on the northeast coast near Bay de Verde and Cape Freels. Here, the extreme oceanic climate limits the development of forest other than Balsam Fir krummholz. The heaths in this ecoregion are similar to oceanic parts of northern Scotland and southern Norway. This ecoregion constitutes very little of the land mass contained within the planning area being limited to the extreme northeastern coastline in FMD 5.

#### 1.3.2.4 Maritime Barrens Forest Ecoregion

This ecoregion extends from the east coast of Newfoundland to the west coast through the south central portion of the island. Relatively mild winters with intermittent snow cover and the coldest summers with frequent fog and strong winds characterize it. The dominant landscape pattern consists of usually stunted, almost pure stands of Balsam fir, broken by extensive open heath land. Good forest growth is localized on long slopes of a few protected valleys. The heaths are dominated by *Kalmia angustifolia* on protected slopes where snow accumulates and by cushions of *Empetrum nigrum*, or *Empetrum eamesii* on windswept ridges. The southern portions of FMD's 4 and 6 extend into the northeastern extent of this ecoregion.

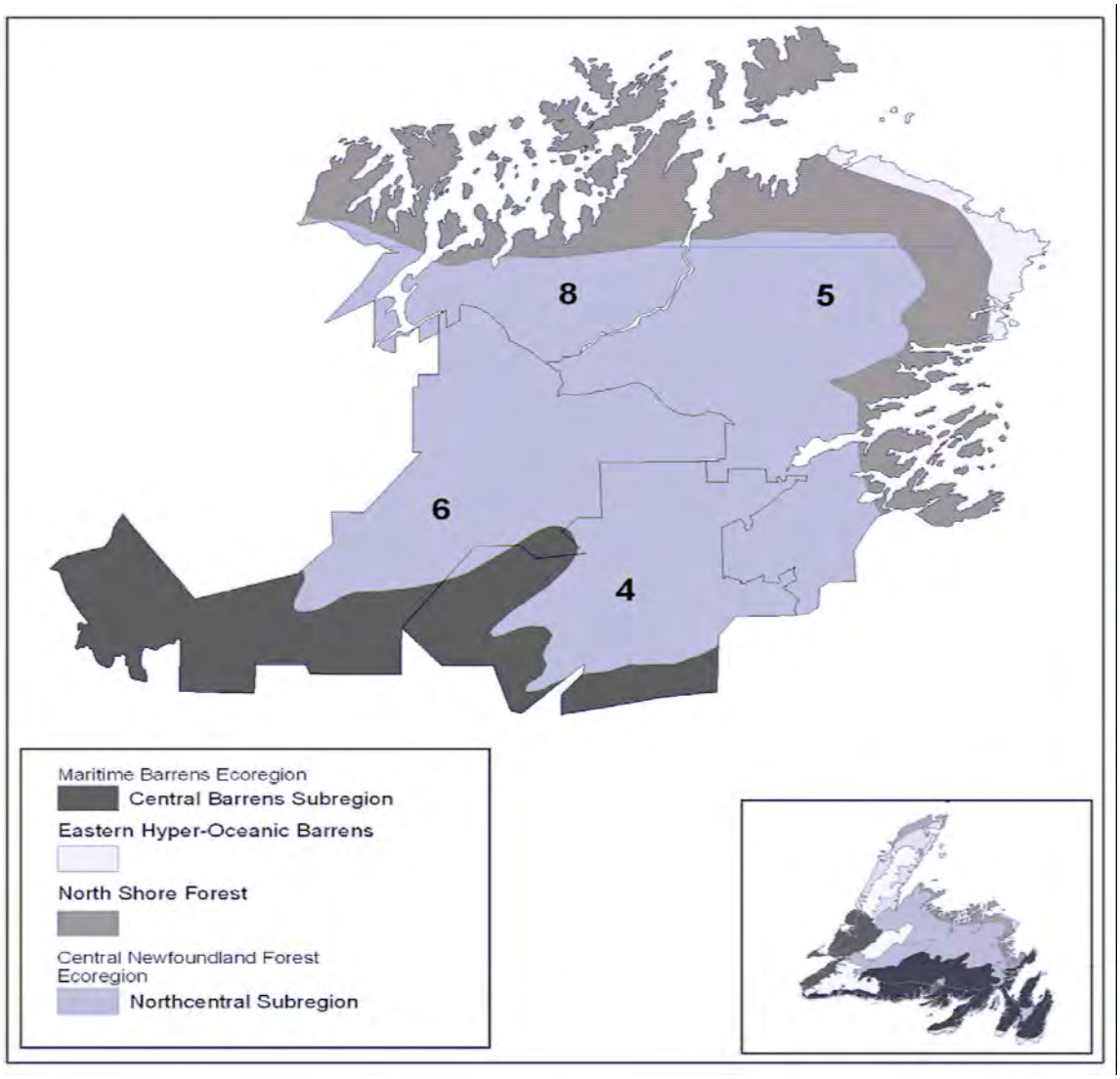



Figure 3 Ecoregions and Sub regions of Planning Zone 3.

## 1.4 Ecosystem Dynamics

### 1.4.1 Ecosystem Condition

As with other parts of the Newfoundland's boreal forest, those of Planning Zone 3 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 Planning Zone 3. For the most part this section will be descriptive and explanatory in nature.

#### 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. Overall, the landscape in Planning Zone 3 has approximately 43 percent productive forest. 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 the zone occur 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 northern parts of FMD's 5 and 8 along the coast have soils are shallower with bedrock at or near the surface. The terrain in northern parts is much rougher and the growing season is shorter than in the valley lowlands (130 as opposed to 160 days). 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. An example of secondary productivity is the number of moose per unit area. One must also recognize the forests inherent biological limits however, when attempting to measure or manipulate site productivity.

#### 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 depends 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. Measuring and monitoring these parameters determine resilience.

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 Success ional 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 some other agent like insects and/or disease weakens a stand. 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. Intermediate treatments of precommercial thinning to maximize saw log potential of these stands are recommended in future.

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 stands, 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 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 humus layer is removed and regeneration failure increases due to lack of adequate seedbed.

#### 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. 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 may not have the same extent of biodiversity that some of the equatorial regions possess, Canada does have many species of plants, animals, and microorganisms in its boreal and other forest regions. Biodiversity provides such essential services as climate control, oxygen production, and 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.

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 microorganisms 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. 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.

#### 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 zones
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.

#### 1.4.2.3 Landscape 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, microorganisms 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 the Swan Island proposed ecological reserve in FMD 8 as a representative of the North Shore Forest Ecosystem, and the Gambo Pond proposed ecological reserve in FMD's 4 and 5 to represent the Central Newfoundland Forest 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. One unique aspect of landscape diversity in Planning Zone 3 is the high representation of native red pine

stands relative to other planning zones on the island. Approximately one-half of the 22 + red pine stands native to insular Newfoundland are located in the planning zone.

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.

## 1.5 Forest Characterization

### 1.5.1 Land Classification

There are four basic categories that currently represent how the land within a forest management district is classified; productive forest, non-productive forest, non-forest and fresh water. The total mapped area in the zone is approximately 1.6 million hectares. Of this approx 635,580 ha is productive forest, 417,920 ha is nonproductive, 404,000 ha is non-forest, and 157,000 ha is water. Productive forest is defined as forested area that is capable of producing 60 $m^3$/ha at rotation. Essentially, this is the forested area that sustains industry in the province.

### 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 combined age class distribution in Planning Zone 3 for the entire productive forest is shown in figure 4 and on an individual district basis in figures 4a to 4d. 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.


Figure 4 Age class distribution in Planning Zone 3

For FMD 4, Figure 4a shows how the different levels of forest development are represented. As illustrated, the age class structure for the district is basically even-aged in that most of the trees have ages that generally do not span more than 60 years. Currently, Class 5+ represents the most area at 43%. This is followed by Class 1 and 2 at 20%, Class 3 at 12%, and Class 4 at 5%. The imbalance of the district age class distribution causes the various timber owners to rely heavily on Class 5 for their commercial wood supplies (which are the oldest). As each year passes, there is a higher potential for overmature trees to be lost to mortality, resulting in less of the resource being available, from a timber production perspective.

The management scheme accepted by the Forest Services Branch is to harvest the oldest stands first. In the case of FMD 4, this will represent a large amount of the harvest for the next 20-40 years because of the limited amount of area in Class 3 and 4 of the current age class structure. Age Class 5+ will have to support both commercial and domestic harvests (with some inputs from Class 4 and even less from Class 3) over the next 20 year cycle. By that time even less fiber will be available in what is currently Class 5+, because of the heavy reliance for harvesting and additional losses due to mortality. Some of the effects of the reliance on Class 5 as a timber source may be reduced by the help of silviculture (primarily thinning, and to a lesser degree, but still important, a program of planting). The thinning will help selected trees reach a merchantable size in a shorter period of time by utilizing resources once taken in by trees before they were thinned out.


Figure 4a Age class distribution for all ownerships in FMD 4

FMD 5 does not have a balanced aged class structure (Figure 4b) as is the goal to maximize sustainable harvest levels. The breakdown for age class for FMD 5 is as follows: Class 5 & 2 (30%), followed by Class 3 (14%), and Class 1 & 4 (13%). Again, a similar situation is presented

here when compared to FMD 4. The bulk of the area is available in Class 4 with just under half as much in Class 5. With the oldest first management policy, Class 5 should be able to support some harvesting for commercial and domestic operations until Class 4 areas are needed. This Class 4 area should be able to support the drain when the age classes advance to the next development stage as the forest ages. This will provide more time for the development of the current Class 3 component. Following that, what is now Class 1 and 2 appear to be in capable of supporting current drain levels when the trees in these areas become merchantable. As with FMD 4, stands that have been thinned are hoped to lessen the impact when less area becomes available by reaching merchantable sizes at earlier ages. The Forest Service's management goal is to implement management strategies, which will ultimately result in balanced age class structure over a period of time (i.e. 1-2 rotations).

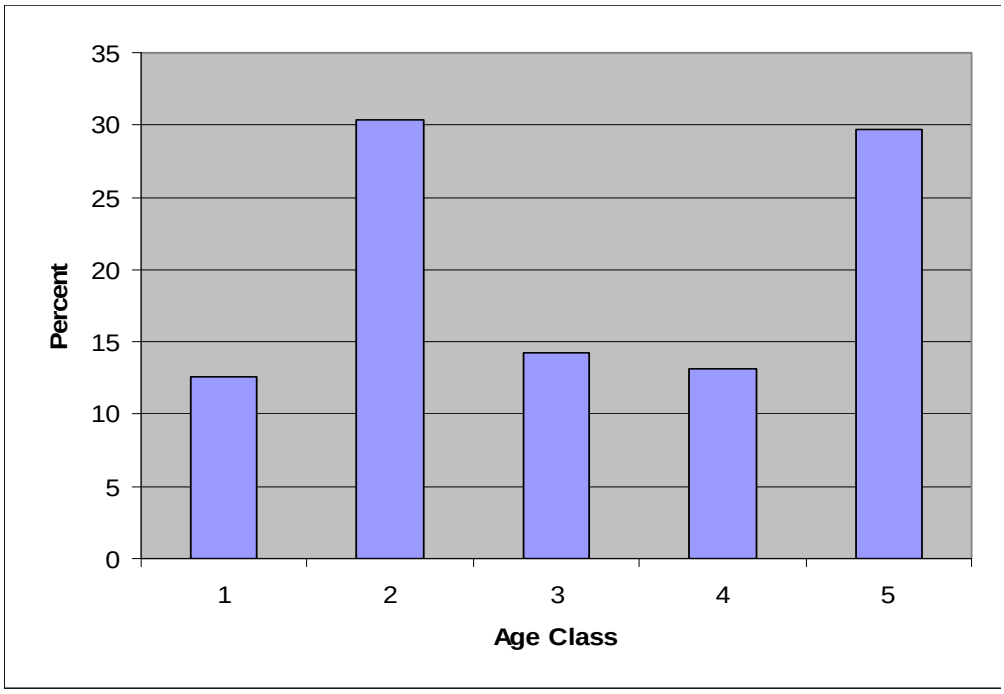



Figure 4b Age class distribution for all ownerships in FMD 5

The age class structure for FMD 6 (figure 4c) indicates Class 5+ occupies the most area at 37%, Class 1 at 36%, Class 2 at 21%, Class 3 at 4%, and Class 4 occupying 3% of the productive

forestland in the district. As in the two previous cases, FMD 6 does not have the desired age class structure for maximized sustainable harvest either. Figure 5c shows that FMD 6 has a similar age class structure to FMD 4, with the exception that FMD 6 has a larger land base. As a result, similar effects are expected to take place with regard to Class 5+ carrying much of the harvest requirements until trees in Class 2 become merchantable. This could be sooner if thinning areas produce as expected.


Figure 4c Age class distribution for all ownerships in FMD 6

The present age class structure in FMD 8 is skewed as follows: Class 1 is at 26 %; Class 2 is at 10%; Class 3 is at 7%; Class 4 is at 10 % and Class 5+ is at 46% (figure 4d). The major problem in this structure is the disproportionately low percentage of the forest in Class 3. The implication, for the medium term 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

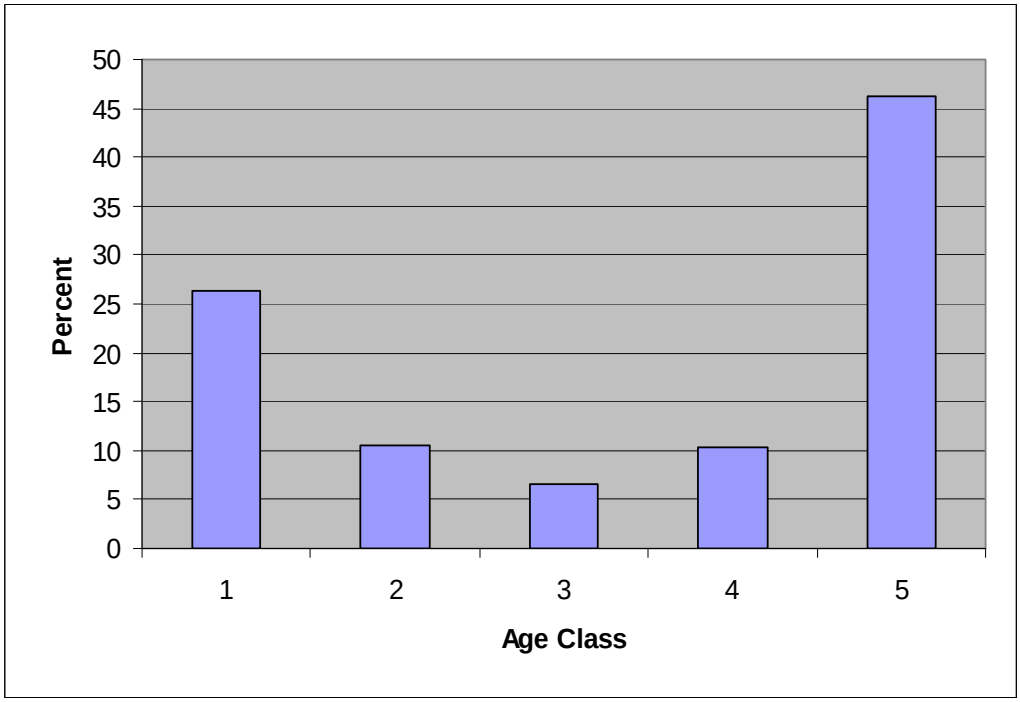



Figure 4d Age class distribution for all ownerships in FMD 8

### 1.5.3 Site Class

The Forest Services Branch 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 Planning Zone 3, holding 70% of the total productive area found in the two major landowners. The next largest class is poor (19%), followed by good (11%) and high (<1%). Figures 5a to 5d present the site class information in graphic form to show the levels of site class in each district.

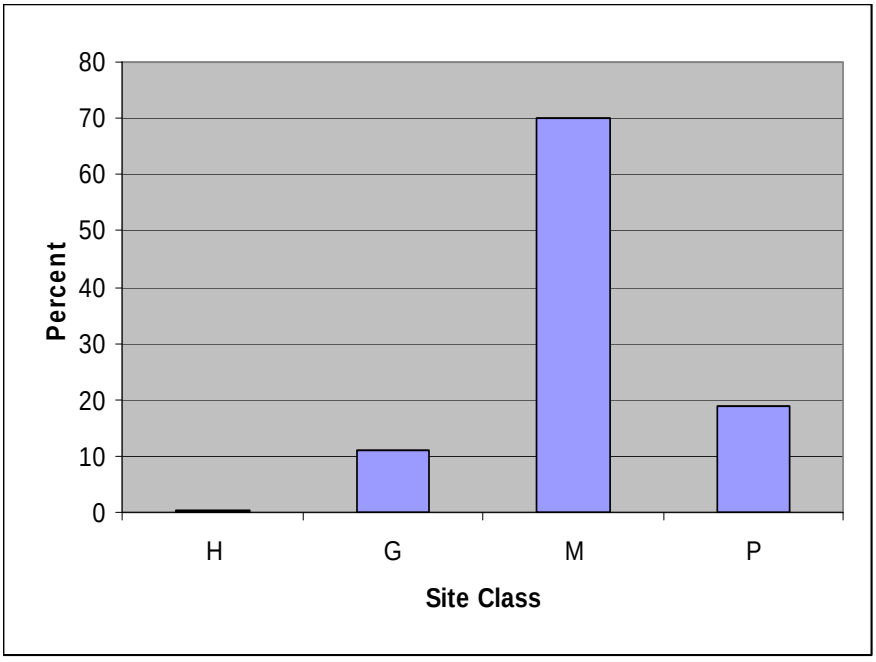



Figure 5. Site Class Breakdown for Planning Zone 3

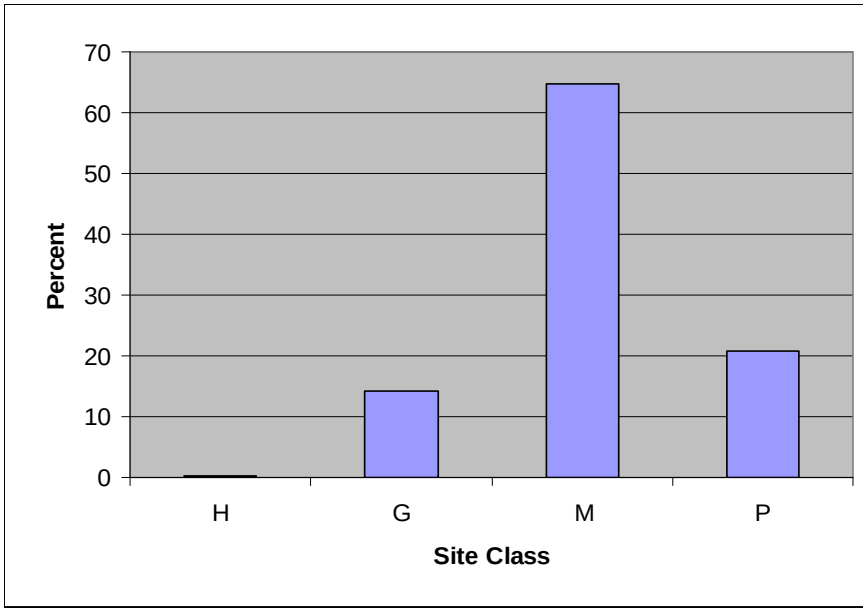
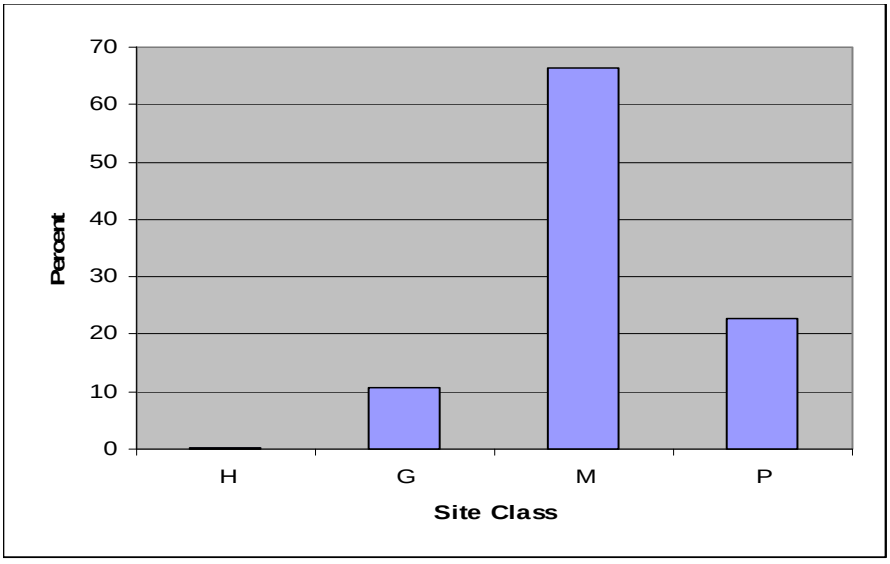



Figure 5a Site Class breakdown for all ownerships in FMD 4




5b Site Class breakdown for all ownerships in FMD 5

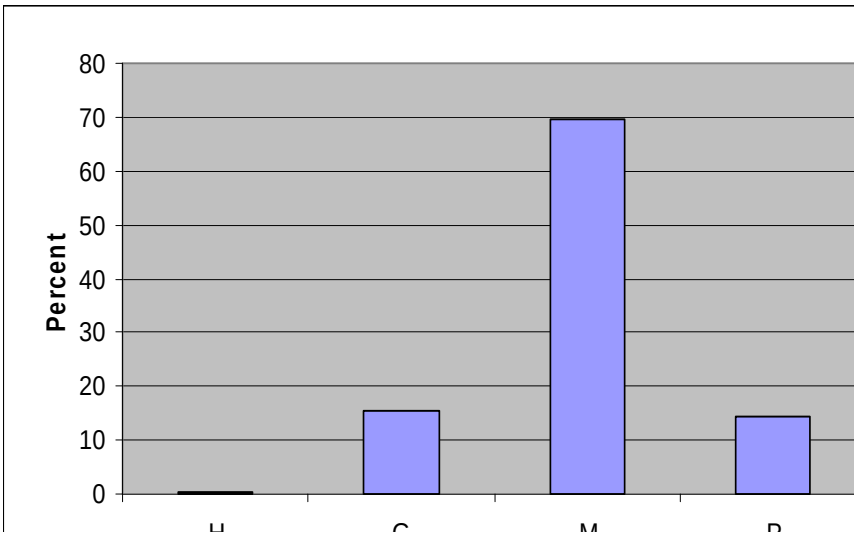



Figure 5c Site Class breakdown for all ownerships in FMD 6

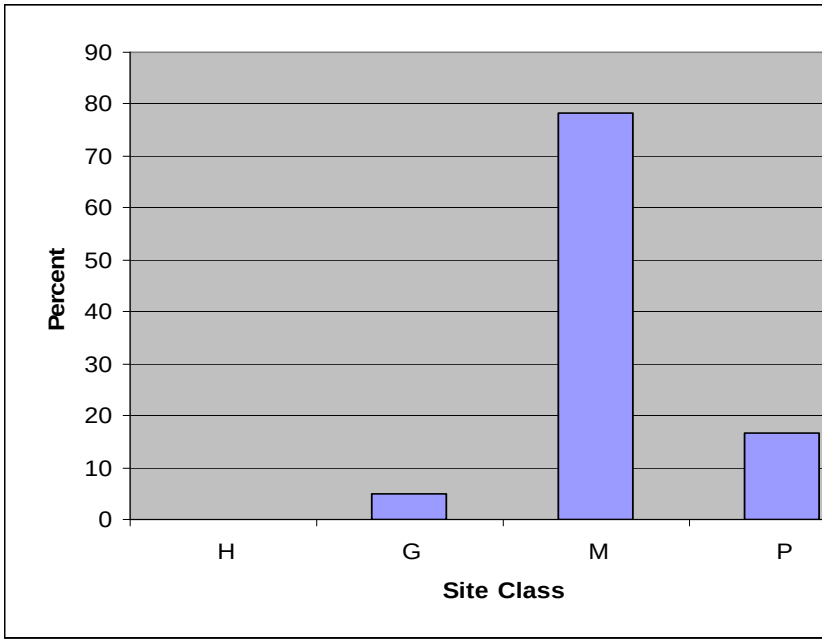



Figure 5d Site Class breakdown for all ownerships in FMD 8

### 1.5.4 Forest Types (Working Group)

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. There are twelve working groups within the four districts. In this zone, the softwood working groups dominate accounting for over 85 percent of the productive forest. The black spruce (bS) working group is by far the most prolific accounting for 60 percent of the working groups in Planning Zone 3 (table 2). Black spruce can occur as pure stands or in association with other species listed below. Balsam fir (bF) is the second most abundant accounting for 15 percent in the four districts. 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 10 and 4 percent of the productive forest area in FMD's 4, 5, 6, & 8. 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 10 percent of the productive forest in the four districts. Approximately 7 percent of the productive forest is classed as disturbed (NS). NS or not stocked include disturbances other than harvesting, which accounts for most of the total, insect damage, fire, wind throw, and flooding. The relative percentages hold true for all ownerships in all four districts.

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

A) 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.

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.

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.

*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 districts. 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 Newfoundlands 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.

B) Balsam Fir - *Abies balsamea (*L.) Mill. Another major forest type is the balsam fir forest. In some districts of the province this type is the dominant species, but in District 4, 5, 6 and 8 it is not. This species occupies sites that are usually fertile and moist but because these districts have 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 the four districts with many of the thirteen forest types not present.

Some are found in limited locations throughout the four districts, 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.

C) White Birch - *Betula papyifera* Marsh. This working group represents the major hardwood component for the forests of the province, and FMD's 4, 5, 6 and 8. 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 the four districts. Three noteworthy sites are the north shore of Home Pond and the ridge of Jonathon's Pond, both in FMD 5 and the west shore of Burnt Lake in FMD 8. There are a number of white birch forest types, all depending upon the understory growth and the associated soil type. This forest type doesn't make up a large portion of the four districts.

For FMD's 4, 5, 6 and 8, 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 inthe 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. eS - as above, with Engelmann spruce (*Picea engelmannii* Parry) the major species.

10. jP - as above, with jack pine (*Pinus banksiana* Lamb.) the major species.

11. sS - as above, with sitka spruce (*Picea sitchensis* (Bong.) Carr.) the major species.

12. jL - as above, with Japanese Larch (*Laxix kaempferi*.) the major species.

Table 2, below illustrates the distribution of working groups by district. The main feature of the table is the dominance of bS which comprises over 56 % of the four districts, and the working group bF representing approximately 7 % of the four districts.

The majority of the working groups are found in all four of the districts, with the exception of the working group Other**. *This group is made up of tA, eS, jP, JL and sS. All five have limited distribution and are grouped together as a result. In fact, eS, jL, and sS are found in FMD 4, and jP is only found in FMD 6, with a total coverage of 0.01% (34 ha) combined. These are not native to the area and were introduced in plantation trials over the past 20-30 years*.

Table 1. Breakdown of districts in Planning Zone 3 by working group

| Working Group | District | % of productive area |
|---|---|---|
| bS | 4 | 11 |
| | 5 | 11 |
| | 6 | 19 |
| | 8 | 14 |
| bF | 4 | 1 |
| | 5 | 1 |
| | 6 | 3 |
| | 8 | 3 |
| wB | 4 | 0 |
| | 5 | 0 |
| | 6 | 1 |
| | 8 | 0 |
| tA | 4 | 0 |
| | 5 | 0 |
| | 6 | 0 |
| | 8 | 0 |
| sH | 4 | 0 |
| | 5 | 0 |
| | 6 | 1 |
| | 8 | 4 |
| hS | 4 | 0 |
| | 5 | 0 |
| | 6 | 1 |
| | 8 | 2 |
| DI | 4 | 1 |
| | 5 | 1 |
| | 6 | 2 |
| | 8 | 3 |

| | | |
|---|---|---|
| NS | 4 | 1 |
| | 5 | 1 |
| | 6 | 1 |
| | 8 | 2 |
| Other | 4 | 3 |
| | 5 | 3 |
| | 6 | 4 |
| | 8 | 7 |

## Section 2 Past Activities Planning Zone 3 – Corner Brook Pulp and Paper Limited

### 2.1 Overview

As stated in the introduction, Forest Management Districts 5, and 6 have been amalgamated to form Planning Zone 3. For consistency purposes, a description of the past five years activities will cover the period from 2007 to 2011 inclusive. This section will include those forest activities within the zone that were on historically CBPPL tenure.

### 2.2 Harvesting

For the most part, the harvest was distributed throughout FMD's 5 and 6. In total, over the five-year period, there was approximately 422 999 m³ harvested on CBPPL tenure from 2007 to 2011. Table 2 summarizes the total harvest administered by CBPPL in the districts of this Planning Zone.

Table 2 Summary of CBPPL AAC harvest in Planning Zone 3 for 2007 to 2011

| District | Softwood / Hardwood | 2007 ($m^3$) | 2008 ($m^3$) | 2009 ($m^3$) | 2010 ($m^3$) | 2011 ($m^3$) |
|---|---|---|---|---|---|---|
| | | | | | | |
| 5 | Softwood | 57,624 | 35,139 | 44,818 | 82,395 | 45,360 |
| | | | | | | |
| 6 | Softwood | 53,480 | 62,103 | 0 | 0 | 42,080 |
| | | | | | | |

This table reflects harvest levels within both Class I & III land base

**2.3 Silviculture**

Table 3 summarizes the silviculture treatments completed for the past five years. There were a total of 9,737 ha of silviculture treatments completed by CBPPL within Planning Zone 3 from 2007 to 2011. By treatment, 4,360 ha of site preparation, and 5,377 ha of planting were completed.

Table 3 Summary of CBPPL silviculture treatments in Planning Zone 3 from 2007 to 2011

| District | Planting / PCT / Scarification | 2007 (ha) | 2008 (ha) | 2009 (ha) | 2010 (ha) | 2011 (ha) |
|---|---|---|---|---|---|---|
| 5 | Planting | 424 | 355 | 0 | 302 | 391 |
| | Scarification | 0 | 0 | 305 | 174 | 260 |
| | | | | | | |
| 6 | Planting | 509 | 910 | 1,433 | 769 | 284 |
| | Scarification | 798 | 1,460 | 984 | 379 | 0 |
| | | | | | | |

**2.4 Road Construction**

There were 61.6 km of new primary access roads constructed in Planning Zone 3 by the CBPPL. Table 4 summarizes the roads constructed in each district. All roads built during the period were required to access commercial timber.

Table 4 Summary of CBPPL primary access roads built in Planning Zone 3 from 2007 to 2011

| District | 2007 (Km) | 2008 (Km) | 2009 (Km) | 2010 (Km) | 2011 (Km) |
|---|---|---|---|---|---|
| | | | | | |
| 5 | 7.4 | 6.9 | 1.5 | 1.5 | 2.0 |
| | | | | | |
| 6 | 18.0 | 14.3 | 10.0 | 0.0 | 0.0 |

**NOTE: All summary numbers submitted for 2011 are estimates based on planned activities.**

### 2.5 Natural Disturbance
#### 2.5.1 Fire

Planning Zone 3 typically has a cyclic fire history of approximately 10 years, in which large fire(s) outbreak. However, during the period of 2006 to 2010, there were numerous, small fires recorded that did not burn significant area of forested land. In total, for this period, there was 32 fires reported that burned a total area of 31.3 ha burnt. This indicates a very aggressive and effective fire protection effort supplemented with a measure of good luck from nature. During the period 2006-2010, on a district basis, 0 ha, 28 ha, 0 ha and 3.3 ha were burned in FMD's 4, 5, 6 and 8 respectively.

#### 2.5.2 Insect

There has been little insect activity in the Zone 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 Planning Zone 3. The majority of the remaining balsam fir stands in the zone are now infected with aphid. Wide scale treatment for eradication of this insect is yet to be developed. According, the only work carried out in the zone to deal with aphid has been the removal of balsam fir in growth through cutting in some plantations where the fir is competing with planted crop trees. It is hoped that this treatment will help reduce the spread of aphid.

## 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 forestland 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.

## 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 the available productive landbase. However, this productive landbase available for forest activity is constantly being evaluated by the demands/requirements of other stakeholder values. Therefore, it is important that we manage relationships with other users to minimize loss to the forest landbase, while taking into account these other values. As well, to mitigate losses to the productive landbase, we must continue to explore ways for growing more volume on the existing landbase.

## 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 landbase (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 Pine Marten and Caribou Habitat

Habitat specialists are working in consultation with industry to study both species and ensure adequate habitat will be available for pine 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 generally have little impact on timber supply.

#### 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 3, all of the public protected water supply areas and some of the larger watersheds (eg Gander River and Terra Nova River) 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.

### 3.4.2.2 Timber Related

The Department also reduces the gross AAC's by taking into account other potential losses of timber, which include:

#### 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. As well, information is gathered throughout the AAC period to determine projected volume against the actual harvested volumes within a given area. The difference is evaluated and applied to net down the gross AAC numbers.

#### 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 Forest Services Branch 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.

#### 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 previously wood supply processes because there was no harvest scheduling 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 land base. 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 this reason 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 wood supply 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, and
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).

## 3.5 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

Forest Insect and Disease Surveys by DNR documented no forest mortality in FMD's 4, 5, 6 and 8 during the last five-year period. Long-term averages of area of timber mortality from insect defoliation were used as the deductions in Planning Zone 3.

### 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 21 %. 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 fuel wood.

## 3.6 Timber Supply

The previous discussion in this chapter on wood supply 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. However, at the time of writing, the new AAC's for the period 2011-2015 were not available publicly for inclusion into this document. As such Table 5 summarizes the results of the 2005 timber supply analysis for District 4, 5, 6 and 8.

However, it should be noted that when producing this plan, Forest Services Branch managers utilized the new wood supply analysis.

Table 5 Annual Allowable Cut results for districts in Planning Zone 3 for 2006-2011

| District | Ownership | Softwood | | Hardwood | |
|---|---|---|---|---|---|
| | | Class 1 | Class 3 | Class 1 | Class 3 |
| | | | | | |
| 5 | CBPPL | 53,000 | 5,600 | 2,680 | 280 |
| | | | | | |
| 6 | CBPPL | 127,000 | 9,200 | 6,330 | 290 |
| | | | | | |

# 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. Applying Newfoundland's culture to the planning process attains

cultural sustainability. 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 cannot 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

Individual values were discussed both at the strategic and operational level. Strategic level information (characterization, critical elements, and guiding principles) is 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 values. This helps 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. 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 13 moose management areas 15, 16, 17, 20, 21, 22, 22a, 23, 24, 25, 27, 28 and 42 are located within the zone.

**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 2,000 animals. Between 1980 and 2000 the number of caribou has increased considerably on the Island with a population estimated at 70,000+ animals. In the past few years however populations have declined significantly, with Planning Zone 3 being no exception. All or portions of 5 caribou management areas 63, 64, 67, 68, 72, are located in the zone.

**Critical Elements:**
Given that there is limited information about the distribution, movements, and habits of caribou in the zone, it is hard to determine what impact timber harvesting may have on these animals. Past studies have shown 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. The abundance and distribution of arboreal lichens has also been shown to impact caribou populations.

Within the Zone 5 (FMD's 10, 11, 12 & 13) five-year operating plan (2011-2015), the Department of Natural Resources (DNR) and the Department of Environment and Conservation (DEC) 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 15, 21, 22, 23, 24, 25, 27, 28 and 42 are located within the zone.

**Critical Elements:**

- Den sites for winter hibernation;
- Forest cover

**Guiding Principles:**

**Big Game Management Strategy (moose, caribou and black bear)**

A planning process in which the Department of Environment and Conservation's Wildlife Division prepare a Big Game Management Plan annually accomplishes management of big game species in the Province. 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 Wildlife Division);
- 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.

#### 4.2.1.2 Furbearers

**Characterization:**

Ten species of furbearers occur in the zone; 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:**
The Wildlife Division, upon consultation with provincial trappers, Newfoundland and Labrador Trappers Association, general public, and departmental staff, develops recommendations concerning the management of furbearer species annually. 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 water body occupied by beaver will remain standing during harvesting operations.

**4.2.1.3 Salmonid**
**Characterization:**
The Atlantic salmon and the brook trout are native to the Island and are found in waterways surrounded by forested areas. There are 23 scheduled salmon rivers in Planning Zone 3 and population counts are conducted on four major rivers including the Exploits, Campbellton, Gander, and Terra Nova as well as on the Middle Brook system. Currently, there are two areas in Planning Zone 3 where estimates of brook trout populations are recorded. These include Indian Bay system and the Rodney Pond system.

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

**Guiding Principles:**

**Salmonid Management (Atlantic salmon and brook trout)**
The Federal Department of Fisheries and Oceans (DFO) deliver management of Atlantic salmon and brook trout in the Province. DFO annually sets bag limits, season dates and river closure dates based on extreme water temperature. In the past, The Gander River system had additional

local management provided by the Gander River Management Association (GRMA). Additionally some special brook trout waters (e.g. Indian Bay and Rodney Pond systems) are jointly managed by DFO, the Wildlife Division of the provincial Department of Environment and Conservation with input from the Indian Bay and Freshwater Alexander Bays Ecosystem Corporations (IBEC and FABEC). This process takes into consideration additional information provided by FABEC.

**Protection**

- DFO recommends that a 100 metre no-cut buffer zone be left in designated sensitive spawning areas.
- Under the Environmental Protection Guidelines designated protected public water supply areas (PPWSA's) also provide protection for these species through existing Environmental Protection Guidelines that apply to these areas (i.e. 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). The scheduled rivers where increased buffers are currently in place within PPWSA's include Northwest and Southwest Gander Rivers, Campbellton River, Dog Bay Rivers, Peter's River, Charles Brook, Anchor Brook, Deadmans Bay Brook and Indian Bay Brook. Strict enforcement of these buffers will be continued during this planning period
- Minimum 30 meter no cut buffer on all water bodies in FMD 8
- Minimum 20 meter no cut buffer on all water bodies in FMD’s 4, 5 and 6
- Minimum 30-meter no-grub zone on road approaches to brook and river crossings

Furthermore, protection for these species is strengthened locally through partnerships with community-based watershed management groups such as FABEC. A one-kilometer wide management zone is currently regulated along the Gander River for protection of salmon habitat. During past plan development and transferring to this plan, negotiated increased buffers on waterways within the Indian Bay, Middle Brook, Terra Nova and Gander River Systems with organizations such as: IBEC, FABEC, and GRAMA are still considered applicable.

### 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 (Whitaker

et al., 1997) 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 of songbird species will mainly involve protection of their habitat through the various methods discussed in earlier sections.

#### 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
- Under the Guidelines for Ecologically based Forest Management, no forestry activity is to occur within 800 metres of a bald eagle or osprey nest during the nesting season (May 15 to July 31) and 200 metres during the remainder of the year. The location of any raptor nest site must be reported to Wildlife Division. 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 Forest Services Staff will inform harvesters of their locations. Regular operator checks and routine patrols of domestic cutting areas by Forestry Staff will ensure compliance of these guidelines.
- On recommendation by the CWS, sensitive waterfowl habitat has been protected through increased buffers of 50 meters on certain ponds. As well, the establishment of municipal wetland conservation areas in the planning zone by Eastern Habitat Joint Venture through stewardship agreements with municipalities.

#### 4.2.1.6 Rare and Endangered Species

4.2.1.6.1 Pine Marten

**Characterization:**

Before 1900, marten ranged over most of the forested areas on the island. Unfortunately, due to a variety of reasons, the population levels dropped where this species was listed to the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) as Endangered. Habitat loss, predation, disease and accidental trapping and snaring are thought to be primary reasons for marten population decline in Newfoundland. Marten still naturally occurs 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 Eastern Newfoundland Pine Marten Recovery Team. Representatives from TNNP, Forest Services Branch, Wildlife Division 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 eastern 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, 16 marten have been relocated to these areas and the population estimate today is approximately 300. Once listed as Endangered, COSEWIC has now downgraded 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, the Forest Service initiated a

landscape approach to habitat management in 1999. This involved working with stakeholders to identify critical or potential marten habitat, locating possible corridors, and identifying areas that 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 snaring and trapping

**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 between 6.6 and 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 m2);
- 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.

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

4.2.1.6.2 Banded Killifish

**Characterization:**

The Newfoundland population of Banded Killifish was first listed as special concern in 1989 due to the limited area of occupancy, limitation on potential for range expansion, and potential threats from logging and other activities that could lead to habitat degradation (Chippett, 2003). In 2003 the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) recommended the status of special concern should be maintained. Banded killifish populations in Newfoundland are distributed over a wide range, but local populations are restricted to very confined regions within their respective watersheds. Populations appear to be locally abundant in representative areas that were sampled (i.e. Indian Bay watershed, Loch Leven and Freshwater Pond). Although multi-year data is not available, population estimates from 1999 indicate that over 20,000 individuals exist in the Indian Bay watershed. Estimates are not available for other local populations (Chippett, 2003). Although no killifish have been officially reported in other areas of the planning zone, it is highly likely other areas may contain suitable habitat.

**Critical Elements:**

- Water quality maintenance;
- Riparian buffer zones

**Guiding Principles:**

- Guidelines for the protection of freshwater fish habitat are developed by DFO’s Habitat Management Branch
- Designated protected public water supply areas (PPWSA's) also provide protection. As well, applying existing Environmental Protection Guidelines to these areas (i.e. increased buffers, 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).
- Protection of this species is also strengthened through partnerships with the community-based watershed management groups. In the past, industry has negotiated increased buffers on waterways throughout the Indian Bay watershed area with IBEC.

- DFO has indicated the level of protection provided by the PPWSA buffers and the additional buffers negotiated between IBEC and industry, along with the implementation of forestry best management practices will be adequate habitat protection for this species.

4.2.1.6.3 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. However, significant stands of white pine still exist in forest management districts of Planning Zone 3. Red pine is a rare tree species in the province with a distribution of some 22+ small stands (<15,000 trees in total). Despite this, it is represented fairly well in this Planning Zone. For example, an approximate 400 ha mature stand exists at Grant's Pit in FMD 5. With approximately 5,000 trees, this is the largest known to exist in the province (Roberts, 1985). There are native red pine stands in FMD's 4 and 8 as well. Since both of these species occur in Planning Zone 3, local protection is required to maintain local and provincial biodiversity.

**Critical Elements:**

- Maintenance or enhancement of stands on the land base
- 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 cloned 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 Planning Zone 3.

- Protection of these species in planning zone 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 clone orchard at Wooddale
- 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.

4.2.1.6.4 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 Planning Zone 3, there are approximately 157,000 ha or 11 percent of the total area of lakes, ponds, rivers, brooks and streams. There are 77 communities within the zone, which derive their potable water from 58 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. Industrially, waters within the zone are primarily used for hydroelectric production on the Exploits River at Bishops Falls and Rattling Brook in Norris Arm. As well, water is used for irrigation of agricultural areas, primarily in the Wooddale area.

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.

### 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.

Domestic harvesting still provides fuel wood to heat many homes and saw log material for residential home construction. There are approximately 2000 permits issued on Crown land in FMD 5 and 3000 permits in FMD 8. As well, in the past, approximately 1500 domestic permits were issued annually on CBPPL tenure.

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 land base 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 saw log and pulpwood species within the province. Within this planning zone, black spruce accounts for more than 90 % 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 84% 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 wood supply analysis.

**White Birch**

Traditionally, white birch has been a valued species for domestic fuel wood. 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. Accordingly, three areas have been set aside for sap production research on Crown limits in the planning zone.

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 the planning zone. 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 wood supply 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 land base
- Planting of non-regenerating areas
- Maintenance of the white birch component
- Minimizing loss of land base 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 saw log, pulpwood and firewood industry

- Maintain support of local research into birch sap production

**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 zone, with considerable potential to expand and provide increased economic benefits. Commercial agriculture is concentrated in Campbellton, Comfort Cove, Gambo, Northern Arm and Pleasantview. Agricultural products produced represent a significant portion of the total agriculture industry in the province. There are 70 commercial farms in Planning Zone 3 from the livestock sector (poultry, beef, hogs, sheep and fur) and the Crops Sector (vegetables, small fruit, forages, Christmas trees and greenhouses production). There is also a peat harvesting industry (Hi Point Peat) near Bishop's Falls. Recently, in the

province there has been a thrust to develop the blueberry industry. Blueberries originating from managed areas have the potential to draw a higher market value than wild berries. In the past few years, over 40 hectares have been developed for intensive blueberry management. Two areas, namely Northern Arm and Cotrell's Cove have been developed in Planning Zone 3.

**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 land base 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 Department of Agriculture 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.

### 4.2.2.3 Mining

**Characterization:**

Within Planning Zone 3, 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 planning zone's ecoregion were derived. In this zone, there are 5600 mineral exploration claims staked and registered. The majority of claims have 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. There are also in excess

of 314 quarries in the zone. Expenditures for mining exploration in Planning Zone 3 are in excess of $1 million annually for metallic and industrial mineral and dimension stone exploration, where activities have been concentrated in the Gander River Valley. 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 a large number of active quarries in the zone, which generate significant royalties. 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.

**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 does not have an adverse impact on forestry activities. Archaeological surveys have been carried out in several areas within the zone over the past 20 years. There are a number of known archaeological sites within Planning Zone 3, which are protected under the Historic Resources Act. Many areas still remain to be surveyed so there is

potential for other historic resources to be discovered. Sites of archaeological significance, such as Boyd's Cove, Black Harbour, Wigwam Point, Gander River and the Bloody Bay Reach Archeological Sites (i.e. Burnside archeological tours of the Beaches and the Quarry) also hold the key to our understanding of past. While some of these sites have been developed (Boyd's Cove, the Beaches, the Quarry and Wigwam Point, others have not had archaeological work completed and their locations cannot be disclosed. These sites show evidence of Maritime Archaic Indian, Palaeoeskimo, recent Indian and European occupation.

Archaeology is very important for our tourist industry. Archaeological excavations and interpretive sites draw thousands of visitors each year to this province. The preservation and interpretation of archaeological sites will continue to benefit the tourism industry in this province for years to come. Thousands of tourists from all over the world visit our archaeological sites each year and the numbers continue to increase (e.g. Boyd's Cove and Burnside typically see approximately 8,000 visitors per year combined). Each year archaeology projects provide many seasonal jobs. For example, Boyd's Cove and Burnside employ approximately 15 people each year. 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, which 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. Utilizing no harvest buffer zones protects known archaeological sites and potential unknown sites, 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 area in FMD 4. Habitat connectivity with other core populations may be critical to long term survival of marten in TMNP. 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.

**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**

There are at least another 45 + recreational trails that protect heritage and provide for expanded recreational opportunities within the planning zone. Among the more important historic trails are those of Eastport, Twillingate, New World, Cottle's and Fogo Islands. These trails are traditional walking links between the communities and now lead to vantage points to scenic ocean vistas, whale and iceberg watching. Today, they provide recreational opportunities for hiking, skiing, viewing of exceptional landscapes, and nature walks, as well as preserving our heritage of isolated fishing and logging communities.

**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.

#### 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 storehouses of natural diversity that exists in a wild, pristine state. They serve as ecological benchmarks 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 km²).

Component 2 reserves protect representative samples of ecoregions (not included in Component 1 reserves) and are mid-sized (50-1000 km²). Component 3 reserves protect exceptional natural features, such as, rare species or areas of unusual biological richness and are generally small (< 50 km²). 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 the zone include: the T'Railway, Terra Nova National Park, Bay Du' Nord Wilderness Area, and Notre Dame Junction, Dildo Run and Jonathon's Pond Provincial parks. As well, two candidate proposed ecological reserve areas, one for the Central Newfoundland Forest Ecoregion and one for the North Shore Forest Ecoregion currently have 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 kilometer of provisional and ecological reserves, wilderness reserves or provincial parks, modified operations may be necessary

**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 cottage development, which has a potential negative an impact on both remoteness and game availability. Removal of large areas of forest has an immediate effect on big game habitat, particularly winter cover, although this impact has been poorly studied (particularly in remote areas). Forest harvesting also has 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 all garbage is removed.

**4.2.2.9 Recreation**

**Characterization:**

The Exploits 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. There are also a number of safe anchorages for boat touring in Exploits Bay. 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. The majority of individuals involved in recreational activities are concerned about viewscapes. Many of the recreational activities occur because of particular viewscapes.

**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 zone. The Gander River (world class salmon river and protected area) and Terra Nova Rivers (candidate as a Canadian Heritage River), Terra Nova National Park, Bay Du' Nord Wilderness Area, the Beaches and Boyd's Cove archeological sites, iceberg and whale tours of Twillingate, are examples of the more prominent tourist attractions

**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. Also, in other important tourism areas including the Gander River, Indian Bay water system and the Freshwater Alexander Bays water systems, the Forest Service will continue to work with local organizations such as FABEC to examine the viewshed issues where applicable. Strategies can then be discussed, negotiated, and implemented to provide a balance between harvesting and the values associated with tourism.

## Section 5 Public Consultation Process

### 5.1 Planning Objectives

Currently, resource managers in Canada are striving for a society that successfully integrates economic, environmental and social considerations into all resource-related decision making. Since the early 1990's, there has been a countrywide shift from single resource management to a more comprehensive approach of forest ecosystem management. In attempting 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 as well. Public engagement is recognized by the Department of Natural Resources as a key component to achieving sustainable development and the department is appreciative of the enduring level of interest and support demonstrated by stakeholders.
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 adopted an adaptive management planning process, which 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 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 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**

This plan is written for Planning Zone 3 and not a specific district. In 2003, a strategy document was prepared for the entire province and a five-year operating plan is prepared for each major tenure holder within a district. Accordingly, a combined planning team was comprised representing interested stakeholders from FMD's 4, 5, 6 & 8. Public consultation meetings were held in Gander, a central location within the zone.

**5.3 Planning Team Participation**

Through participation in the planning teams, individuals and stakeholders could take part in open, consensus-based forums that address a wide range of forest management issues. All public are encouraged to attend this process, where an initial news release was made by the Minister of Natural Resources on February 07, 2011 announcing that public meetings to form a planning team to aid in developing new five-year forest operating plans would soon start at various locations across the province. This release was followed by a widespread email sent to potential interest groups and individuals (developed from previous planning exercises) which was circulated to inform potential participants of an initial meeting in Gander on February 23, 2011. This initial meeting was designed to inform attendees of the planning framework, the ground rules for participation and to invite stakeholders to form a new planning team for the districts within Zone 3. Planning team membership was not restricted to those listed in appendix 1; rather it remained open to anyone who wanted to join the process at any time. A listing of all individuals and the interest groups represented during the consultation process is presented in appendix 1.

As outlined previously in the Timber Supply Analysis section, a harvest scheduling was used to identify, on maps, where harvesting should take place over the next 25 year period, which was broken down into 5 year increments. These maps were discussed during the fourth planning team meeting and sent out electronically to all members. These maps are important because they formed the basis of more detailed proposed harvest blocks for the upcoming five-year period. They were used in subsequent meetings to give particular emphasis to harvest areas for the next 10 years. The planning team meetings focused on particular value(s), where these maps were available to identify any particular area of conflict when the values were discussed. Through this

approach, areas where conflicts exist were identified and any remedial action or process to mitigate the conflict could be developed for inclusion in this plan.

As part of the Forest Services Branch initiative to facilitate meaningful discussions and provide for constructive input by varying stakeholders, a number of meetings were held in Gander during the winter/spring 2011. Including the opening meeting, there were 9 meetings held in a public forum to develop this plan, where the dates include: February 23, March 16, March 30, April 13, May 4, May 11, May 25, June 8, and June 22.

To aid in public consultations and avoid bias in discussions, the Forest Services Branch enlisted the services of an independent facilitator to help guide the meetings. Throughout the meetings, there were many discussions and presentations provided by interested stakeholders, which include: Wood supply & Roads (DNR), Aquatic Habitat Protection (DFO), Possible Old Growth Forests (CPAWS), Planning Process & Experiences (FABEC), Protected Areas & Reserves (PNAD), Big Game Management (Wildlife Division), Cabin Development & Referral Process (Crown Lands), Forestry Roads (Georges Pond Cabin Owners).

As well, the maps of proposed forestry activity were provided to individuals through both email and all information was put on a CD and given to all members about midway through the process. Time was provided during each meeting for discussions/concerns regarding proposed forestry activity and as well, the meeting held on May 25 was solely dedicated to identifying stakeholder concerns regarding proposed activity. Throughout the whole process, all stakeholders were encouraged to provide any issues or concerns regarding the proposed activity. These concerns/issues did not have to wait until an actual meeting and stakeholders were encouraged to contact the respective District Managers or Regional Planner at any time.

There were some side meetings held with some stakeholders who identified concerns and where possible, changes were made to harvest areas or processes were adopted to resolve conflicts. Mitigative actions identified throughout this planning process are outlined in section 8 or on the actual operating sheet information for each operating area.

# Section 6 Management Objectives and Strategies

## 6.1 Harvesting

The forest in this zone is part of the boreal forest, which is characterized as being disturbance driven resulting in the formation of relatively even aged stands. The clear-cut 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 clear-cut areas vary across the landscape depending on localized topography and terrain conditions. A modification of the clear-cut 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. The clear-cut 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 zone. The model used to calculate wood supply 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 saw log 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 saw logs.

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 (i.e. larger buffers on salmon rivers)
- Where possible, utilize winter harvest on wet and sensitive sites
- Maintain current size and distribution of clear-cut's
- Use landscape design techniques to mitigate viewshed impacts on areas of concern
- Keep losses through timber utilization to a minimum (< 6 m3/ha)
- Continue to encourage and pursue transfers and exchanges with paper companies to ensure saw log supply for local sawmills.

### 6.1.2 Domestic

The harvest of domestic fuel wood and saw logs occurs from three main sources in the zone;

- Designated domestic cutting blocks on Crown land,
- Cutover clean up on Crown and Industry limits, and
- Landing and roadside clean up on both Crown and Industry limits.

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, limit volume allocation in designated cutting areas and encourage alternate sources (cutovers, landings, scrub etc)
- Monitor stands harvested in domestic cutting areas for compliance to the harvest schedule

### 6.1.3 White Birch

The harvest of white birch occurs throughout the planning zone in close association with softwood harvest for saw logs, 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 saw logs, resulting in the development of several value added sawmills in the province (two in Planning Zone 3). The value added industry focuses on products such as cabinet stock, flooring; guard rails posts and pallet stock. This increased demand can be addressed in the short term on Crown land in FMD 8. During the 2006 -2010 Wood Supply Analysis it became evident that at the sustained level of harvest forecasted by the model a large proportion of the Class I white birch on Crown land in FMD 8 will not be harvested and will be lost to natural mortality. The majority of white birch dominated stands on Crown land in FMD 8 that are harvestable (85 %) have resulted from large wildfires in the early part of the 20$^{th}$ century. The origin of theses stands has resulted in the skewed age class structure of white birch towards overmature. Essentially, 65 % of the Crown's white birch in FMD 8 is overmature (i.e. 81 +). The projected yield curves used in the model for this species indicate rapid volume loss due to mortality beyond age 120. Subsequent analysis of the wood supply files

indicates that a significant salvage harvest can be implemented to capture the impending mortality.

Specific harvesting strategies include:

- Encourage the use of saw log sorting by commercial harvesters
- Encourage the development of relationships between harvesters and value added white birch saw millers.
- Target overmature white birch stands that are forecasted to succumb to mortality
- Implement an annual white birch class I salvage harvest of 10,000 $m^3$/yr for two periods (i.e. 10 years) to capture the impending mortality.
- Where possible, direct domestic harvest to alienation Class 3 white birch stands, which have low commercial potential
- in areas of high domestic demand, limit volume allocation in designated cutting areas and encourage alternate sources (birch, cutovers, landings, scrub etc)
- 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 FMD's 5 & 8, there is concern about the type (species) of regeneration because of increased presence of balsam woolly adelgid in the area. In these areas, regeneration to balsam fir may not necessarily be acceptable on certain site types. As well, on certain sites in FMD 8, particularly in the Seal Bay area, balsam fir has been regenerating on black spruce sites and often forms the majority of available stocking. This regeneration is "off site" and often becomes chlorotic and stagnates at an early age. As a result of these concerns

with balsam fir regeneration, planting levels tend to be much higher in this zone 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. 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 zone. 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 zone is considered full planting of disturbed sites and without scarification, planted seedling success in Planning Zone 3 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 Planning Zone. 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 zone. 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 the zone. 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 planning zone, 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 best growing sites in the planning zone, and placing them back into rotation will help maintain the productive forestland base. A 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 zone typically relied on the excellent dispersal of balsam fir after clear cutting. However, as stated earlier balsam fir in this zone 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 this planning zone. 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 realistic 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). Some white birch sites have been harvested in the planning zone utilizing seed tree harvesting. This 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 (i.e. 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. In the planning zone, balsam fir is usually thinned to favor 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 is 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 the zone. 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 saw log 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 forestland 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 saw logs 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 (e.g. 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 land base 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 FMD’s 5 and 8, 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 zone, insects are now considered of lesser importance. Balsam fir is susceptible to most of the major insects and is in lower proportion throughout the zone 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 forcast 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 zone, 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 zone 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 Wind throw

Wind throw or blow down occurs in stands that are old and decrepit or in stands that have been predisposed by some other disturbance such as insects and disease. Blow down 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. 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 wind throw to residual forest
-investigate techniques to minimize the risk blow down 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. wind throw and butt rot) and update harvest schedule on a 5 year basis accordingly to capture mortality

## 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 land base. 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 (e.g. Crown and paper company 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 05

### 7.1.1 Overview

This section will outline all forest activities that will occur on CBPPL Limits in District 05 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 on the entire district an overview map is presented in Appendix 3. Maps of individual 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 mitigation measures employed.

### 7.1.2 Allocation of Timber Supply

**Note: All numbers related to timber supply are based on the 2006-2010 provincial wood supply. All volumes will be adjusted to reflect the 2011-2015 provincial wood supply when released.**

There is 265,000 $m^3$ of timber scheduled to be harvested by CBPPL in District 05 for the next 5 years.

Summer and winter harvesting operations will be carried out in the District, with summer operations concentrated in areas farthest from the main public highways, and winter operations closer to the public highways to reduce snow-clearing costs.

For the most part, harvesting will be carried out in accordance with the clear-cut silviculture system. All merchantable spruce and fir trees on site will be cut and extracted, leaving only sub merchantable stems and noncommercial species such as eastern larch and white birch. This approach is appropriate for shallow-rooted Boreal conifers such as fir and spruce, which are prone to wind throw following partial cutting. Additionally, clear cutting enhances the early

growth of balsam fir seedlings, which typically exist in large numbers beneath mature balsam fir forests but require full sunlight to achieve optimal growth.

Harvesting and forest access road construction will focus on the harvest of mature and over mature timber throughout the district. Harvesting activities will endeavor to maximize the use of mechanical harvesters, extending winter and summer operating seasons in order to allow for the delivery of fresh wood over the entire twelve months of the year. This will allow us to reduce overall pulpwood inventories, and supply the mill with a constant supply of fresh pulpwood with the optimum species mix, over the maximum number of operating days per year.

Our mechanized logging fleet will be used in combination with our tree length and conventional logging systems to ensure maximum utilization during winter harvesting, harvesting blow down timber, and harvesting low volume stands. Short wood harvesters and forwarders, which are equipped with wide tires and tracks, have a very low ground bearing pressure, and when they spread a brush mat of tops and branches in their travel path, ground disturbance is significantly reduced.
Table 6 details this proposed volume and compares it to the 5 year AAC. There will be no deviation from the five-year AAC in either the Class1 or Class 3 land base.

Table 6 Proposed softwood harvest on CBPPL Limits in District 05 from 2012-2016

| | |
|---|---|
| **Total Class I AAC CBPPL Limits** | **266,000** |
| **CBPPL Harvest on CBPPL Limits** | **265,000** |
| **Crown Harvest on CBPPL Limits** | **0** |
| **Total Harvest CBPPL Limits FMD 05** | **265,000** |
| **CBPPL AAC Deviation (+/-)** | **-1,000 m3** |

#### 7.1.2.1 Commercial

The timber scheduled for harvest in the district is over mature with some small pockets of mature dispersed throughout. This proposed harvest follows the harvest schedule that was used to determine the AAC in Section 3. The first two five year periods are highlighted on the operating area maps in red. This represents two times the actual proposed harvest. The purpose of including more volume than is actually proposed is to allow for operational flexibility within operating areas without having to constantly amend the plan.

Table 7 CBPPL Harvest by Operating Area in District 05, 2012-2016

| **CBPPL Limits in FMD 05 Operating Area Name** | **Operating Area Number** | **Proposed Harvest Volume ($m^3$)** |
|---|---|---|
| Joe Batts | K-05-02 | 75,000 |
| Home Pond | K-05-07 | 135,000 |
| Jonathons Pond | K-05-16 | 25,000 |
| Butts Pond | K-05-17 | 30,000 |
| | | |
| **Total CBPPL Harvest:** | | **265,000** |

#### 7.1.2.2 Hardwoods

The Company policy as it relates to domestic and commercial cutting of hardwoods is that after pulpwood harvesting operations have been completed in an area, domestic and commercial cutting for fuel wood will be allowed on cutover areas to cut hardwoods left behind. Details of the domestic cutting on Crown Lands can be found in the Crown Plan.

### 7.1.3 Silviculture

Silviculture prescriptions scheduled for the next five years will be planting and site preparation where required. No pre commercial thinning is planned. Planting is designed to return a site to a minimum stocking level with the desired species, mainly spruce. There is full planting when there is complete natural regeneration failure and gap planting when a site has some desired regeneration but not enough to meet minimum stocking standards. Precommercial thinning is done to reduce the density on overstocked regeneration so that growth can be concentrated on the remaining crop trees and thus reduce the time to harvest.

Table 8 summarizes silviculture treatments for the next five-year by treatment. There are 1,400 ha of planting and 0 ha of pre-commercial thinning scheduled which meet the assumptions for silviculture in the timber supply analysis.

Table 8 Summary of silviculture treatments on CBPPL Limits in District 05 for 2012-2016

| Treatment | Area (ha) |
|---|---|
| Pre Commercial Thinning | 0 |
| Planting | 1,400 |
| Herbicide | **0** |
| Site Preparation | **1,550** |
| **Total** | **2,950** |

Areas that are scheduled for commercial harvest or have been harvested in the past five years are candidates for planting or gap planting to black, white or Norway spruce. These areas will undergo reconnaissance and or intensive regeneration surveys to determine the need for planting. Immature and regenerating stands have also been identified on operating area maps and are candidates for precommercial thinning if reconnaissance surveys deem them suitable.

### 7.1.4 Primary Access Roads and Bridges

There are 48.0 km of primary forest access roads scheduled to be built in District 05 in the next five years (Table 9). These roads will be built to access timber for harvesting in the operating areas proposed.

Table 9 Primary Access Road Construction on CBPPL Limits in District 05
For 2012 –2016

| **Operating Area Name** | **Operating Area Number** | **Length (km)** | **Bridges** |
|---|---|---|---|
| Joe Batts | K-05-02 | 15.5 | 1 |
| Home Pond | K-05-07 | 15.0 | 0 |
| Jonathons Pond | K-05-16 | 7.5 | 1 |
| Butts Pond | K-05-17 | 10.0 | 1 |
| **Total** | | **48.0** | **3** |

All roads will be built to the specifications of the Class 3 standard and all pertinent EPG's will be followed. As well, referrals will be sent to all relevant agencies (including DFO and Water Resources Division) before any construction is initiated.

### 7.1.5 Activities in Protected Public Water Supply Areas

For all harvesting operations scheduled to occur in protected water supply areas, wider buffers will be used inside these PPWSA's and the pertinent EPG's for operations within PPWSA's will be strictly adhered to. There will be continuous monitoring inside these areas and buffers will be flagged to ensure compliance with the guidelines. In addition, a Certificate of Approval under Section 10 of the Environment Act must be obtained before any commercial or domestic harvesting commences inside the PWSA.

### 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 few timber losses. 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 Crown fire crews and equipment stationed at Gambo and Lewisporte 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 at Pasadena and Gander that are available for initial attack.

#### 7.1.6.2 Insect and Disease

Monitoring and protection for insects and disease is done out of the forest protection division in Corner Brook.

#### 7.1.6.3 General Environment

The environmental protection guidelines form the basis for protecting the environment from the effects of forest activities. Forest activities have the potential to impair water quality, erode and compact soil, impact fish and wildlife habitat, impact viewscape, and disturb sensitive and rare sites etc. 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 1.

### 7.1.7 Surveys

Utilization surveys will be conducted on all cutovers to insure loss of merchantable timber is minimized. CBPPL will work with the Industry Services Division in Corner Brook to implement a yield comparison study to compare the expected volume in an operating area to those actually attained. The results of this survey will help refine the inventory deduction described in Section 3.

As previously mentioned, reconnaissance and intensive regeneration surveys will be conducted on 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 to 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, meetings and National Forest Week activities.

## 7.2 District 06

### 7.2.1 Overview

This section will outline all forest activities that will occur on CBPPL Limits in District 06 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 on the entire district an overview map is presented in Figure 7 (Appendix 4). Maps of individual operating areas and summary sheets are also presented in Appendix 4. 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

**Note: All numbers related to timber supply are based on the 2006-2010 provincial wood supply and tenure changes. All volumes will be adjusted to reflect the 2011-2015 provincial wood supply when released.**

There is 450,000 $m^3$ of timber scheduled to be harvested by CBPPL in District 06 for the next 5 years.

Harvesting activities will be carried out in several locations throughout the District as shown on the operating area maps contained in Appendix 4.

Summer and winter harvesting operations will be carried out in the District, with summer operations concentrated in areas farthest from the main public highways, and winter operations closer to the public highways to reduce snow-clearing costs.

For the most part, harvesting will be carried out in accordance with the clear-cut silviculture system. All merchantable spruce and fir trees on site will be cut and extracted, leaving only sub merchantable stems and noncommercial species such as eastern larch and white birch. This approach is appropriate for shallow-rooted Boreal conifers such as fir and spruce, which are

prone to wind throw following partial cutting. Additionally, clear cutting enhances the early growth of balsam fir seedlings, which typically exist in large numbers beneath mature balsam fir forests but require full sunlight to achieve optimal growth.

Harvesting and forest access road construction will focus on the harvest of mature and over mature timber throughout the district. Harvesting activities will endeavor to maximize the use of mechanical harvesters, extending winter and summer operating seasons in order to allow for the delivery of fresh wood over the entire twelve months of the year. This will allow us to reduce overall pulpwood inventories, and supply the mill with a constant supply of fresh pulpwood with the optimum species mix, over the maximum number of operating days per year.

Our mechanized logging fleet will be used in combination with our tree length and conventional logging systems to ensure maximum utilization during winter harvesting, harvesting blow down timber, and harvesting low volume stands. Short wood harvesters and forwarders, which are equipped with wide tires and tracks, have a very low ground bearing pressure, and when they spread a brush mat of tops and branches in their travel path, ground disturbance is significantly reduced.

There will be no deviation from the five-year AAC in either the Class1 or Class 3 land base.

Table 10 Proposed Harvest on CBPPL Limits in District 06, 2012-2016

| | |
|---|---|
| **Total Class I AAC CBPPL Limits** | **450,000 m3** |
| **CBPPL Harvest on CBPPL Limits** | **450,000 m3** |
| **Crown Harvest on CBPPL Limits** | **0 m3** |
| **Total Harvest CBPPL Limits FMD 06** | **450,000 m3** |
| **CBPPL AAC Deviation (+/-)** | **0 m3** |

### 7.2.2.1 Commercial

The timber scheduled for harvest in the district is over mature with some small pockets of mature dispersed throughout. This proposed harvest follows the harvest schedule that was used to determine the AAC in Section 3. The first two five year periods are highlighted on the operating area maps in red. This represents two times the actual proposed harvest. The purpose of including more volume than is actually proposed is to allow for operational flexibility within operating areas without having to constantly amend the plan.

Table 11 Summary of CBPPL Harvesting by Operating Area in District 06
2012-2016

| Operating Area Name | Operating Area Number | Proposed Harvest Volume (m3) |
|---|---|---|
| Coopers Brook | K-06-02 | 65,000 |
| Careless Cove | K-06-03 | 20,000 |
| Red Rock | K-06-05 | 70,000 |
| South West Gander | K-06-07 | 5,000 |
| Coy Pond | K-06-12 | 40,000 |
| Canning Brook | K-06-15 | 40,000 |
| Third Berry Hill Pond | K-06-16 | 120,000 |
| Dead Wolf South | K-06-17 | 40,000 |
| Dead Wolf North | K-06-18 | 10,000 |
| Bear Pond | K-06-22 | 10,000 |
| Hussey Pond | K-06-23 | 30,000 |
| | | |
| | | |
| | | |
| **Total** | | **450,000** |

### 7.2.2.2 Hardwoods

The Company policy as it relates to domestic and commercial cutting of hardwoods is that after pulpwood harvesting operations have been completed in an area, domestic and commercial cutting for fuel wood will be allowed on cutover areas to cut hardwoods left behind. Details of the domestic cutting on Crown Lands can be found in the Crown Plan.

### 7.2.3 Silviculture

Silviculture prescriptions scheduled for the next five years will be planting and site preparation where required. No pre commercial thinning is planned. Planting is designed to return a site to a minimum stocking level with the desired species, mainly spruce. There is full planting when there is complete natural regeneration failure and gap planting when a site has some desired regeneration but not enough to meet minimum stocking standards. Precommercial thinning is done to reduce the density on overstocked regeneration so that growth can be concentrated on the remaining crop trees and thus reduce the time to harvest.

Table 12 Summaries of Silviculture Treatments on CBPPL Limits 2012-2016

| Treatment | Area (ha) |
|---|---|
| Pre Commercial Thinning | 0 |
| Planting | 1,400 |
| Herbicide | **0** |
| Site Preperation | **1,550** |
| **Total** | **2,950** |

Areas that are scheduled for commercial harvest or have been harvested in the past five years are candidates for planting or gap planting to black, white or Norway spruce. These areas will undergo reconnaissance and or intensive regeneration surveys to determine the need for planting. Immature and regenerating stands have also been identified on operating area maps and are candidates for precommercial thinning if reconnaissance surveys deem them suitable.

### 7.2.4 Primary Access Roads and Bridges

There are 76.0 km of primary forest access roads scheduled to be built in District 06 in the next five years. These roads will be built to access timber for harvesting in the operating areas proposed. All roads will be built to the specifications of the Class 3 standard and all pertinent EPG's will be followed. As well, referrals will be sent to all relevant agencies (including DFO and Water Resources Division) before and construction is initiated.

Table 13 Summary of Primary Access Road Construction on CBPPL Limits in District 06 2012 -2016

| Operating Area Name | Operating area Number | Length (km) | Bridges |
|---|---|---|---|
| Careless Cove | K-06-03 | 2.5 | 0 |
| Coy Pond | K-06-12 | 27.0 | 1 |
| Lane Pond | K-06-14 | 5.0 | 1 |
| Canning Brook | K-06-15 | 7.5 | 1 |
| Third Berry Hill Pd | K-06-16 | 24.0 | 1 |
| Dead Wolf South | K-06-17 | 8.0 | 1 |
| Bear Pond | K-06-22 | 2.0 | 0 |
| **Total** | | **76.0** | **5** |

### 7.2.5 Activities in Protected Public Water Supply Areas

For harvesting operations inside PPWSA's, wider buffers will be used and the pertinent EPG's will be attached to any 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, a Certificate of Approval under Section 10 of the Environment Act must be obtained before any domestic harvesting commences inside the PPWSA.

### 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 few timber losses. Despite this fact the district must remain vigilant in its fire suppression program to ensure any future losses are minimized.

There are Crown Fire Crews and equipment stationed at Lewisporte and Gambo 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 is an air tanker stationed at Deer Lake and a helicopter at Pasadena that are available for initial attack.

#### *7.2.6.2 Insect and Disease*

Monitoring and protection for insects and disease is done out of the forest protection division in Corner Brook. CBPPL and Crown 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. Forest activities have the potential to impair water quality, erode and compact soil, destroy fish and wildlife habitat, impact viewscape, and disturb sensitive and rare sites etc. 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

Utilization surveys will be conducted on all cutovers to insure loss of merchantable timber is minimized. CBPPL will work with the Industry Services Division in Corner Brook to implement a yield comparison study to compare the expected volume in an operating area to those actually attained. The results of this survey will help refine the inventory deduction described in Section 3.

As previously mentioned, reconnaissance and intensive regeneration surveys will be conducted on 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.

### 7.2.8 Information and Education

CBPPL Staff will continue to 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, meetings and National Forest Week activities.

# Section 8 Mitigations

## 8.1 District 05

Site-specific mitigations arising from concerns identified during the planning process and from other regulatory agencies are identified on the summary sheets accompanying each operating area in Appendix 3. As well, guiding principles, which outline procedures, to follow should an unforeseen conflict arise have been identified for each value in Section 4. Highlights of the mitigative measures that arose as a result of Planning Team concerns are:

- The Central Regional Lands Office carried out a review of each area resulting in comments and conditions that CBPPL should be aware of before commencing harvesting, road construction and

silviculture projects. Conditions include not impeding access or affect the use of cottage titleholders in each area and a specific request to maintain a 100m buffer on the southwest portion of Jonathans Pond. CBPPL will agree to conditions set by the Lands Branch.

- Gander River Tours outfitting operator expressed concern with cottage development inside an 8km buffer around the main lodge. CBPPL agreed that any Crown Land referrals inside the 8km buffer would be recommended for refusal.
- The Freshwater Alexander Bay Ecosystem Corporation (FABEC) expressed concerns with access and buffers around First burnt Pond, Square Pond and Middle Brook (Butts Pond K-05-17). CBPPL has agreed that no forest access road will occur within 1 kilometer of First Burnt Pond and Middle Brook. A 100m no cut buffer will be maintained around First Burnt Pond, Square Pond and Middle Brook. CBPPL has agreed to harvest the area in the winter to substantially reduce access by utilizing winter roads. In the event that a summer harvest occurs, CBPPL will work with FABEC on a deactivation plan for the road system.
- The Indian Bay Ecosystem Corporation (IBEC) expressed concerns with road building and access around the Southern Pond area (Home Pond K-05-07). CBPPL is working with this group to substantially reduce access to the area and has agreed to deactivate the road when operations are not occurring.
- Individual member of the planning team expressed concern around wetland protection for the Joe Batts/ H-Pond area. The request is for a 70m buffer around H-Pond and no harvesting of the stands surrounding the stream and wetlands to the south of H-Pond. CBPPL has sent these recommendations to the Wildlife Division for review and comment. CBPPL will agree to maintain a 30m-treed buffer around H-Pond and the wetlands to the south of the pond. There was also concern expressed over the protection of white/red pine. CBPPL will ensure pine is protected through adherence to the forestry act, regulations, and guidelines and polices related to pine management. CBPPL will agree that, where safe to do so, a 5m-machine free zone is maintained around individual and clusters of pine and immature softwood, immature and mature hardwood and all other understory are left undisturbed in the 5m zones.
- The Canadian Parks and Wilderness Society recommended the following adjustments for the operating plan.

1. 100m buffer on the wetlands of Millers Brook – Joe Batts Brook.
2. 20m no-cut forest/vegetation buffer around individual and clusters of white pine.

3. 100m buffer on all streams in salmon bearing watersheds.

CBPPL has sent these recommendations to the Department of Fisheries and Oceans and the Wildlife Division for review and comment. CBPPL will agree to a 30m-treed buffer on the wetlands of Millers Brook – Joe Batts Brook unless otherwise directed by the Wildlife Division. CBPPL will ensure white pine is protected through adherence to the forestry act, regulations, and guidelines and polices related to white pine management. CBPPL will agree that, where safe to do so, a 5m-machine free zone is maintained around individual and clusters of white pine and immature softwood, immature and mature hardwood and all other understory are left undisturbed in the 5m zones. The Federal Department of Fisheries and Oceans (DFO) deliver management of Atlantic salmon in the Province. DFO recommends that a 100m no-cut buffer be left on designated sensitive spawning sites. CBPPL will leave a 100m no-cut buffer on all sensitive spawning sites as directed by DFO.

CPAWS- NL requested that a landscape approach be adopted for woodland caribou in Zone 3. To minimize the industrial footprint, CPAWS delineated proscription areas where they requested that proposed forestry activities be deferred for this 5-Year plan. CBPPL understands that many special interest groups such as CPAWS have concern over woodland caribou habitat management. Each group has their own interpretation of how that management should be prescribed on the landscape. CBPPL also values the woodland caribou and are committed to protecting this value. CBPPL feels that following the current government guidelines and policies that are in place to manage woodland caribou is the best approach. 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 Wildlife Division);
- 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 earlier in this document, 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.

## 8.2 District 06

Site-specific mitigations arising from concerns identified during the planning process and from other regulatory agencies are identified on the summary sheets accompanying each operating area in Appendix 4. As well, guiding principles, which outline procedures, to follow should an unforeseen conflict arise have been identified for each value in Section 4. Highlights of the mitigative measures that arose as a result of planning team concerns are:

- Existing guidelines for caribou will be followed for all affected areas and any new guidelines developed as a result of ongoing processes will be adhered to.

- The Central Regional Lands Office carried out a review of each area resulting in comments and conditions that CBPPL should be aware of before commencing harvesting, road construction and silviculture projects. Conditions include not impeding access or affect the use of cottage titleholders in each area. CBPPL will agree to conditions set by the Lands Branch.

- Caribou Pond Outfitting operator raised concerns with proposed harvesting around caribou pond proposed in the Deadwolf south operating area. CBPPL agreed that no harvesting or road building would occur without a review of the operational level plan with the outfitter and adherence to the M.O.U. between CBPPL and the NLOA.

- CPAWS- NL requested that a landscape approach be adopted for woodland caribou in Zone 3. To minimize the industrial footprint, CPAWS delineated proscription areas where they requested that proposed forestry activities be deferred for this 5-Year plan. CBPPL understands that many special interest groups such as CPAWS have concern over woodland caribou habitat management. Each group has their own interpretation of how that management should be

prescribed on the landscape. CBPPL also values the woodland caribou and are committed to protecting this value. CBPPL feels that following the current government guidelines and policies that are in place to manage woodland caribou is the best approach. 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 Wildlife Division);
- 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 earlier in this document, 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.

# Section 9 Plan Administrations

## 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 deductions if work does not meet contract 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 is considered as a monitoring committee (which is the planning team) whose primary role is meet on a regular basis (ie: once a year or more frequently if required) to monitor implementation of this Five Year Operating Plan for this zone. This is a crucial role, as many implementation commitments are stated in the plan. The primary function of this monitoring committee is to:

- Monitor plan implementation for consistency with commitments in the plan
- Identify concerns with plan implementation to team members
- Be aware of annual operating plans
- Provide recommendations for plan changes
- Establish protocol for concerns reported to and/or identified by monitoring committee

Additional meetings may be required to review amendments or provide 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 have 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 Forest Services Branch and the other must be submitted to the Environmental Assessment Division for public review. Changes to this plan can be approved by the Forest Services Branch 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 area(s) 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. The planning team will review amendments requiring submission through EA.

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