Kruger
Publication
Papers

Corner Brook Mill

Corner Brook Pulp and Paper Limited
Five - Year Operating Plan

Zone 3
Forest Management Districts 5 and 6

January 1, 2017 - December 31, 2021

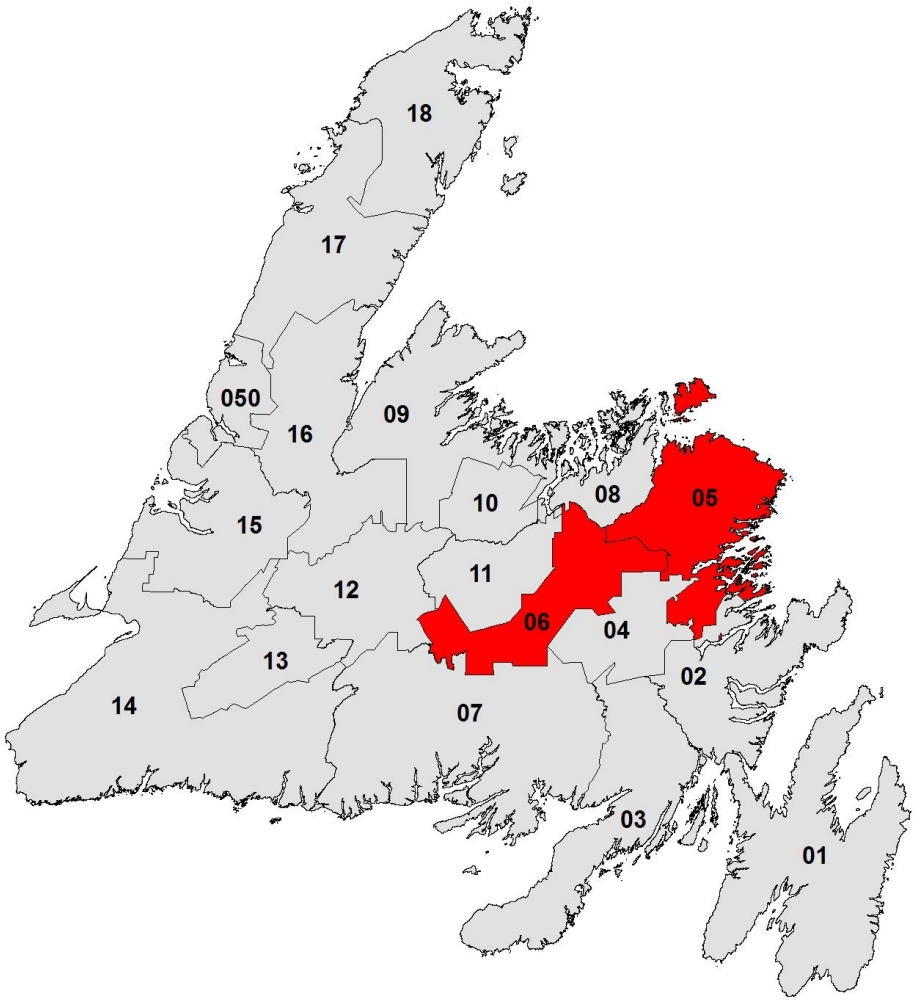


Table of Contents

List of Tables

List of Figures

List of Maps

1. Introduction

This five year operating plan incorporates the new provincial planning requirements. In the past, there were five major planning documents; the provincial sustainable forest management strategy, the district strategy document, the five year operating plan, the annual operating plan, and the past annual report. This new planning framework has eliminated the district strategy document; however, its former contents are now split between the provincial sustainable forest management strategy and the five year operating plan. Sections that are provincial in scope such as carbon, global warming and criteria and indicators are now included in the provincial sustainable forest management strategy while sections that are more descriptive or depict local conditions such as values, forest characterization and ecosystem description are moved to the five year operating plan. Linkages between strategies from the provincial sustainable forest management strategy and on the ground activities in the five year operating plan will be provided where applicable.

Another major change to the planning process is the creation of eight planning zones on the island which are based primarily on ecoregion composition. Districts 04, 05, 06 and 08 are adjacent and share common ecoregion characteristics and collectively form Planning Zone Three. The requirement for submission to the Forestry Services Branch and for Environmental Assessment is one five year operating plan for each owner in each Zone. The past requirement was one five year operating plan by each owner in each district. This zone is comprised of both crown land and private tenure, however; so there will be only one submission by the crown and one by Corner Brook Pulp and Paper. Throughout this five year plan, references will be made to Districts 04, 05, 06 and 08 individually but when combined they will collectively be referred to as Planning Zone Three or the Zone.

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

will be generic in nature and give information for the entire zone as well as some broad comparative statistics.

Finally, this document will build on previous documents. Information will be updated as required or new sections will be added if any new information is available. Sections from previous documents will be included if they are still relevant.

2. Landbase Description

2.1. General

Planning Zone 3 encompasses FMD's 4, 5, 6 and 8 (Map 1-1). 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.

2.1.1. Location

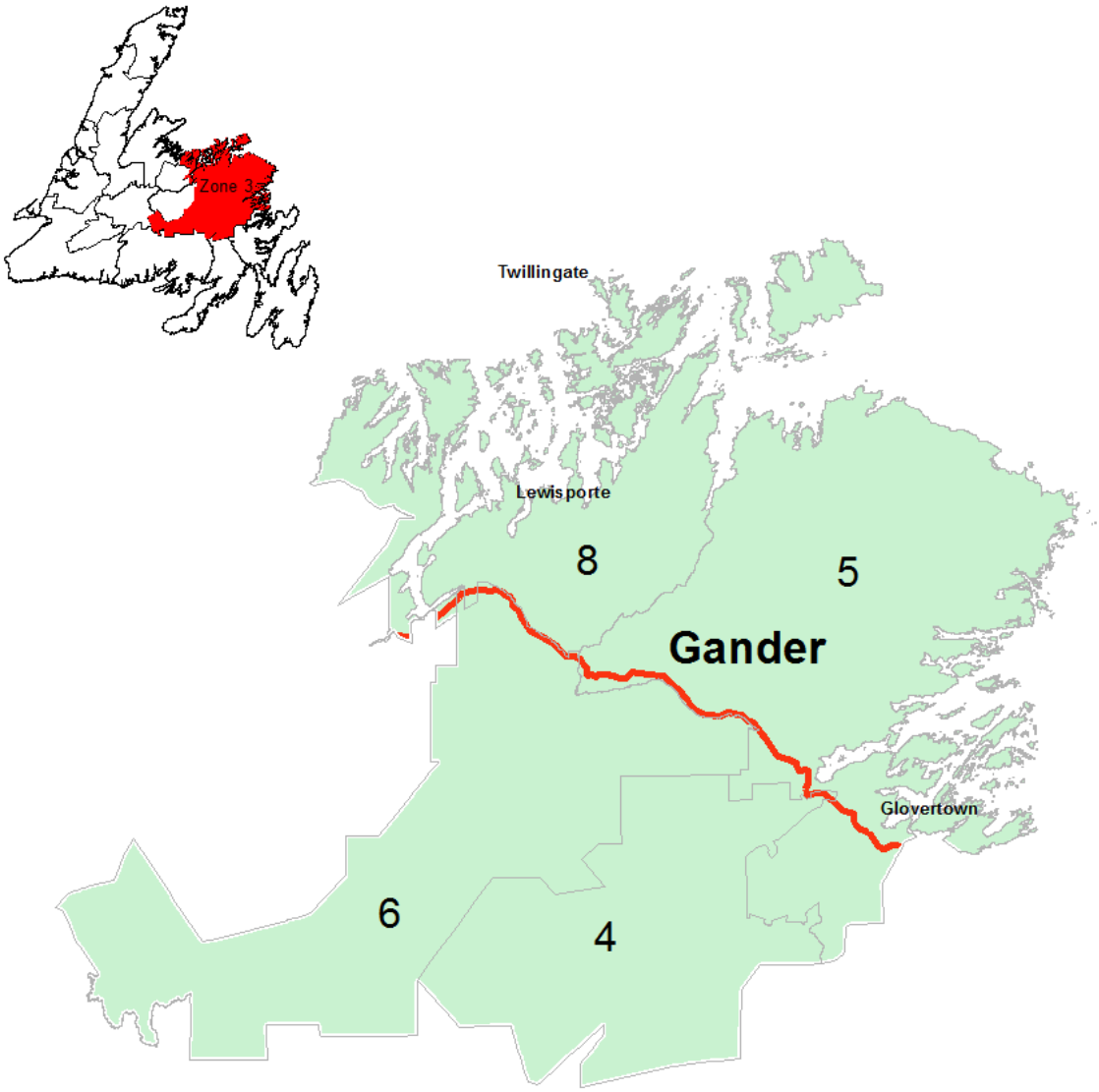
Forest Management District 4, known as the Terra Nova Management District, basically encompasses both the Terra Nova and Gambo River watersheds. Its boundaries follow tenure lines north of Mint Brook to the south shore of Gambo Pond, then extends south (including Terra Nova Lake) to the Bay Du Nord Wilderness 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 Forestry Services offices.



Map 1- 1 Planning Zone / District Map, Zone 3.

2.1.2. 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.

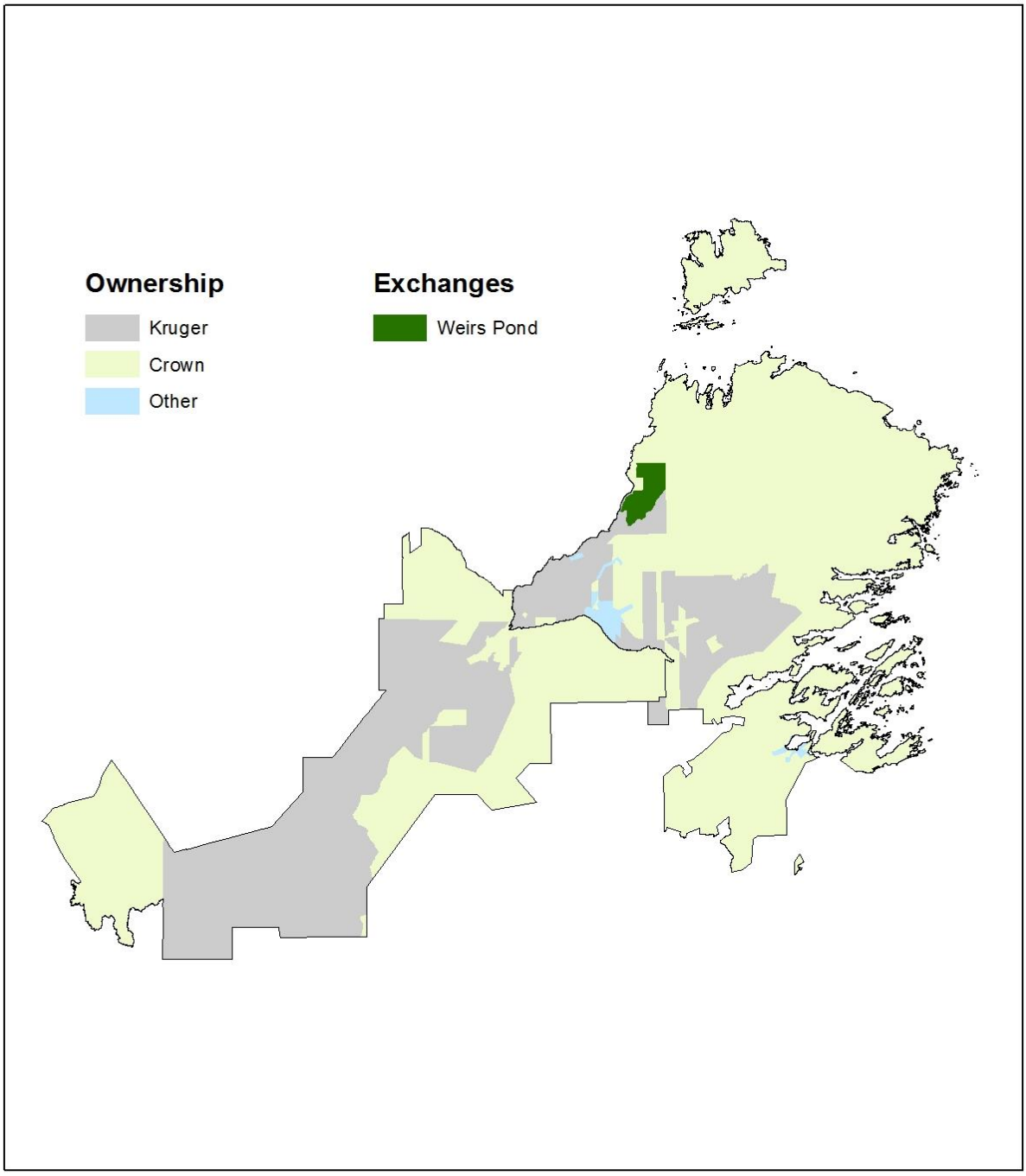
FMD 6 encompasses the watershed of both the Northwest and Southwest Gander Rivers and the area immediately adjacent to Glenwood, has a similar history. While the Corner Brook mill was still under construction, the Reid Newfoundland Company was also trying to promote a newsprint mill on the Gander River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

2.1.2.1. Ownership

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 %.

When transfers and exchanges exist within the Zone, a detailed map accompanied with relevant information will be provided. (**Error! Reference source not found.**)



Map 1- 2 Timber ownership and active transfers and exchanges occurring throughout Zone 3.

2.1.3. *Physical Description*

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.

2.1.3.1. *Topography and Hydrology*

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.

2.1.3.2. 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 deglaciations. 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.

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.

2.1.3.3. 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.

2.1.3.4. 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).

2.1.4. Ecological Characteristics

2.1.4.1. Ecosystem Description

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. 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 dependent 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.

2.1.4.1.1. Ecoregions and Subregions

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 Map 1-3).

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).

2.1.4.1.1.1. 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.

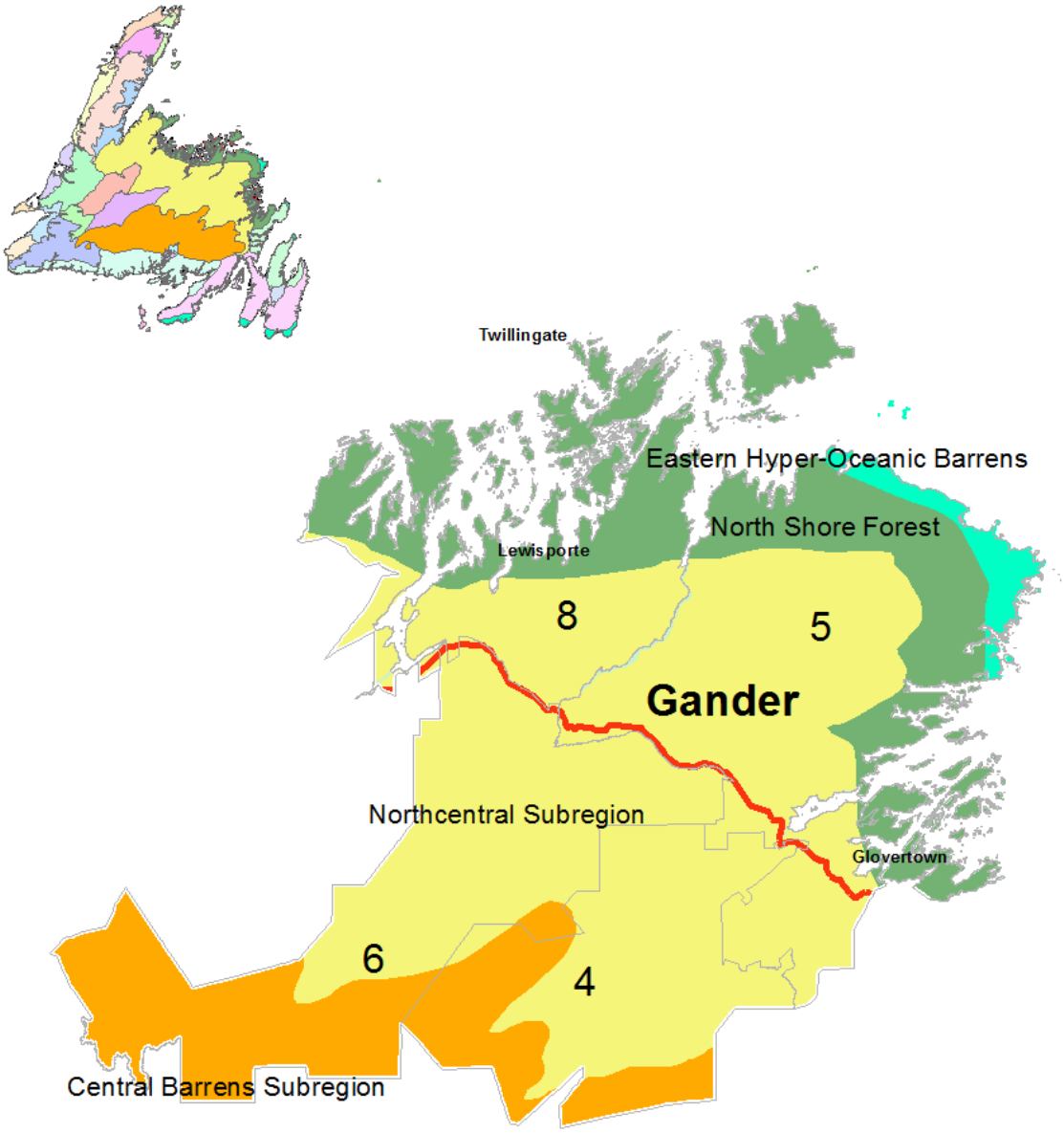
2.1.4.1.1.2. North Shore Forest Ecoregion
The less prevalent North Shore Ecoregion is essentially a 20-25 km wide coastal zone that extends from Bonavista Bay to the Baie Verte Peninsula. Here, a continuous forest of black spruce and balsam fir dominates except on the coastal headlands where barrens 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.

2.1.4.1.1.3. 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.

2.1.4.1.1.4. 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.



Map 1- 3 Ecoregions/Subregions occurring throughout Zone 3.

Table 1- 1 Ecoregions/ Subregions within Zone 3

	Eco/ Subregion	District 4		District 5		District 6		District 8		Zone 3 (D4,5,6,8)
Zone 3 Eco/Subregions	Area (ha) in Province	Total % Area Occupied in District	Relative % of Subregion in District	Total % Area Occupied in District	Relative % of Subregion in District	Total % Area Occupied in District	Relative % of Subregion in District	Total % Area Occupied in District	Relative % of Subregion in District	Relative % of Subregions in Zone
North Shore Forest Ecoregion										
North Shore Forest Subregion	550,662			34%	35%			54%	27%	61%
Section Sub-total	*550,662*									
Eastern Hyper-Oceanic Barrens										
Eastern Hyper-Oceanic Barrens Subregion	160,335			5%	0.2					19%
Section Sub-total	*160,335*									
Maritime Barrens										
Central Barrens Subregion	1,524,392	33%	7%			38%	11%			18%
Section Sub-total	*1,524,392*									
Central Newfoundland Forest										
Northcentral Subregion	2,310,744	67%	9%	61%	15%	62%	12%	46%	5%	41%
Section Sub-total	*2,310,744*									
Grand Total	***4,546,133***									

2.1.4.2. Ecosystem Condition and Productivity

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.

2.1.4.2.1. 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 dependent 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.

2.1.4.2.2. 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.

2.1.4.2.3. 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.

2.1.4.2.4. Disturbance Regimes and Successional Patterns

There are four main driving forces that cause disturbance in the boreal forest. Harvesting accounts for the majority of disturbance in the zone and occurs on a regular and consistent basis. Fire and insect damage are the other two major disturbances and occur on a more irregular or cyclic basis. With the exception of a major atypical windstorm, wind throw usually occurs after some other agent like insects and/or disease weakens a stand. For this reason successional 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.

2.1.4.2.4.1. *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.

2.1.4.2.4.2. 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.

2.1.4.2.4.3. *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.

2.1.4.3. 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.

2.1.4.3.1. 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.

2.1.4.3.2. 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.

2.1.4.3.3. 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, CBPPL 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.

2.1.5. Forest Characterization

A forecast description of the future forest structure and composition anticipated from the implementation of the proposed forest activities under the plan. Refer to 1.7.2 for graphs.

2.1.5.1. Land Classification

There are six broad categories that currently represent how the land within a forest management district is classified 1) Regulatory alienations, 2) Non-harvestable inventory types, 3) Water features, 4) Operational alienations, 5) Non-Timber Values and 6) Productive forest. The sixth category represents the harvestable landbase and is further subdivided into Core, & Operational. Regulatory alienations are areas which have a legal restriction which prevents harvesting. Non-harvestable inventory types are areas such as bog or scrub forest. Water features are simply bodies of water (lakes, ponds, rivers..etc) Operational alienations are areas which cannot be harvested due to a physical impediment (i.e extreme steep slopes). Non-Timber Values represent areas in which harvesting is not permitted due to a use other than harvesting such as agriculture or aesthetics. In this case productive forest is any forested area that is not restricted from harvest and is capable of producing at least 60 m^3/ha of merchantable timber.

The total landbase for Zone 3 (Table 1-2, Figure 1-1, Map 1-3) is approximately 1.6 million hectares and is subdivided into the 6 categories as follows:

1) Regulatory alienations 287,333 ha
2) Non-harvestable inventory types 607,890 ha
3) Water features 160,048 ha
4) Operational alienations 84,891 ha
5) Non-Timber Values 17,677 ha
6) Productive forest
    - Core 333,940 ha
    - Operational 124,548 ha

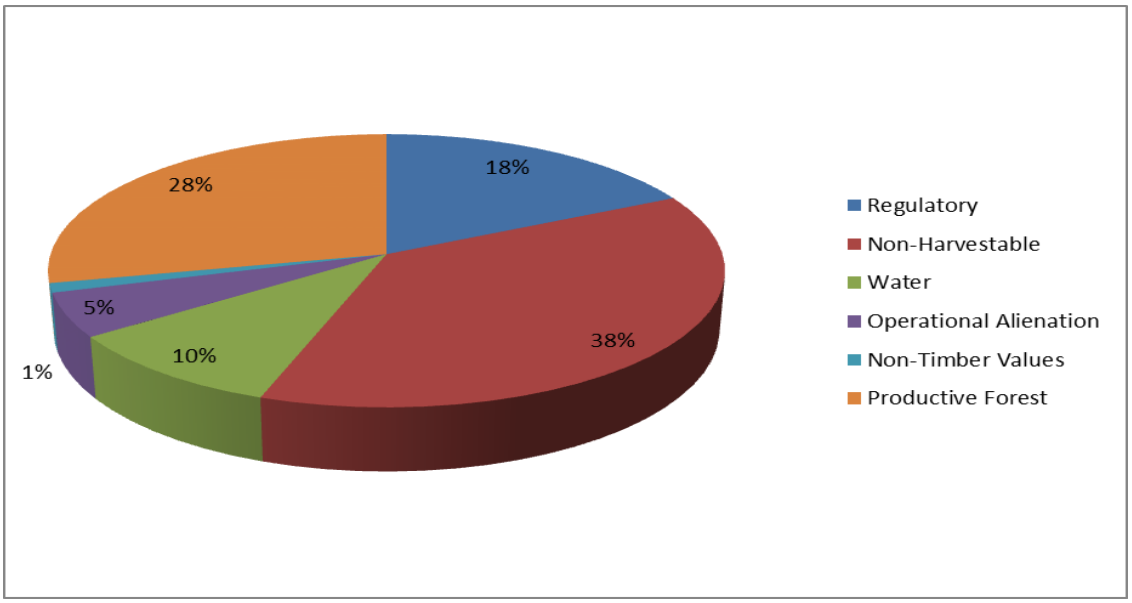
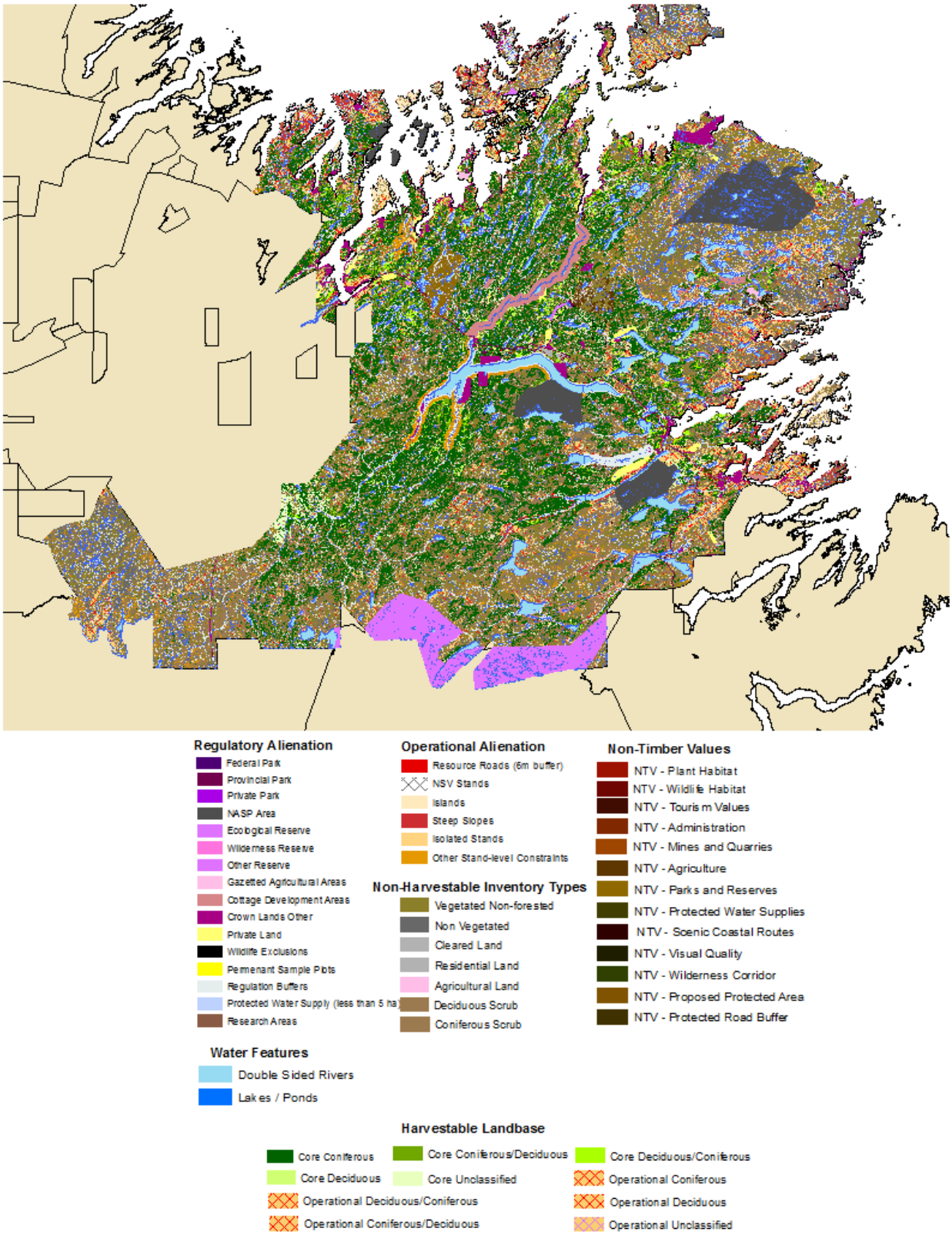


Figure 1- 1 Landbase Classification

Up until now the landbase descriptions, ecosystem description, discussion on biodiversity and general forest characterization have been at the Zone level. From this point forward information presented will specifically to CBPPLs tenure in FMDs 5 and 6.

Table 1- 2 Zone 3 Landbase Classification Table

Date:	6/12/2015	ZONE 3					
		Forested Area (ha)	Non Forested (ha)	Forested Area (ha)	Non Forested (ha)	Total Area (ha)	% Of Total
	Landbase Classification	Crown		Kruger			
1	**Regulatory Alienations**						
1.a	***Parks***						
1.a.1	Federal	0.0	0.0	0.0	0.0	0.0	0.0%
1.a.2	Provincial	1,852.0	722.8	639.3	198.4	3,412.4	0.2%
1.a.3	Private	0.0	0.0	0.0	0.0	0.0	0.0%
1.a.4	Natural Areas System Plan	36,767.7	18,532.2	0.0	0.0	55,300.0	3.4%
1.b	***Reserves***						
1.b.1	Ecological	0.0	0.0	0.0	0.0	0.0	0.0%
1.b.2	Wilderness	0.0	0.0	0.0	0.0	0.0	0.0%
1.b.3	Others	22,395.3	24,981.6	36.5	2.6	47,416.1	2.9%
	Other						
1.c.1	Agricultural Areas	1,000.7	230.7	0.0	0.0	1,231.3	0.1%
1.d.1	Cottage Development Areas	9,057.8	1,716.6	4,103.1	692.7	15,570.2	1.0%
1.d.2	Crown Lands Other	14,884.5	8,076.7	1,069.2	743.1	24,773.5	1.5%
1.d.3	Private Land	5,125.7	3,171.3	1,371.3	252.7	9,921.0	0.6%
1.e.1	Wildlife Exclusions	0.1	0.1	0.0	0.0	0.1	0.0%
1.f.1	Permanent Sample Plots (PSP's)	418.9	34.8	107.0	9.1	569.8	0.0%
1.f.2	Regulation Buffers Water (30m)	64,940.3	35,620.0	17,860.0	10,719.2	129,139.5	8.0%
1.g.1	Protected Water Supply Areas	0.0	0.0	0.0	0.0	0.0	0.0%
1.h.1	Research Areas	0.0	0.0	0.0	0.0	0.0	0.0%
	Section Sub-total	*156,443.0*	*93,086.8*	*25,186.4*	*12,617.6*	*287,333.8*	*17.8%*
	Non-Harvestable						
2	**Inventory Types**						
2.a.1	Coniferous Scrub	224,010.0	0.0	76,750.0	0.0	300,760.0	18.6%
2.b.1	Deciduous Scrub	12,729.7	0.0	3,959.5	0.0	16,689.2	1.0%
2.c.1	Vegetated Non-forested	0.0	174,133.6	0.0	51,310.6	225,444.2	13.9%
2.d.1	Non Vegetated	0.0	55,020.6	0.0	5,720.4	60,740.9	3.8%
2.e.1	Cleared Land	0.0	1,243.0	0.0	213.0	1,456.0	0.1%
2.f.1	Residential Land	0.0	2,385.6	0.0	65.2	2,450.8	0.2%
2.g.1	Agricultural Land	0.0	328.1	0.0	21.7	349.8	0.0%
	Section Sub-total	*236,739.7*	*233,110.9*	*80,709.5*	*57,330.8*	*607,890.9*	*37.6%*
3	**Water Features**						
3.a	***Water Bodies***						
3.a.1	Lakes/Ponds	0.0	130,926.7	0.0	20,830.5	151,757.1	9.4%
3.a.2	Double Sided Rivers	0.0	4,566.3	0.0	3,725.4	8,291.7	0.5%
	Section Sub-total		*135,492.9*		*24,555.9*	*160,048.8*	*9.9%*
4	**Operational Alienations**						
4.a	***Roads***						
4.a.1	Right Of Way (Roads)	0.0	644.1	0.0	243.1	887.2	0.1%
4.a.2	Resource Roads (6m buffer)	1,040.5	45.9	440.7	6.3	1,533.5	0.1%
4.b	***Stand Level***						
4.b.1	NSV Stands	24,436.4	0.0	8,341.9		32,778.3	2.0%
4.b.2	Islands	9,288.7	0.0	4.8	0.0	9,293.5	0.6%
4.b.3	Steep Slopes	16,905.1	2,973.8	491.2	54.2	20,424.4	1.3%
4.b.4	Isolated Stands	6,122.2	0.0	0.0	0.0	6,122.2	0.4%
4.b.5	Other Stand-level Constraints	13,556.9	0.0	259.3	0.2	13,816.4	0.9%
4.b.6	Area Not Interpreted	0.0	36.0	0.0	0.0	36.0	
	Section Sub-total	*71,349.9*	*3,699.9*	*9,538.0*	*303.8*	*84,891.5*	*5.3%*
5	**Non-Timber Values**						
5.a.1	Plant Habitat	0.0	0.0	0.0	0.0	0.0	0.0%
5.b.1	Wildlife Habitat	332.9	182.6	27.1	39.3	581.9	0.0%
5.c.1	Tourism Values	0.0	0.0	0.0	0.0	0.0	0.0%
5.d.1	Administration	370.4	0.0	0.0	0.0	370.4	0.0%
5.e.1	Mines and Quaries	87.5	34.8	0.0	0.0	122.2	0.0%
5.f.1	Agriculture	2,538.6	0.0	4.0	0.0	2,542.6	0.2%
5.g.1	Parks and Reserves	4,410.8	2,167.5	0.0	0.0	6,578.3	0.4%
5.h.1	Protected Water Supplies	683.7	0.0	107.9	0.0	791.6	0.0%
5.i.1	Scenic Coastal Routes	145.0	0.0	0.0	0.0	145.0	0.0%
5.j.1	Visual Quality	1,671.0	0.0	62.2	0.0	1,733.2	0.1%
5.k.1	Wilderness Coridor	0.0	0.0	0.0	0.0	0.0	0.0%
5.l.1	Proposed Protected Area	0.0	0.0	0.0	0.0	0.0	0.0%
5.m.1	Protected Road Buffer	2,828.8	1,377.6	558.1	47.8	4,812.3	0.3%
	Section Sub-total	*13,068.7*	*3,762.5*	*759.2*	*87.1*	*17,677.5*	*1.1%*
6	**Harvestable Landbase**						
6.a.1	Core Coniferous	209,274.5	0.0	93,585.7	0.0	302,860.1	18.7%
6.a.2	Core Coniferous/Deciduous	21,242.7	0.0	6,736.6	0.0	27,979.3	1.7%
6.a.3	Core Deciduous/Coniferous	9,691.1	0.0	3,817.9	0.0	13,509.0	0.8%
6.a.4	Core Deciduous	3,529.6	0.0	2,436.9	0.0	5,966.5	0.4%
6.a.5	Core Unclassified	4,901.2	0.0	6,055.2	0.0	10,956.4	0.7%
	Section Sub-total	*248,639.1*		*112,632.3*		*361,271.4*	*22.4%*
6.b.1	Operational Coniferous	66,597.4	0.0	11,454.6	0.0	78,052.0	4.8%
6.b.2	Operational Coniferous/Deciduous	12,535.8	0.0	359.0	0.0	12,894.8	0.8%
6.b.3	Operational Deciduous/Coniferous	4,794.5	0.0	79.9	0.0	4,874.4	0.3%
6.b.4	Operational Deciduous	907.3	0.0	20.0	0.0	927.3	0.1%
6.b.5	Operational Unclassified	466.2	0.0	2.6	0.0	468.8	0.0%
	Section Sub-total	*85,301.3*		*11,916.0*		*97,217.3*	*6.0%*
	Section Sub-total	*333,940.4*		*124,548.4*		*458,488.7*	*28.4%*
	Grand-total	*811,541.6*	*469,153.0*	*240,741.6*	*94,895.2*	*1,616,331.3*	*100.0%*



Map 1- 4 Landbase Classification Map – ZONE 3.

2.1.5.2. Forest Profile

2.1.5.2.1. Species Composition

Working group describes the dominant tree species present in a forest stand. This species may occupy 100 percent of crown closure of a stand or may be present in association with other species. The working group designation describes the stand in general terms based on the prevalent species whereby species composition describes specifically, the relative proportion of each individual tree species that make up a stand. For the purposes of timber supply there are five broad working groups within the Zone 3 CBPPL tenure. The softwood working groups dominate accounting for approximately 80 percent of the productive forest. The black spruce (bS) working group is by far the most prolific accounting for 63 percent of the working groups in FMD 5 and 74 percent in FMD 6 (Figure 1-2). Black spruce can occur as pure stands or in association with other species listed below. Balsam fir (bF) is the second most abundant on CBPPL tenure. 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 approximately 12 and 5 percent of the productive forest. These working groups occur as varying mixtures of fir, spruce, birch and aspen. The pure hardwood working group (white birch (wB), trembling aspen (tA)) occupies less than 1 percent of the productive forest on CBPPL tenure.
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 sprucefeathermoss/ 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 Zone 3 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. There are a number of white birch forest types, all depending upon the understory growth and the

associated soil type.

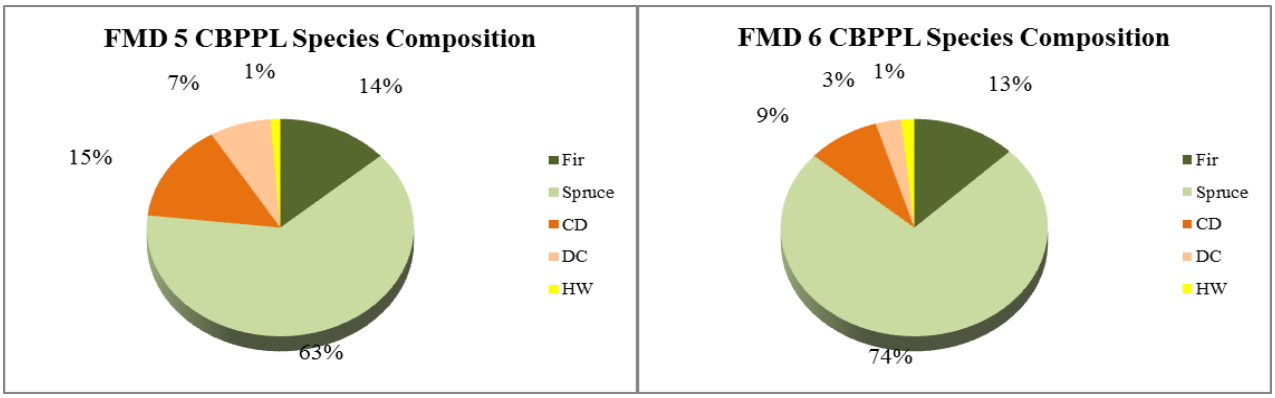


Figure 1- 2 Working group (species composition) by FMD

.

2.1.5.2.2. 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:

Age (years)

0 - 20 regenerating

21 – 40 immature

41 – 60 semi-mature

61 – 80 mature

81 - 100 over mature

101 - 120 over mature

121 -140 over mature

141 – 160 over mature

161 + (actually represents uneven-aged stands)

The age class distribution for CBPPL tenure in Planning Zone 3, for the entire productive forest, is shown in Figure 1-3 for both FMDs 5 & 6. 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.

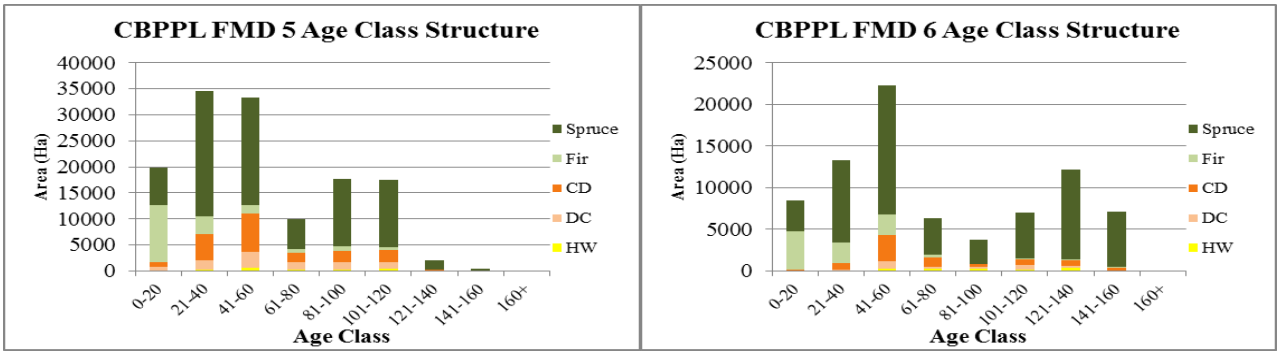


Figure 1- 3 Working group by Age Class by tenure

It can be seen that both FMDs have an unbalanced age class structure with more productive forest falling in the younger age classes. This unbalanced age class structure limits the maxim sustainable harvest levels as the mature forest will have to be harvested before the immature stands can reach their peak yields. This is particularly evident in looking at the Core landbase which is the largest portion of the productive forest comprising the Zone 3 AAC for CBPPL (Figure 1-4).

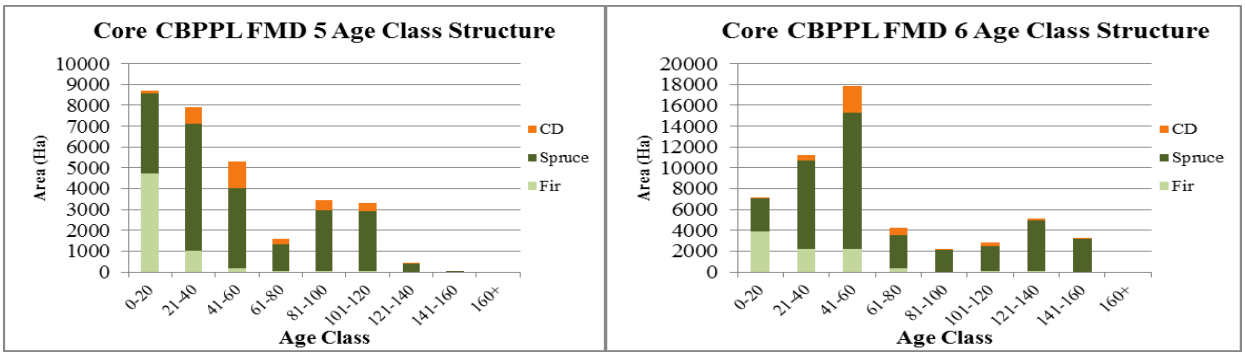


Figure 1- 4 Working group by Age Class by tenure for Core Landbase

2.1.5.2.3. 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

Since the occurrence of high site classes is so rare on the Island the Forest Service branch has combined the Good and High site types into the Good site type for the purpose of timber supply. The medium site class is by far the largest in the districts within CBPPL tenure in Planning Zone 3, holding approximately 70% of the total productive area found across FMDs 5 & 6. Figure 1-5 presents the site class information in graphic form to show the levels of site class in each district for CBPPL tenure.

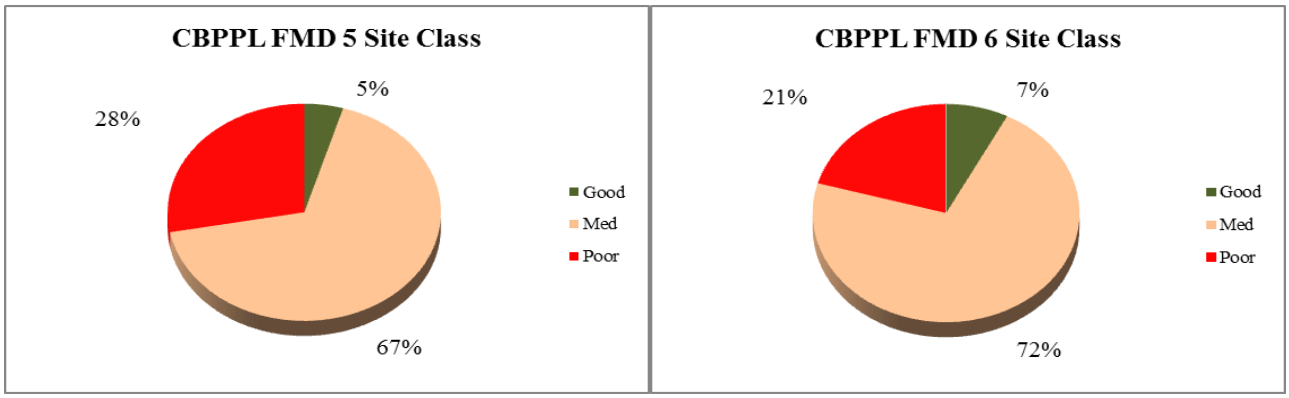


Figure 1- 5 Site class distribution by tenure and AAC class.

2.2. Past Planning Activities

2.2.1. Harvesting

2.2.1.1. Commercial Activity

Harvesting activities in this zone have been targeted towards satisfying the spruce requirement to the Pulp and Paper mill. The AAC in FMD 5 has been harvested to its full allocation due to its

high spruce content and short haul distances from the operable stands to the main highway. The AAC in FMD 6 hasn't been harvested to its full allocation due to the longer haul distances to the south of the district and the need for the fiber has been offset through the procurement of chips from Sexton lumber.

Table 1- 3 Commercial harvest summary table CBPPL FMD 5 2012-2016

Timeframe		Year	Core					Operational - Available				
			AAC	Harvested		Remaining		AAC	Harvested		Remaining	
				m3	*%*	*m3*	*%*		*m3*	*%*	*m3*	*%*
Annual	***Softwood***	1	46,600	31,693	68.01%	14,907	31.99%	4,700	51	1.09%	4,649	98.91%
		2	46,600	49,960	107.21%	-3,360	-7.21%	4,700	319	6.79%	4,381	93.21%
		3	46,600	76,786	164.78%	-30,186	-64.78%	4,700	2,584	54.98%	2,116	45.02%
		4	46,600	44,174	94.79%	2,426	5.21%	4,700	444	9.45%	4,256	90.55%
		5	46,600	29,625	63.57%	16,975	36.43%	4,700	850	18.07%	3,851	81.93%
5 Year	***Softwood Sub-total***		***233,000***	***232,238***	99.67%	762	0.33%	***23,500***	***4,248***	18.07%	***19,253***	81.93%
		Year	Core					Operational - Available				
			AAC	Harvested		Remaining		AAC	Harvested		Remaining	
				m3	*%*	*m3*	*%*		*m3*	*%*	*m3*	*%*
Annual	***Hardwood***	1	2,700	0	0.00%	2,700	100.00%	1,800	0	0.00%	1,800	100.00%
		2	2,700	0	0.00%	2,700	100.00%	1,800	0	0.00%	1,800	100.00%
		3	2,700	0	0.00%	2,700	100.00%	1,800	1,000	0.00%	800	44.44%
		4	2,700	0	0.00%	2,700	100.00%	1,800	0	0.00%	1,800	100.00%
		5	2,700	0	0.00%	2,700	100.00%	1,800	250	0.00%	1,550	86.11%
5 Year	***ardwood Sub-total***		***10,000***	***0***	***0***	10,000	100.00%	***9,000***	***1,250***	13.89%	***7,750***	86.11%

Table 1- 4 Commercial harvest summary table CBPPL FMD 6 2012-2016

Timeframe		Year	Core					Operational - Available				
			AAC	Harvested		Remaining		AAC	Harvested		Remaining	
				m3	*%*	*m3*	*%*		*m3*	*%*	*m3*	*%*
Annual	***Softwood***	1	71,100	65,897	92.68%	5,203	7.32%	5,500	0	0.00%	5,500	100.00%
		2	71,100	28,590	40.21%	42,510	59.79%	5,500	0	0.00%	5,500	100.00%
		3	71,100	14,761	20.76%	56,339	79.24%	5,500	1,268	23.05%	4,232	76.95%
		4	71,100	48,495	68.21%	22,605	31.79%	5,500	3,151	57.29%	2,349	42.71%
		5	71,100	16,652	23.42%	54,448	76.58%	5,500	1,105	20.09%	4,395	79.91%
5 Year	***Softwood Sub-total***		***355,500***	***174,395***	49.06%	181,105	50.94%	***27,500***	***5,524***	20.09%	***21,976***	79.91%
		Year	Core					Operational - Available				
			AAC	Harvested		Remaining		AAC	Harvested		Remaining	
				m3	*%*	*m3*	*%*		*m3*	*%*	*m3*	*%*
Annual	***Hardwood***	1	1,500	0	0.00%	1,500	100.00%	148	0	0.00%	148	100.00%
		2	1,500	0	0.00%	1,500	100.00%	148	0	0.00%	148	100.00%
		3	1,500	0	0.00%	1,500	100.00%	148	200	0.00%	-52	-35.14%
		4	1,500	0	0.00%	1,500	100.00%	148	0	0.00%	148	100.00%
		5	1,500	0	0.00%	1,500	100.00%	148	50	0.00%	98	66.22%
5 Year	***Hardwood Sub-total***		***10,000***	***0***	***0***	10,000	100.00%	***0***	***250***	#DIV/0!	***-250***	#DIV/0!

2.2.1.2. Domestic Activity

CBPPL doesn't manage its landbase for domestic harvesting with segregated blocks. Historically CBPPL issues 100 domestic permits, in each of its Zone 3 tenures, for the harvest of non-commercial species (hardwoods & larch).

2.2.2. *Silviculture*

The past levels of silviculture (2012-2016) in Zone 3 were less than anticipated. Since the AACs in Zone 3 have been undercut for the previous period the levels of silviculture are accordingly lower.

Table 1- 5 Summary of completed silviculture activity (2012-2016)

Treatment Type	Area (ha)	
	Proposed	Treated
Pre Commercial Thinning	0	0
Planting	2800	2250
Scarification	3100	2440
Commercial Thinning	0	0
Cone Collection	0	0

2.2.3. *Forest Access*

The amount of road proposed was much greater in the past five years (2012-2016) than was actually constructed. The roads proposed were anticipation of either harvesting the full AAC or in anticipation of having to shift operations for unforeseen circumstances (operational flexibility). However the volume harvested in both districts could be mostly obtain through existing networks therefore reducing the amount of construction required.

Table 1- 6 Summary of forest access roads built 2011 to 2016.

Roads		
District	Proposed	Constructed (km)
5	48	10.3
6	76	0.0
	124	10.3

2.2.4. *Natural Disturbances*

2.2.4.1. *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 2011 to 2015, there were numerous, small fires recorded

that did not burn significant area of forested land. In total, for this period, there were 48 fires reported that burned a total area of 127.1 ha burnt. This indicates a very aggressive and effective fire protection effort supplemented with a measure of good luck from nature. During the period 2011-2015, on a district basis, 0 ha, 123 ha, 0 ha and 4.1 ha were burned in FMD's 4, 5, 6 and 8 respectively.

2.2.4.2. Insects

There has been little insect activity in the Zone over the period 2011 to 2015. 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 ingrowth 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.

3. Timber Supply Analysis

The current annual allowable cuts for each district are in effect from January 1, 2016 to December 31, 2020.

3.1. Methodology

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

Forest Modeling:

- 160 year planning horizon
- harvest strategies (Even flow, Step up Harvest, non-declining)

Baseline Constraints:

- Even flow harvest level
- Silviculture treatment levels
- 2X Operable Growing Stock
- 15% age 81 + Old Growth Minimum

Table 1- 7 Provincial AAC classes

Timber Class	AAC	Description
AAC	*Core*	Unalienated Land - First priority in terms of timber harvesting landbase. Free to harvest
	Operationally Available	Unalienated Land - Secondary timber harvesting landbase. Free to harvest but operationally restrictived (steep slopes, timing of harvest, etc)
Non-AAC	*Regulatory*	Alienated from harvest by regulations (parks, stream buffers, etc)
	Operationally Unavailable	Alienated from harvest by operational restrictions (steep slopes, isolate stands, etc)

3.1.1. 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.

3.1.2. 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.

In 2015, 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.

3.1.2.1. Land 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 2016 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

3.1.2.2. 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 being available for the AAC calculation;

Core - available for harvest under normal conditions, and
Operational - has restrictions for harvesting due to economic constraints.

The remaining productive forest has been removed for varying social/legislative reasons. The major removals are listed below:

3.1.2.2.1. 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.

3.1.2.2.2. 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 various stakeholders, have increased buffer zone widths beyond the 20 meter minimum to protect special values such as: salmon spawning areas, cottage development areas, aesthetic areas, wildlife habitat, outfitting camps, etc.

3.1.2.2.3. 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, the Forest Services Branch, Corner Brook Pulp and Paper 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

3.1.2.2.4. 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.

3.1.2.2.5. Protected Areas

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

3.1.2.2.6. 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.

3.1.2.2.7. 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.

3.1.2.2.8. 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.

3.1.2.2.9. 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.

3.1.2.2.10. 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.

3.1.2.2.11. 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.

3.1.2.2.12. Operable Growing Stock Buffer

The Province imposed an operable growing stock constraint in the analysis to ensure the sustainability of calculated timber supplies. The constraint imposes a condition that in any period there must be a minimum operable growing stock of two times the harvest level on the landscape. In other words, for every hectare that is harvested another harvestable hectare must exist on the landscape. The requirement for a growing stock buffer is based on a number of factors. First, several of our non-timber objectives are not explicitly accounted for in our planning process and therefore will require a growing stock buffer to achieve them. Second, we are unable to follow optimum harvest schedules explicitly due to operational restrictions on harvesting. Third, the Province is not willing to assume high risk with the sustainability of the timber supply. For these reasons a growing stock constraint of two times was used. This constraint was used in concert with harvest scheduling to help map out a reasonable harvest for the next 20 years.

3.1.2.2.13. Old Forest Targets

Consistent with our ecosystem policy, the province introduced into the analysis an old forest target that at least 15 percent of forests be older than 80 years. While this is a minimum target, actual results are usually higher. This initiative was designed to provide a coarse 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 now be tracked across a district rather than a single ownership. This has resulted in this strategy being less restrictive than the last analysis. As well, the site class distribution of the older forest reserve is being examined in an attempt to make it representative of each ecoregion and subregion.

3.1.2.2.14. Operability Limits

Operability limits are the time windows in which forest management actions such as harvesting can be undertaken within 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 young stands, one can have acceptable harvest volumes, but still have trees that are too small to harvest. In the 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. The ending operability limits or the last age in which a stand can be harvested before it becomes too old to harvest is solely determined on a minimum stand volume of between 60 to 80 m3/ha, after which that stand does not have enough volume to make it economical to harvest. It should be noted that while the operability limits define the extreme end points of when stands can be harvested, very few stands are ever harvested at these extreme points. In order to meet other non-timber objectives and in order to maximize the total volume of wood harvested the model schedules stands to harvest somewhere inside the operability limit window.

3.1.2.2.15. Silviculture

Silviculture is one of the main forest management tools available to forest managers when they are analyzing the many different future forests that are generated using the wood supply modelling software. The silvicultural actions use in the 2016 analysis include; 1) precommercial thinning of balsam fir, black spruce, and softwood hardwood stands, and 2) full plant of any areas that do not regenerate naturally with either white spruce, black spruce, or Norway spruce. The planting levels for CBPPL tenure in districts 05 & 06, used in the analysis were 300 and 400 ha per year respectively with no precommercial thinning planned.

3.1.3. Forest Profile Dynamics

Two of the most readily available parameters used to measure harvest sustainability and impacts associated with future forests, are 1) age class distribution (Figure 1-6) and 2) species composition (Figure 1-7) . Cumulatively, these two parameters define forest structure.

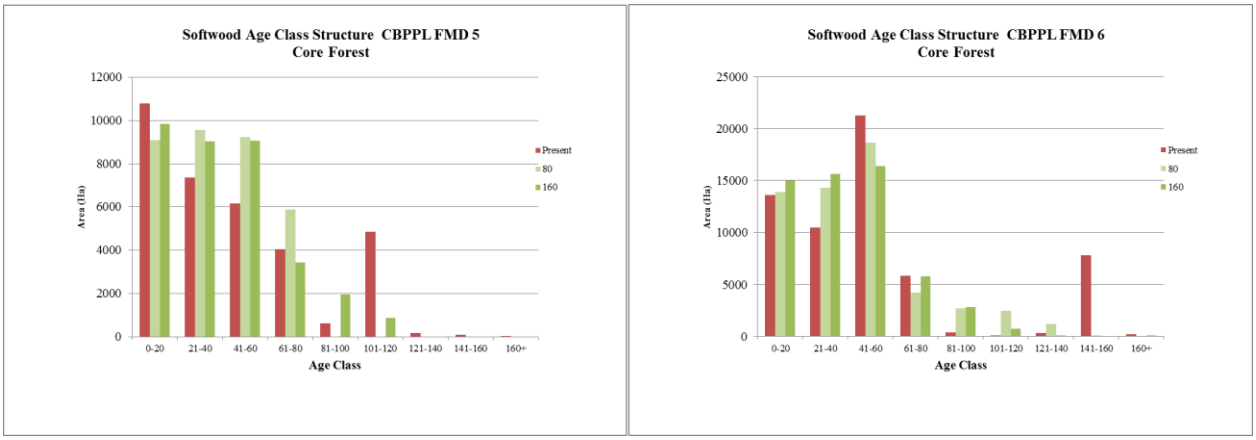


Figure 1- 6 Core Softwood Age Class Structure for Planning Horizon

The general trends for the age class structure at the end of each 80 year rotation ends to mimic the initial age class structure of present day, with minor variations. This isn't surprising as the management strategy of oldest first harvesting and even flow harvesting will facilitate this. To balance the ageclass structure it would be necessary to do varying amounts of silviculture coupled with an uneven harvest flow of wood. The species composition in FMD 5 shifts towards Balsam Fir dominated stands from the Spruce dominated stands today. This is due the preponderance of Fir regeneration after harvesting in this district. These are forecasts in the model and if through survey work it holds true and is an undesirable outcome then planting and/or crop selection

thinning will need to be performed on these stands to ensure spruce regeneration. In FMD 6 the relative amounts of Spruce and Fir content remain fairly stable but should be monitored during stocking surveys.

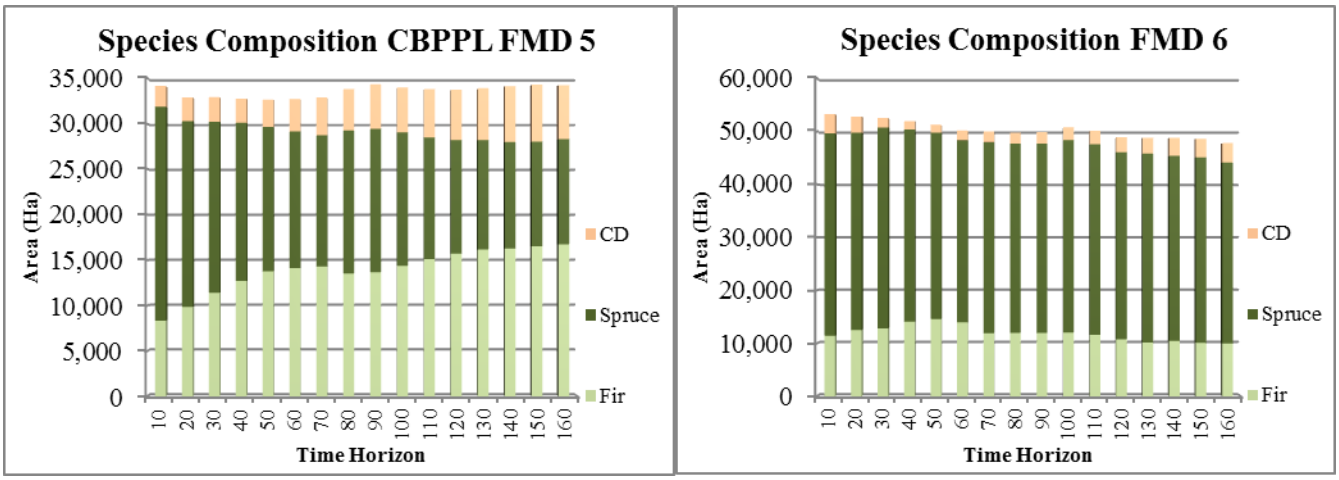


Figure 1- 7 Core Species Composition for Planning Horizon

3.1.4. AAC Adjustments

3.1.4.1. GMV Volume Adjustments

Reductions are applied to the Net AAC, Gross Merchantable Volume (GMV) which account for net losses due to natural disturbances, operational factors or timber utilization.

3.1.4.1.1. Natural Disturbances

Projected future losses related to Fire, Insect and Disease are calculated by FEIS section and are based on historical five year running average.

3.1.4.1.2. Operational Losses (Predicted versus Actual Volumes)

Operational losses associated with stand level utilization and volume predictions are calculated based on data derived from commercial harvesting blocks (roughly 10% sample) occurring throughout the District over the previous five year period. Timber supply volume predictions are compared on a block by block basis against actual reported harvest volumes and a percentage difference, generally a reduction, is applied to the AAC to account for current and future operational losses. The Zone 3 operational loss is 9% for the 2016-2020 period.

3.1.4.2. Spatial Blocking Adjustments

Spatial blocking adjustments refer to the operational loss associated with the spatial scheduling. More specifically, the 20 year harvest schedule integration and the volume differences between the aspatial AAC and the spatially scheduled AAC. 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 approach for 2016 was to use a 20 year harvest schedule using a 10 year harvest period. This was for two reasons; First to reduce modelling complexity at the aspatial level and secondly to align the amount of scheduled wood with the 2 times AAC allowed in a 5 year plan.

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 20 year harvest schedules build credibility into the forest management process. Every stand that will be harvested over the next 20 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 period. 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 Core landbase. The Operational 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. The Zone 3 blocking adjustment is 6.2% for the 2016-2020 period.

3.2. *AAC Results & Outputs*

The AACs for CBPPL tenure for Softwood in Zone 3 as a whole have gone down by just under five percent. The Core softwood however has only been reduced by less than one percent. If the numbers are examined on a FMD basis CBPPL has actually made gains in FMD 5, where historically the entire AAC has been utilized. The operationally constrained AAC has gone down in both FMDs while the hardwood AACs have increased. The hardwood increase is due to the changes in sustainability parameters by the Crown.

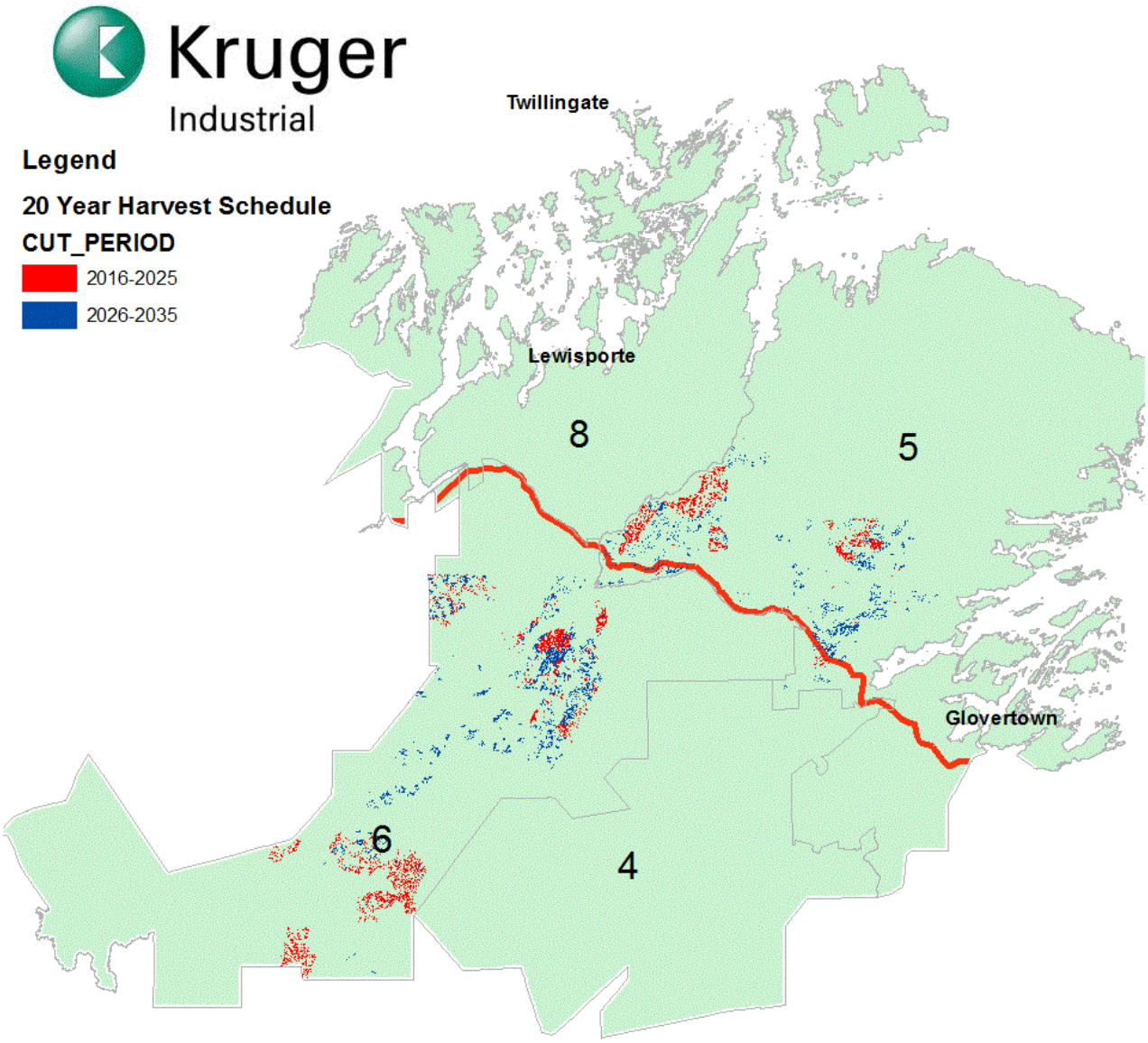
Table 1- 8 Annual Allowable Cut results 2011 through 2020.

Land Tenure		Zone	District #	Provincial Annual Allowable Cut (AAC) 2011-2015					
				Softwood Volume (m^3/yr)			Hardwood Volume (m3/yr)		
				Core	Oper Constrained	***Sub-total***	Core	Oper Constrained	***Sub-total***
Kruger	***Island***	3	5	46,600	4,700	51,300	2,000	100	2,100
			6	71,100	5,500	76,600	2,100	0	2,100
			Sub-total	***117,700***	***10,200***	***127,900***	***4,100***	***100***	***4,200***

Land Tenure		Zone	District #	Provincial Annual Allowable Cut (AAC) 2016-2020					
				Softwood Volume (m^3/yr)			Hardwood Volume (m3/yr)		
				Core	Oper Constrained	***Sub-total***	Core	Oper Constrained	***Sub-total***
Kruger	***Island***	3	5	50,600	2,600	53,200	3,700	0	3,700
			6	65,600	3,700	69,300	2,700	0	2,700
			Sub-total	***116,200***	***6,300***	***122,500***	***6,400***	***0***	***6,400***

3.2.1. *20 year Harvest Schedule*

The spatial harvest schedule was first introduced during the 2006 TSA and represents a significant advancement towards operationalizing provincial AACs, as it represents the stand level boundaries intended for the next 20 years of harvest. Although this scheduling results in a reduction to the AAC it ads anther safeguard to ensuring sustainability on the landbase. Also when considering long term planning, with respect to other stake holders, the harvest schedule helps in conflict resolution. Note: The first 10 years of the harvest schedule define the five year plan proposed harvest and represent the basis upon which harvest compliance is measured. Map 1-5 represents the harvest schedule constructed during the 2016-2020 timber supply analysis.



Map 1- 5 20 Year Harvest Schedule for Zone 3 from the 2016 TSA

3.2.2. *Harvest Profile*

Harvest profiling is the more traditional measure of AAC sustainability and is represented by the Species Working Group by Age Class combinations targeted in the 20 year harvest schedule. The harvest profile is based on the first ten years of harvest, as identified in the 20 year spatial harvest schedule (Figure 1-8). Historic harvest profiles are based upon the previous five years of harvesting and will be used to define the harvest profiling of the next wood supply analysis.

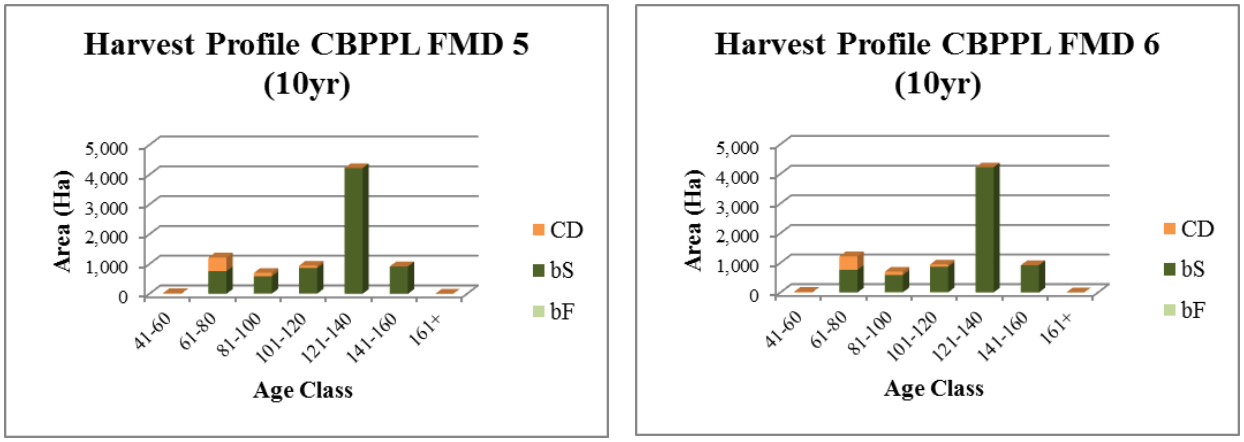


Figure 1- 8 Harvest Profile generated from most recent Timber Resource Analysis

The harvest profile for CBPPL tenure lends itself to the oldest first management strategy practiced throughout the province. However some of the stands targeted in the harvest schedule tend towards the lower operability limits. This is a consequence of fragmentation (the younger timber is mixed with the older) coupled with having to layout large blocks of timber for operational feasibility.

4. Resource Values

4.1. *Guiding Principles of Sustainability*

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

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

Political sustainability refers to goals and management objectives being applicable, administrable, and practical. These goals and objectives must maintain these qualities well into the future with the aid of public input and support. Social sustainability means fairness and equity to all stakeholders. Cultural sustainability is attained by applying Newfoundland's culture to the planning process. A forest management strategy cannot be successful without allowances within the strategy for traditional access and use of the land. For generations, many of Newfoundland's public had free range in our pristine wilderness, a fact that 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. CBPPL is guided by the Sustainable Forest Management (SFM) Plan developed for their defined forest area.

4.1.1. CBPPL Sustainable Forest Management (SFM) Plan Introduction

The forest industry in Canada has evolved from the management of the timber resource to the management of the forest ecosystem. Previously, forest managers developed forest management plans in isolation, focusing on timber. But as the public began requesting the inclusion of other values, consultations with the public and other resource managers evolved simultaneously with the consideration of non-timber values. This has become a cornerstone of sustainable forest management.

Corner Brook Pulp and Paper Limited (CBPPL) has joined in this shift to sustainable forest management by incorporating social, environmental and economic values in the sustainable development of Newfoundland's forests. Forestry Services and CBPPL have incorporated public consultations in the forest management planning process since the 1980s, developing a positive relationship among the government, CBPPL, and the community. Public involvement in the

identification of values and the development of management plans benefits present as well as future generations.

The Sustainable Forest Management (SFM) Plan for the forested land on insular Newfoundland for which CBPPL has management responsibility, described as the Defined Forest Area (DFA). It was developed with the cooperation of the Public Advisory Committee (PAC), a group of dedicated individuals and organizations interested in sustainable development of the forests of the DFA. The planning process involves public consultation, and follows the principles of sustainable forest management.

CBPPL's first SFM Plan was developed over 16 months and released in July 2004. In late 2008, the Canadian Standard Association released a draft revised standard (CSA Z809-08), and the PAC began updating CBPPL's plan to conform to the new standard, incorporating lessons learned and continual improvement. In 2012, CBPPL was also certified to Forest Stewardship Council (FSC) Boreal Standard.

CBPPL wishes to illustrate to the public (the landowners) and to its customers that the DFA is being managed on a sustainable basis. To this end, CBPPL seeks to maintain certification to CAN/CSA-Z809, Canada's national sustainable forest management (SFM) Standard, and the FSC Boreal Standard. CAN/CSA-Z809 gives organizations a system for continually improving their forest management performance and engaging interested parties in a focused participation process. The FSC Boreal Standard advocates the precautionary and adaptive management approaches to dealing with uncertainty in forest management. Rigorous and regular independent third-party audits are involved in certification to both standards.

A major strong point of the CSA Standard is the involvement of the public in the planning of forest management activities. As mentioned before, this is something CBPPL has already incorporated into their planning process. The public identifies forest values of specific importance to environmental, social, and economic concerns and needs. Another benefit of the requirements of this Standard is providing a link between local level sustainable forest management and forest policy on a provincial and national scale. This is accomplished through the use of the Canadian

Council of Forest Ministers (CCFM) Criteria and Elements for sustainable forest management, which identifies local forest values across Canada. This Standard identifies 35 required core indicators under these criteria and elements. The Standard also deals with performance, by allowing the public to set targets at the local level, to which the organization will be held accountable. Finally, the CSA Standard requires a system to ensure that both the public participation and performance requirements are satisfied (CSA 2008).

The FSC Boreal Standard promotes "healthy forests providing an equitable sharing of benefits from their use while respecting natural forest processes, biodiversity and harmony amongst their inhabitants." This is achieved through implementation of the precautionary approach, i.e., avoiding actions that may lead to irreversible change in ecosystem function. To achieve this, alternative management strategies must be considered, including no management/harvesting. The Boreal Standard also encourages adaptive management, which is implementing new management approaches in a structured scientific manner, by monitoring the results of the new approach and adjusting the approach based on the monitoring results. These two approaches will work together, implementing management strategies that ensure no negative consequences and monitoring these strategies for effectiveness.

CBPPL Woodlands' Environmental Management System (EMS) is the vehicle that ensures fulfillment of the CSA SFM and FSC Boreal Standard requirements. CBPPL's EMS is a registrant (2001) to the ISO 14001 Standard, a standard that incorporates environmental aspects and continual improvement into all forest operations. EMS applies to all Woodlands operations controlled by the Company including management planning, road construction and maintenance, harvesting operations, transportation of fibre, silviculture, and support services. The documented procedures of EMS will provide the system to satisfy all requirements of the ISO 14001, CSA-Z809, and FSC Boreal standards.

Throughout the SFM, references are made to Indicator Profiles (e.g. Indicator Profile 6.3.2). The Indicator Profiles, located in the final section of the Plan (which can be found on CBPPLs website), contain the background information, management strategy, and implementation details for each of the indicators of sustainable forest management selected by the PAC.

The SFM Plan illustrates how CBPPL has satisfied the requirements of the CAN/CSA-Z809-08 as laid out in the SFM Standard, by implementing the public participation, system, and performance requirements for the DFA. The auditing process, conducted by an independent third party, determines whether the SFM requirements are implemented at the DFA level. For FSC certification, the SFM Plan provides management objectives, strategies, performance indicators and monitoring strategies for biodiversity, species at risk, unique environmental features, watersheds, etc.. It also provides direction to other documentation that fulfills the requirements of the indicators in Principle 7 Management Plan of the Boreal Standard.

4.2. Values Structure

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) are the focus of discussion in this section. They provide a mechanism to resolve conflicts that might arise throughout or after the five year planning process. Where possible, the physical location of the value on the landscape (operational level) was also identified during the discussion of values (appendix 6). 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 10,000 animals. Between 1980 and 2000 the number of caribou has increased considerably on the Island with a population estimated at 90-100,000 animals. In the past few years however populations have declined significantly, with 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:

It is unclear how forestry activities in the immediate vicinity of calving areas during the calving period may have an impact on caribou populations. Recent studies and anecdotal information has

indicated that harvesting restriction zone around caribou calving zones may be significantly larger than first thought. It has also been shown that as roads are constructed and access is improved into remote areas, there is generally an increase in the number of animals which are killed due to road-kill and poaching.

CBBPL has worked with the Wildlife division to create connectivity corridors for this plan and will follow the EPGs with respect to caribou management.

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)

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

Environmental Protection Guidelines

Moose

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

Caribou

- to ensure the continued protection of these animals the following EPG's will be followed during forestry activities;
- in areas where caribou utilize lichens, a minimum amount of lichen forest must be maintained for caribou. (This amount is to be determined through consultation with 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. Den sites must be reported to the Wildlife Division.

4.2.1.2. Furbearers

Characterization:

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

Critical Elements:

- forest cover for protection;
- water quality maintenance;
- riparian buffer zones along aquatic areas;

- snags and coarse woody debris (denning, nesting sites, etc.)

Guiding Principles:

Fur Bearer Management Strategy:

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

Environmental Protection Guidelines:

To protect beaver habitat, all hardwoods within 30 metres of a waterbody occupied by beaver will remain standing during harvesting operations.

4.2.1.3. Salmonids

Characterization:

The Atlantic salmon and the brook trout are native to the Island and are found inwaterways 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)

Management of Atlantic salmon and brook trout in the Province is delivered by the Federal Department of Fisheries and Oceans (DFO). DFO annually sets bag limits, season dates and river closure dates based on extreme water temperature. 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 (eg Indian Bay and Rodney Pond systems) are jointly managed by DFO, the Wildlife Division of the provincial Department of Tourism Culture and Recreation 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 (PPSWA's) also provide protection for these species through existing Environmental Protection Guidelines that apply to these areas (ie. increased buffers, usually 150 meters on intake ponds, 75 meters on main river stems, 50 meters on major tributaries and minimum 30 meter buffer regulated in the rest of the district). 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
- The locations of all known bald eagle and osprey nests will be identified on all cutting maps and harvesters will be informed of their locations by Forest Services Staff. Regular

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

- 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 (eg. Whitmans Pond – Town of Gander).

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, a landscape approach to habitat management was initiated by the Forest Service in 1999. This involved working with stakeholders to identify critical or potential marten habitat,

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

Critical Elements:

- sufficient habitat to support a viable population of marten;
- areas of known marten populations remain closed to 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 m^2);
- hardwood stands (insect kill, wind throw) will be considered where crown closure is greater than or equal to 30%;
- Softwood scrub that meets the minimum requirements (6.5 m) will be considered habitat.

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

ongoing research into a variety of aspects of marten dynamics through the Model Forest, Canadian Forest Service, and University of Maine. 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 multiyear 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 (PPSWA's) also provide protection. As well, applying existing Environmental Protection Guidelines to these areas (ie. 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 communitybased watershed management groups. In the past, industry has negotiated increased

buffers on waterways throughout the Indian Bay watershed area with IBEC and Middle Brook watershed with FABEC.

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

Guiding Principles:

- enforcement of forestry act, regulations, guidelines and policies
- gene preservation gardens for these species and a clonal orchard for white pine have been developed by DNR at Wooddale Tree Nursery. At some point, the goal is to produce seed from these gardens/orchards to grow pine seedlings of native origin.
- some native red pine stands are protected under reserve status.
- DNR has adopted a no cutting policy of pine by non traditional users and a phase out of

cutting by traditional commercial users. Currently, no commercial operators harvest pine in 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 clonal orchard at Woodale - DNR also implements stand level silviculture prescriptions such as pruning of immature

white pine to reduce the infection rate of blister rust and cone production enhancement on red pine to ensure an adequate supply of native red pine seed.

4.2.1.6.4. 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 cottage 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 fuelwood to heat many homes and sawlog 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 landbase is maintained by planting areas that are not sufficiently restocked. Forest improvement activities help improve and enhance the growing stock which can reduce harvest cost, enhance forest product options and increase sustainable timber supply.

Protection of the forest from various disturbances is also a major characteristic of resource management. Because of the long fire history in the zone, protection through well maintained and/or upgraded initial attack equipment (i.e. water bombers, pumps, hose and trucks) and well trained fire management staff is required. A large fire today in the older softwood forest would be devastating to industry. While insect kill has not been a major disturbance in recent years, protection is still critical since there is a significant area of thinned balsam fir stands, which is paramount to future AAC's. Protection of other resource values through modification of activities and enforcement is also important.

4.2.2.1.1. Spruce and Fir

Black spruce, white spruce and balsam fir are the main sawlog 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 woodsupply analysis.

4.2.2.1.2. White Birch

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

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

Critical Elements:

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

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

Soil surveys show 100,000 ha or 0.9% of the Island has mineral soils suitable for farming. There is a substantial agriculture industry in the zone, with considerable potential to expand and provide increased economic benefits. As well abundant organic soils available on peat lands create opportunities for cranberry and commercial sod production.

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 approximately 80 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).The Agrifoods Development Branch owns and operates the Provincial Seed Potato Farm near Glenwood. There is also a peat harvesting industry (HiPoint Peat) near Bishop's Falls.

There are several commercial blueberry farms in the zone comprising a significant portion of the provincial 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. The newest agricultural sector developing in the zone is cranberries. Recently there has been established in the Grand Falls region, eleven new cranberry farms, along with already established operations in Terra Nova and an experimental site at

Deadman's Bay, operated by the Agrifoods Development Branch. Total acreage is in the vicinity of 75 hectares with an expected 100 hectares to be developed in the near future.

Critical Elements:

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

Guiding Principles:

Lands designated for forest management can include areas with high potential for agriculture. Consequently; the Forest Services Branch will work with the 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 ecoregions 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 linecutting, 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 do 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. Known archaeological sites and potential unknown sites are protected by utilizing no harvest buffer zones, whereas archaeological assessments may be required in other areas. Archeological buffers are typically required along

rivers and ponds, as well as, along the coastline where there is a high potential for archaeological resources to be found. Occasionally there are accidental discoveries made of historic resources. In the event this does happen, activities should cease in this area and contact be made immediately with the Provincial Archaeologists at 729-2462.

4.2.2.5. The Greater Terra Nova Ecosystem

Characterization:

The primary role of Canada's national parks is maintenance of ecological integrity.
Although enshrined in policy for many years, this role has recently been given prominence in legislation by the passing of the Canada National Parks Act in October
2000. The Report of the Panel on Ecological Integrity of Canada's National Parks
(February 2000) noted that parks all across the country (including TNNP) are under threat from stresses both within and outside the national parks. Ninety percent of forested parks are under stress from external forestry activities. The primary challenge for national parks in maintaining their ecological integrity is that most parks are part of larger ecosystems and the area set side for the parks is not large enough to protect the full integrity of that ecosystem. Large-scale changes on the landscape surrounding parks can isolate the park ecologically creating an "island". Parks Canada must work with adjacent land managers in striving to achieve its mandate.
Biodiversity goes beyond the range of wildlife and plant species to include the range of habitats and landscapes. Loss of special habitats such as old-growth forest and associated species may impair the ecological integrity of TNNP in ways that are not currently understood. In recent history, the endangered Newfoundland pine marten has been relocated to the park and in some of the adjacent forest 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 ecologicalfunctions 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 itrelates 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 cottage access are also permitted with a special permit.

4.2.2.6.1. 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 ter 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 store houses of natural diversity that exists in a wild, pristine state. They serve as ecological bench marks indicating the natural succession of forest ecosystems. They also preserve in perpetuity, provincially significant representative and special natural features and outstanding recreational environments.

There are many types of protected areas in the province. The Wilderness and Ecological Reserves Act enables the Province to establish the following; wilderness reserves (Component 1), ecological reserves (Component 2) and protected sites (Component 3). Component 1 reserves are defined using the critical habitat of high level, wide ranging species i.e. caribou. They generally cross ecoregion boundaries, protect complete systems and are large (> 1000 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 Wildnerness 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 cottages and new structures.
- where forestry operations are within one kilometre of provisional and ecological reserves, wilderness reserves or provincial parks, modified operations may be necessary

4.2.2.8. Outfitting

Characterization:

An economic impact study conducted in 1995 by the Department of Industry, Trade and

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

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

Critical Elements:

Remote outfitting camps are dependent on their remoteness, where forest access roads potentially impact the ability of a camp to maintain its remote status. Increasing accessibility through establishment of access roads may lead to increased hunting and fishing pressures in a given area, which may lead to decreased success rates of tourists. Forest access roads may also lead to increased resource development, which has a potential negative an impact on both remoteness and game availability. Forest harvesting may also have the potential to impact negatively upon travel corridors, bear denning areas, and caribou feeding and calving areas.

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

trophy to bring home and that which is taken away is the experiences (i.e. sights, sounds, smells, etc.).

Guiding Principles:

It is necessary to ensure properly managed areas remain around outfitting camps, which have been determined by relevant parties. These types of Buffer zones can be difficult tonegotiate 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 is prohibited within established outfitting buffers.

- 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 cottages is maintained when conducting forest operations.

- forest operations will be evaluated to should any 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.

Accessibility

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. Where possible, the Land Branch of the Department of Environment and Conservation shall plan cottage development along newly developed forest access roads in conjunction with Forestry Services. This will allow for planned cottage development areas and potential Crown land reserves to help minimize potential land use conflicts.

Viewscape

Aesthetic views using landscape design techniques will be utilized in areas where forest perations 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 archeolgical 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, CBPPL will continue to work with local organizations such as FABEC & IBEC 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.

5. Mitigations

Stakeholder	Contact	FMD		ISSUES / CONCERNS RAISED DURING 2017-2021 PLAN DEVELOPMENT on CBPPL Timber Limits (Government Depts. and on-on-one consultations with known stakeholders) Forest Management District 05 & 06	Mitigation
Parks & Natural Areas	Jeri Graham	FMD 05, 06		Digital information highlighting the proposed harvest and primary road construction activities for the 2017 – 2021 plan were provided to the Department of Environment & Conservation late in 2015 for analysis. A subsequent review meeting on February 1, 2016 identified no concerns from the Parks & Natural Areas Division.	CBPPL will provide the Department of Environment & Conservation a copy of each year's Annual Operating Plan for review. Any issues or concerns arising from this review will be dealt with in a timely manner.
Wildlife Division	Kirsten Miller	FMD 05, 06		**K-05-16 – Jonathons Pond**: Overlap with Stewardship Management Unit and Zone. These areas are established in agreement between WD and the Town of Gander. As per the agreement, Stewardship Management Units are 'no loss' areas with no development. The Town is to be consulted on proposed harvest within the Stewardship Management Zone. Digital information highlighting the proposed harvest and primary road construction activities for the 2017 – 2021 plan were provided to the Department of Environment & Conservation late in 2015 for analysis. A consultation meeting on February 1, 2016 was held with the Wildlife Division to initiate the development of corridors and no harvest zones to protect sensitive wildlife habitat in the southern section of CBPPL's limits in Fmd 06. A subsequent meeting on June 8 finalized this process. **K-06-04 – Dowd Pond, K-06-12 – Coy Pond, K-06-15 – Canning Brook, K-06-16 – Third Berry Hill, and K-06-22 – Bear Pond:** These proposed harvest areas are within core / buffer caribou areas. Commercial harvest activities are to take place outside of the calving/post-calving period and maintain 30% of the overmature forest.	Consultation will be held in conjunction with the Town of Gander and the Wildlife Division prior to road building or any harvesting activities. CBPPL has agreed to defer all harvesting for the duration of this planning period within the agreed upon sensitive wildlife zones. CBPPL will provide the Department of Environment & Conservation a copy of each year's Annual Operating Plan for review. Recommendations pertaining to harvest timing or maintaining 30% overmature within harvest blocks will be built into the operational plans.
Crown Lands		FMD 05, 06		**K-05-01 – Soulis Pond, K-05-02 – Joe Batts, K-05-06 – Boot Pond, and K-05-16 – Jonathons Pond, K-05-17 – Butts Pond:** These areas overlap sections	Consultation with the Town of Gander is required before any Forest Management activities can occur within the Town's

				of the Town of Gander's Municipal / Planning Area boundaries. A meeting was held on March 4, 2016 with Town of Gander (James Blackwood) to discuss proposed harvest plans. **K-05-17 – Butts Pond and K-06-23 – Hussey Pond:** Overlaps with Cabin Development Areas. Contact with Peter Hearn (Land Management Division) resulted in identification of key locations on CBPPL Limits. **General Cabin Locations on CBPPL Limits:** CBPPL will continue to investigate the location of legal titles within operating areas prior to harvest. All efforts will be made to resolve identified conflicts.	boundaries. The consultation may include a presentation to council and the General Public. CBPPL will continue to monitor Cabin Development Areas prior to harvest and road building activities. All efforts will be made to reduce impacts. Further consultation with the Freshwater Alexander Bay Ecosystem Corporation has resulted in the establishment of a 150 meter buffer on Butts Pond. Ongoing
Mines & Energy		FMD 05, 06		Should future quarry or mineral resource developments or exploration programs (i.e. new quarry development, existing quarry expansion, new mine development, quarry materials exploration, mineral exploration) be considered by Forestry as having the potential to cause a significant impact on the forest resource and forest resource users, then Forestry should work closely with the Mines Branch and the proponent to ensure that mutual impacts are minimized. Other Forest Management Plans, in relation to mineral exploration, have stated that parties carrying out mineral exploration should "Make every attempt to extract timber harvested as part of exploration and development. If timber cannot be feasibly extracted using conventional means then timber shall be piled so that it may be extracted during winter months by snowmobiles." Many mineral exploration companies, having abided by this principle in the past, have stated that often the timber they have stacked is not harvested but rather remains untouched. In addition, the Mines Branch, for the past several years, has been advising mineral exploration companies to use any timber they may have to cut for the purposes of corduroy over	CBPPL will adhere to the policies as outlined by the Forest Service and commits to working with Mines & Energy to ensure both sectors continue to operate as efficiently as possible. CBPPL will notify the Mines Branch of any road or bridge decommissioning prior to commencement.

				soft ground (to prevent rutting) and site rehabilitation (e.g. scattering over disturbed sites, especially those having lost their original organic cover), and the Mines Branch is presently finalizing a draft set of 'Environmental Requirements and Recommendations for Mineral Exploration' which will encode practices such as these which minimize the environmental impact of mineral exploration. For these reasons, and in light of the referral process described below, the Mines Branch requests that the Forestry Services Branch reconsider the above statement. All applications for 'exploration approval' for exploration programs beyond basic prospecting and low-impact sampling are referred to the Forestry Services Branch (among other government agencies) and Forestry should continue to use these opportunities to communicate any project-specific concerns or requirements. Project-specific concerns and requirements are addressed in the conditions under which the exploration work is approved. As has been recognized in other Forest Management Plans, many forest access roads and bridges are used by other land users, among them parties carrying out mineral exploration or quarrying. The Mines Branch requests that it be forwarded plans to decommission roads or bridges as a matter of course to ensure that all road/bridge rehabilitation and decommissioning plans are reviewed to consider whether mineral exploration, quarrying, or mining may be affected.	
FABEC	Kevin Stroud / John Baird	FMD 05, 06		Met with Board of Directors for Freshwater Alexander Bay Ecosystem Corporation (FABEC) on March 3, 2016 to provide an update on current operations within their area of interest and discuss new Five Year Plan. The only issued raised by the group was within **K-05-17 – Butts Pond,** with a request to increase the current regulated buffer width.	A Memorandum of Understanding (MOU) was reached between both parties for the new Five Year Plan (2017 – 2021). CBPPL agreed to implementing a 150 meter buffer on Butts Pond and committing to honor the access mitigation plan as outlined in the previous MOU with FABEC.
Miawpukek – Conne River	Greg Jeddore	FMD 05, 06		Email including maps and digital information containing the proposed Five Year Plan harvest areas for District 6 were sent for review and comment.	No further consultation scheduled to date.
Qalipu First Nation	Jonathon Strickland	FMD 05, 06		Digital plan information was provided for review and comment.	No further consultation scheduled to date.
General Public	Raymond	FMD		Opposed to 2017 – 2021 harvest plan along the Gander River.	No further consultation scheduled to date.

	Whallen	05			
IBEC	Don Sturge / Kelly Vodden	FMD 05		Met with representatives of Indian Bay Ecosystem Corporation (IBEC) on March 15 & 16, 2016 to provide an update on current operations within their area of interest (K-05-07 – Home Pond) and discuss the new Proposed Five Year Plan (2017 – 2021). Discussions centered on previous MOU between both parties and commitments to complete the access management plan once silviculture activities are finalized in 2016.	CBPPL is committed to honoring all aspects of the previous MOU and the access management plan. Consultation between both parties is currently ongoing to formalize the agreement.
GREC	Chief Calvin Francis	FMD 05		Met with the Gander River Ecosystem Corporation on June 21, 2016 to review proposed Five Year Plan (2017 – 2021) in District 05. Discussed the harvest and road proposals for K-05-02 – Joe Batts and K-05-16 – Jonathons Pond. No major issues expressed by GREC at meeting but discussed possible increases in buffer widths on sensitive salmon / trout spawning and rearing habitat. Group will review maps further and submit any additional concerns in writing.	Consultation between both parties is currently ongoing to formalize the agreement.
Outfitter	John Allan	FMD 05		Outfitter on Gander River – concerned with harvesting and road construction proposal in close proximity to his Lodge. Met with Mr. Allan on May 19, 2016 to discuss issues.	Consultation between both parties is currently ongoing to develop a harvest strategy that minimizes the impacts on the Outfitter and provides CBPPL with access to timber volumes in the Gander River area.
Outfitter	Robert Coates	FMD 05		Outfitter on Gander River – concerned with harvesting and road construction proposal in close proximity to his Lodge. Phone conversation with Mr. Coates resulted in a discussion regarding possible mitigation measures.	Consultation between both parties is currently ongoing to develop a harvest strategy that minimizes the impacts on the Outfitter and provides CBPPL with access to timber volumes in the Gander River area. Agreed to meet when Outfitter returns to province.
Outfitter	Chris Collingwood	FMD 05		Outfitter on Gander River – concerned with harvesting and road construction proposal along Gander River. Mr. Collingwood sent correspondence to CBPPL stating he does not agree to timber harvesting along the Gander River.	No further consultation scheduled to date.
Outfitter	Browning Harvey Limited	FMD 05		Outfitter on Gander River – CBPPL sent an information package to all Outfitters located within or in close proximity to their Timber Limits, each package contained maps showing proposed harvest areas and road development proposals. Individual Outfitters were asked to submit concerns or issues regarding the new Five Year Plan (2017 – 2021).	No correspondence has been received to date. Information packages were sent on two different occasions.
Outfitter	Basil Dobbin	FMD		Outfitter on Gander River – concerned with harvesting and road	CBPPL will investigate these concerns and continue consultation

		05		construction proposal in close proximity to his Lodge. Mr. Dobbin submitted his concerns to CBPPL requesting viewscape considerations for his Lodge and timing restrictions (summer angling season) if harvesting was to proceed.	with a goal to develop a harvest strategy that minimizes the impacts on the Outfitter and provides CBPPL with access to timber volumes in the Gander River area.
Outfitter	Boyce Dove	FMD 06		Outfitter on Caribou Pond – only concern was to minimize activities around Lodge during hunting season.	CBPPL agreed to minimize all activities in this location during hunting season.
Outfitter	Tom Sargent	FMD 06		Outfitter on Northwest Gander River – CBPPL sent an information package to all Outfitters located within or in close proximity to their Timber Limits, each package contained maps showing proposed harvest areas and road development proposals. Individual Outfitters were asked to submit concerns or issues regarding the new Five Year Plan (2017 – 2021).	No correspondence has been received to date. Information packages were sent on two different occasions.
Outfitter	Craig Pomeroy	FMD 06		Outfitter on Southwest Gander River – has concerns with harvest and road development in vicinity of Great Gull River.	CBPPL has attempted to arrange a meeting to discuss these concerns on numerous occasions to no avail. All efforts will be made to schedule meeting.
Outfitter	Matt Wettlaufer	FMD 06		Outfitter on Northwest Gander River – only concern was to minimize activities around Lodge during hunting season.	CBPPL agreed to communicate annually with Mr. Wettlaufer to provide updates on harvest timing.
Outfitter	Reg Robinson	FMD 06		Outfitter on Little Gull River – has no issues with harvest plan, would like to see access management plan to decommission various roads.	CBPPL agreed to remove a section of harvest planned near the Lodge and to provide updates on annual plans. CBPPL requested digital locations of Bear Stands to aid in their protection.
Outfitter	Don Tremblett	FMD 06		Outfitter on Frozen Ocean Lake – CBPPL sent an information package to all Outfitters located within or in close proximity to their Timber Limits, each package contained maps showing proposed harvest areas and road development proposals. Individual Outfitters were asked to submit concerns or issues regarding the new Five Year Plan (2017 – 2021).	No correspondence has been received to date. Information packages were sent on two different occasions.
NLOA	Cory Foster	FMD 05, 06		Requested assistance from Cory Foster (Executive Director – NL Outfitters Association) in contacting those Outfitters that had yet to return correspondence regarding the proposed Five Year Plan.	Cory sent correspondence to those Outfitters that are NLOA members requesting them to contact CBPPL.
NLSF	Bruce Nichols, Tom Humphrey	FMD 05, 06		Provided NL Snowmobile Federation direction to locate copy of CBPPL's Five Year Plan or opportunity to schedule a review meeting. Committed in writing to continue the annual fall issues review meeting between both parties.	Committed to continue annual fall review meeting. This process has been ongoing for several years and has resulted for example in CBPPL constructing new bypass trails in several locations to avoid conflicts, identifying and correcting safety concerns at snowmobile crossing sites and installing safety awareness signs at crossing sites.

Tourism	Chris Tuck	FMD 05, 06		Digital information highlighting the proposed harvest and primary road construction activities for the 2017 – 2021 plan were provided to the Department of Business, Tourism, culture and Rural Development late in 2015 for analysis. The location and identity of all Outfitters on CBPPL Timber Limits was provided to initiate consultation with each individual owner.	No further consultation scheduled to date.

6. *Public Consultation*

A component of forest-management planning in this province is public engagement. Since the 1990s forest management plans have been developed with advice from public planning teams. This process was designed to garner advice from the public and was intended to improve forest management practices at the local scale while also mitigating land-use conflicts. Because the forest management planning process is the only regular interface for public input, the planning teams have become a catch-all for many provincial resource management issues. In many cases, issues raised extend beyond the district or zonal boundaries, and may even be outside the scope of the planning team mandate. It is important to note, that the forest management planning and consultation process has had a measure of success. Diligent work by district managers and planners has led to the submission and implementation of many plans over the past several decades.

The stakeholder involvement process into the development of new five year operating plans in 2016 has changed from the historical process. Over the years, Managers have seen a reduction in public participation in many zones. In anticipation of capturing an increased public awareness, the District Ecosystem Managers in conjunction with CBPPL have reached out to a number of known stakeholders in each planning zone during the winter/spring of 2016 as plans were being developed.

To support further public consultation, a process has begun of scheduling a number of "open house" sessions over the summer months. Each Zone will have a minimum of one , full open house session and any additional sessions within a zone will occur as required.

Prior to these sessions, it is anticipated that all five year plan maps , including CBPPL , (each zone) will be posted to the government website (as well as to CBPPLs own website) and a press release given to the public to inform of new proposed five year plans and provide the cyber location to the proposed plans. It is anticipated the general public will review these plans at their own leisure.

Zonal "opens house" sessions will commence mid-July and continue throughout the summer as required. These sessions will be located at strategic locations, and when fully identified, it is anticipated another press release will be given to inform the public of location and time to visit and discuss any concerns / issues.

A common brochure will be developed and approved by communications, outlining forest management planning and the five year planning process. Overview Maps and other required mapping will be printed and made available to public as required.

No formal presentations will be scheduled for these sessions, as they are intended to identify any stakeholder concerns with the proposed operational activity.

7. Management Goals, Objectives and Strategies

7.1. 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 silviculture 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.

7.1.1. 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.

There is an insufficient supply of timber on Crown Land, particularly sawlogs, to supply the current sawmill industry. To help alleviate this problem the Crown has negotiated a series of transfers and exchanges with CBPPL in order to secure a stable supply of timber for these mills. With this arrangement, these sawmills utilize the sawlog material from these areas and sell the pulpwood and pulp chips (sawmills residue) to CBPPL. As well, these operators exchange pulpwood from their Crown cutting permits with CBPPL for sawlogs which also increases their supply.

Specific commercial strategies are as follows:
- Continue to encourage and promote growth in the sawmill industry through exchanges and transfers

7.1.2. Domestic

The harvest of domestic fuel wood from CBPPL limits in the Zone is confined to Cutover cleanup and the harvesting of non-commercial species.

7.1.3. Hardwoods

The harvest of white birch occurs throughout the planning zone in close association with softwood harvest for saw logs, pulpwood and firewood. Hardwood utilization by CBPPL is limited to the issuance of several hundred domestic permits to allow residents of the zone to harvest non-commercial species for home heating use and 3-5 commercial firewood permits.

7.1.4. Silviculture

Section 2.1.3.2.4 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 "offsite" 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.

7.1.4.1. Forest Renewal

Forest renewal silviculture 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 throughout 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, however CBPPL only plants species native to the province. 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.

7.1.4.2. Forest Improvements

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

7.1.5. 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)

7.1.6. Forest Protection

7.1.6.1. Insect 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

7.1.6.2. 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

7.1.6.3. 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

7.1.7. 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 other's 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

8. Proposed Activities

8.1.1. Harvesting

This section will outline all forest activities that will occur on CBPPL Limits in District 5 & 6 from 2017-2021. 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 2. Maps of individual operating areas and summary sheets are also presented in Appendix 2. 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.

8.1.1.1. 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 proposed harvest blocks have more volume proposed than the AACs, however for operational flexibility Forest Services branch allows for 10 years harvest volume to be proposed with the stipulation that the 5 year AAC be adhered to.

Table 1- 9 Proposed commercial harvest activity FMD 5 2017-2021

Operating Area					Volume Harvested (m^3)			
					Softwood			
Number	Name	Tenure	Area (ha)	Number of Permits	Core	Operational Constrainted	Sub-total	Non AAC wood
K-05-01	Soulis Pond	CBPP	230		18238			
K-05-02	Joe Batts	CBPP	535		36134			
K-05-06	Boot Pond	CBPP	21		1300			
K-05-07	Home Pond	CBPP	695		55899			
K-05-16	Jonathons Pond	CBPP	967		90461			
K-05-17	Butts Pond	CBPP	508		31972			
K-05-18	Little Harbour	CBPP	57		4440			
Sub-Total			**3013**		**238444**			

Table 1- 10 Proposed commercial harvest activity FMD 6 2017-2021

Operating Area					Volume Harvested (m^3)			
					Softwood			
Number	Name	Tenure	Area (ha)	Number of Permits	Core	Operational Constrainted	Sub-total	Non AAC wood
K-06-03	Careless Cove	CBPPL	148		10440			
K-06-04	Dowd Pond	CBPPL	389		26998			
K-06-07	South West Gander	CBPPL	1635		94288			
K-06-12	Coy Pond	CBPPL	498		35435			
K-06-15	Canning Brook	CBPPL	151		14446			
K-06-16	Third Berry Hill Pond	CBPPL	1071		62506			
K-06-17	Dead Wolf South	CBPPL	128		11780			
K-06-18	Dead Wolf North	CBPPL	499		38249			
K-06-22	Bear Pond	CBPPL	351		22867			
K-06-23	Hussey Pond	CBPPL	76		2671			
Sub-Total			**4945**		**319680**			

8.1.1.2. Domestic

There are no large scale domestic blocks on CBPPL tenure. Permits for non-commercial species can be obtained from CBPPL and have historically been approximately 100 per FMD. 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.

8.1.1.3. Silviculture

There are two silviculture prescriptions scheduled for the next five years; planting/gap planting including site preparation where required, and pre commercial thinning. 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 prescribed 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.

Areas that are scheduled for commercial harvest or have been recently harvested have been identified on the operating area maps and are candidates for planting or gap planting to black or white spruce. Site preparation using either mechanical means or prescribed burning will be employed on suitable sites that have impediments to planting. Approximate estimates for the next five years are as follows:

Table 1- 11 Proposed Silviculture Zone 3 2017-2021

Treatment	FMD	Area (ha)
Precommercial Thinning	5	0
	6	0
Sub-Total		**0**
Planting	5	1300
	6	1600
Sub-Total		**2900**
Site Prep	5	1300
	6	1600
Sub-Total		**2900**
Grand-Total		**5800**

*8.1.2. **Forest Access Roads & Water***

As timber closer to infrastructure has been harvested it is necessary to build roads to timber that has yet to be accessed. This remote timber has been incorporated into the timber supply analysis and must be accessed to ensure sustainability.

Table 1- 12 Proposed primary access road const. and water crossings FMD 5 2017-2021

Operating Area		Construction/ Reconstruction	Length (km)	Water Crossings	
Name	Number			Culvert	Bridge
Soulis Pond	K-05-01	Construction	3.5	1	1
Joe Batts	K-05-02	Construction	10	1	0
Home Pond	K-05-07	Construction	12	2	0
Jonathan's Pond	K-05-16	Construction	12.3	2	0
Jonathan's Pond	K-05-16	Reconstruction	1.8	0	0
Butts Pond	K-05-17	Construction	11	2	0
		Sub-total	**50.6**	**8**	**1**

Table 1- 13 Proposed primary access road const.and water crossings FMD6 2017-2021

Operating Area		Construction/ Reconstruction	Length (km)	Water Crossings	
Name	Number			Culvert	Bridge
Southwest Gander	K-06-07	Reconstruction	32	4	0
Coy Pond	K-06-12	Construction	23.3	9	0
Third Berry Hill	K-06-16	Construction	21.5	3	0
Deadwolf South	K-06-17	Construction	2.7	1	0
Deadwolf South	K-06-17	Reconstruction	2	0	1
Deadwolf North	K-06-18	Construction	11	1	0
Deadwolf North	K-06-18	Reconstruction	3.7	2	0
Bear Pond	K-06-22	Construction	1.8	0	0
		Sub-total	**98**	**20**	**1**

*8.1.3. **Forest Protection***

Identify forest protection measures planned, as outlined below:

8.1.3.1. 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 fire crews and equipment stationed at Lewisporte and Gambo District offices in the fire season whose direct responsibility is fire protection. In addition, support, equipment and manpower at both the regional level in Gander and

provincial level in Corner Brook is available should the need arise. Gander houses the bank of provincial fire equipment and as well is the base for 2 air tankers and a helicopter with a crew of fire fighters for initial attack.

8.1.3.2. Insects and Disease

No forest mortality was documented by Forest Insect and Disease Surveys by the Forestry Services Branch in FMD's 4, 5, 6 and 8 during the last five year period. Monitoring and protection for insects and disease is done out of the forest protection division in Corner Brook.

8.1.3.3. Wind Throw

Wind throw is not a major concern on CBPPL limits for FMDs 5 and 6. Where wind throw may occur CBPPL will utilize the strategies outlined in section 7.1.6.3 of this plan.

8.1.3.4. 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.

8.1.4. 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.

Table 1- 14 Operating area overlap with PWSA

Operating Area	FMD	Area in PWSA
Home Pond	5	3711.5
Little Harbour	5	168.9
Butts Pond	5	487.9
Careless Cove	6	7748.2
Dowd Pond	6	458.5
South West Gander	6	12277.2
Dead Wolf South	6	4489.3
Dead Wolf North	6	8025.7
Hussey Pond	6	7520.3
Sub-total		***44887.5***

8.1.5. Information and Education

CBPPL in conjunction with Forestry Services 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 fieldtrips and meetings, school presentations, open houses, meetings and National Forest Week activities.

8.2. Plan Administration

8.2.1. 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.

8.2.1.1. Operational Level

Annually, Corner Brook Pulp and Paper Limited is issued a Certificate of Managed Land. Attached to this Certificate are schedules that set out the conditions that must be followed in order to maintain managed land status. Schedule five contains the Environmental Protection Guidelines (EPG). Industry planning and operations must comply with schedule five or the land can be

declared unmanaged and fines levied. NFS staff will monitor for compliance with schedule five and recommend managed or unmanaged status.
All planned activities are monitored by the NFS to ensure all guidelines and regulations pertaining to environmental protection, harvesting, road construction, and silviculture are followed. Any infractions or deviations from the regulations or guidelines are dealt with as required under the Forestry Act.

In addition to the monthly Government monitoring for compliance Corner Brook Pulp and Paper Limited has put in place an Environmental Management System (EMS), which was registered to the internationally recognized environmental standards ISO 14001, CSA Z809 and the FSC Boreal Standard. For more information, see section 6 of the plan.

As part of this EMS, many monitoring activities take place throughout the year (checking for non-compliances) including:

- Field inspections (Number 1, 2 and 3) completed by contractors and Operations Superintendents,
- Yearly internal EMS audit,
- Yearly external EMS and field surveillance audits,
- External compliance audit every five (5) years,
- External communication from the public through our web site, cbppl.com.

All non-compliances are documented and reported to the EMS Management Review Committee. All non-compliances are reviewed by the EMS Committee, and corrective action is implemented where and when required.

8.2.1.2. Planning Level

The strategic planning section at forestry services monitors the 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 the planning section is to monitor plan implementation for consistency with commitments in the plan though approval of the Annual Operating Plans

derived from this plan and review of the past annual reports associated with each year's activities. The section will identify concerns with plan implementation provide recommendations for plan changes and establish protocol for concerns reported to them. Additional meetings between CBPPL, Strategic Planning and/or relevant stakeholders 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.

8.2.2. Amendments

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

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

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

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

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

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

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

Appendix 1 EPG

Appendix 2 5 Year Plan Operating Area Maps

DEPARTMENT OF NATURAL RESOURCES

FORESTRY SERVICES BRANCH

2015 ENVIRONMENTAL PROTECTION GUIDELINES

FOR FORESTRY OPERATIONS IN NEWFOUNDLAND AND LABRADOR

TABLE OF CONTENTS

LIST OF APPENDICES

FORWORD

The 2015 Environmental Protection Guidelines for Forestry Operations in Newfoundland and Labrador is an updated version of the guidelines prepared in 1998 and has been developed through a consultative process with provincial Forest Managers and Planners, as well as other resource managers and stakeholders in the province. The Guidelines are intended to be stand level, on-the-ground guidelines to be used by Forest Managers and operators to ensure sustainable use of the forest resource without degrading the environment. More specifically, the Guidelines are designed to prevent and control degradation of soil, water, and vegetation and thus maintain healthy forest ecosystems.

The Guidelines set out sound and practical measures and are rooted in the best available scientific information. To ensure the incorporation of new research findings and technologies, the Guidelines will be reviewed periodically and adjusted to reflect any new ideas.

To facilitate use, the Guidelines are structured by forestry activity and include separate sections on harvesting, road construction, silviculture, forest protection, and operations within protected water supply areas. Each of these sections is sub-divided into a Planning section and a Conduct of Operations section and each list all the guidelines relevant to carrying out this activity.

These Guidelines will accompany Corner Brook Pulp and Paper's annual Certificate of Managed Land and will also be associated with the issuance of commercial cutting permits. Compliance with these guidelines will be monitored by Departmental staff.

These Environmental Protection Guidelines will complement the Newfoundland and Labrador Forest Service Planning Guidelines. Broader, landscape level issues will be addressed in the Department's new 20 Year Sustainable Forest Management Strategy. The recent revisions to the environmental protection guidelines, planning guidelines and provincial strategy will ensure that forestry activities in the province are carried out in an ecologically sound and sustainable manner.

The Department of Natural Resources (DNR) will continue to use science as a basis for refining and implementing sustainable forest policies and practices in the province. In particular, the development of these Environmental Protection Guidelines will continue to be an evolving process within which DNR will incorporate the best available information about forest ecosystems and sustainable forest management concepts in a timely fashion - through adaptive management and other innovative, scientific approaches.

1.0 HARVESTING GUIDELINES

1.1 Planning of Operations

1.1.1 Permits Required

1. When temporary water crossings are required to facilitate travel of harvesting equipment, the location and type of all water crossings must be submitted to the Department of Environment and Conservation (DEC). A permit is required from Water Resources Management Division of DEC, for any water identified on the latest 1:50,000 topographic maps. Appropriate protection (permit and Letter of Advice) is still required for streams greater than 1.0 m in width (at its narrowest point from the high water mark) not found on the 1:50,000 topographic maps. The intent of these measures is to safeguard water quality and fish habitat.

2. All waste disposal sites require a valid permit under the *Environmental Protection Act*. Application for approval can be made by contacting the nearest Government Services Centre.

3. Timber harvesting is considered a development under the *Urban and Rural Planning Act* and, when this activity is proposed within a planning area boundary or within 400 meters of a protected road, a development permit is required from Service NL, before any activity takes place.

1.1.2 Consultation Required

1. The Parks and Natural Areas Division (PNAD) of Department of Environment and Conservation will be consulted during the preparation of each District five-year operating plan. Where harvesting is proposed within one kilometer of an ecological reserve, wilderness reserve, provincial park or proposed reserve, PNAD will be expected to identify/discuss any concerns during the planning consultation process. Also, access roads will not be located within 500 m of the boundary of an ecological reserve, wilderness reserve, provincial park or proposed reserve, without first consulting PNAD.

2. The Wildlife Division (WD) of Department of Environment and Conservation will be consulted on timber harvesting within woodland caribou habitat during the preparation of each District five-year operating plan

3. Rare and/or listed flora will be protected through mitigative measures, in consultation with the Wildlife Division (WD) of Department of Environment and Conservation.

4. Where specific forest cover is a requirement for the management of moose or other wildlife species, such areas will be identified by the Wildlife Division.

5. The impacts of forest operations on Newfoundland marten (hereafter referred to as marten) have been an ongoing issue. Until provincial guidelines are developed for marten habitat, forestry activities within known marten recovery areas will require consultation with the Wildlife Division, during the preparation of five-year operating plans.

6. During the preparation of five-year operating plans, areas identified as "Sensitive Wildlife Areas" require consultation with the Wildlife Division.

7. The Historic Resources Division will be contacted during the preparation of the five-year operating plans to determine the location of historic resources and appropriate mitigation measures.

1.1.3 Planning

Planning forest operations for both Industry and Crown may include, but is not limited to:

(i) boundaries of protected public water supplies (if applicable)
(ii) existing and proposed access roads
(iii) general location of extraction trails and landing locations
(iv) areas sensitive to erosion
(v) buffer zones around water bodies
(vi) location of approved stream crossings
(vii) location of fuel storage
(viii) sensitive wildlife areas as shown in the five-year operating plan.
(ix) sensitive fish habitat (e.g., salmonid spawning and rearing areas) identified in consultation with DFO.

1.1.4 Nutrient Poor Sites

If deemed necessary to harvest nutrient poor sites (e.g., those typed as Poor or Scrub on the Provincial Forest Inventory forest type maps), all efforts will be made to ensure such sites are regenerated in a timely manner.

1.2 Conduct of Operations

1.2.1 Minimizing Erosion and Disturbance

1. When extraction trails and winter roads are to be constructed, soil disturbance and impacts on water bodies are to be minimized. The operator will use culverts and/or temporary bridges, depending on site conditions, in order to minimize erosion and sedimentation, avoid restricting stream-flow, and ensure fish passage in fish-bearing streams. Erosion control measures (e.g., laying down brush mats and the construction of diversion ditches for water run-off) are to be maintained while an extraction trail is in use. The trail is to be left in an environmentally acceptable condition thereafter. All temporary crossings are to be removed at the end of the operating season. As well, when an extraction trail is located on steep ground and is no longer in use, cut-off ditches and push-lanes must be created.

2. No more than 6 % of the forested floor within the harvested land base of an operating area can be disturbed by equipment. In situations where specific operating areas require more than 6 % disturbance to capture available timber, the operator is required to obtain approval and then rehabilitate (i.e., leave the area in a condition suitable for successful forest regeneration and growth) the area to reduce the total net disturbance to the 6 % maximum. **Disturbance is defined as per the Ground Disturbance Survey Guidelines developed by the NL Forest Service.**

3. Heavy equipment and machinery are not permitted in any waterbody, on a wetland or a bog (unless frozen) without a permit from Water Resources Management Division the Department of Environment and Conservation and without contacting the DFO Area Habitat Biologist.

4. In areas prone to erosion and silting:

(i) conduct winter logging (i.e., harvest during winter) , or

(ii) place slash on extraction trails if conventional equipment is operating in an area.

5. Any forestry operation that directly or indirectly results in chronic sedimentation under normal conditions entering a waterbody must be dealt with immediately by notifying DFO's Area Habitat Biologist and /or the District Manager within 24 hours.

6. Woody material of any kind (trees, slash, sawdust, slabs, etc.) is not permitted to enter a waterbody. Depositing woody material on ice within the high water floodplain of any waterbody is also prohibited.

7. To minimize potential for erosion and sedimentation, temporary waterbody crossings shall:

(i) have stable approaches

(ii) be at right angles, wherever possible, to the waterbody
(iii) be located where channels are well defined, unobstructed, and straight
(iv) be at a narrow point along the waterbody
(v) allow room for direct gentle approaches wherever possible

8. Extraction trails and landings shall not be established within 20 metres of a waterbody.

1.2.2 Archaeological Find

When an archaeological site or artifact is found, the *Historical Resources Act* requires that all development temporarily cease in the area and the discovery be reported to the Provincial Archaeology Office (709-729-2462). The Provincial Archaeology Office will respond immediately and will have assessment requirements and/or mitigation measures in place within seven days as agreed to by the Provincial Archaeology Office and the operator. Forestry activity can then continue.

1.2.3 Timing of Operations

1. Harvesting is not permitted within woodland caribou calving and post-calving areas from May 15 - July 31. Calving areas will be identified by WD during the 5 year planning process.

2. Harvest scheduling may be modified during the migration of wildlife (e.g., caribou, waterfowl) and during temporary wildlife concentrations. Areas of concern and mitigation measures will be identify as part of the 5 year planning process.

1.2.4 Leaving Buffers and Wildlife Trees

1. A 20-metre, no harvesting activity buffer zone shall be established around all water bodies that are identified on the latest 1:50,000 topographic maps and along streams greater than 1.0 metre in width that do not appear on the maps. Where the slope is greater than 30% there shall be a no-harvest buffer of 20 m + (1.5 x % slope). All equipment or machinery is prohibited from entering waterbodies; thus, structures must be created to cross over such waterbodies for the protection of aquatic habitat. Every reasonable effort will be made to identify intermittent streams and they will be subject to this buffer requirement.

The District Manager must adjust the specified buffer requirements in the following circumstances:

(i) the no harvesting activity buffer can exceed the 20 meters for sensitive fish habitat (e.g., salmonid spawning habitat).

(ii) a 50-metre, no harvesting activity buffer will be maintained around known black bear denning sites (winter) or those encountered during harvesting. These den sites must be reported to the Wildlife Division.

(iii) no forestry activity is to occur within 800 metres of an active bald eagle nest or osprey nest during the nesting season (March 15 to July 31) and 200 metres during the remainder of the year. For other raptor species,like hawks, falcons, and owls) no forestry activity is to occur within 160 metres of a known nest at any time of the year. The location of any raptor nest site must be reported to the Wildlife Division.

(iv) all hardwoods within 30 metres of an active beaver lodge are to be left standing.

(v) a minimum 50-metre, no-cut, buffer will be maintained from the high water mark in Sensitive Wildlife Areas for waterfowl including breeding, moulting and staging areas. These sites will be identified by the Canadian Wildlife Service (CWS) and/or the Wildlife Division.

2. A minimum average of 10 snags (i.e., standing dead trees) or other suitable living trees per hectare shall be left individually or as small clumps on sites identified as habitat for wildlife (i.e., nesting and perching sites for birds, den sites for particular wildlife species, etc..). Preference should be given to the largest trees (i.e., standing dead trees or live hardwoods). Research has shown that larger diameter snags are more valuable (last longer and contribute more to the biomass pool) than smaller diameter snags. Consequently, the trees retained should be ones which are from the dominant or co-dominate portion of the stand and be left in a fairly evenly distributed manner.

1.2.5 Petroleum Products

1. In the event of a spill and/or leak of petroleum products, the owner and/or the operator must make every effort to first, contain, and second, clean up the spill. Spills in excess of 70 liters, and all leaks must be reported by calling the following spill report line:

Environmental Emergencies Spill Report Line
Canadian Coast Guard
1-(709) 772 – 2083 collect or 1-(800) 563-9089

In this province, spills and leaks must be remediated in accordance with the *Guidance Document for the Management of Impacted Sites* prepared by Pollution Prevention Division of DEC. (see Appendix I)

2. No heavy equipment or machinery is to be refueled, serviced, or washed within 30 metres of a waterbody. Gasoline or lubricant depots must be placed at least 100 metres from the nearest waterbody. All fuel-storage tanks (including GEEP tanks) must be registered with Service NL and installed in accordance with the *Storage and Handling of Gasoline and Associated Products Regulations, 2003* as amended, under the *Environmental Protection Act*.

3. Used oil storage, handling and disposal is to comply with the *Used Oil Control Regulations*, NLR, 82/02 under the *Environmental Protection Act*

4. Above ground storage tanks shall be surrounded by a dyke. The dyked area will contain not less than 110% of the capacity of the tank. The base and walls of the dyke shall have an impermeable lining of clay, concrete, solid masonry or other material, designed, constructed and maintained to be liquid tight to a permeability of 25L/m^2/d. There shall be a method to eliminate water accumulations inside the dyke. Construction and installation standards are clearly listed in section 27 of the *Storage and Handling of Gasoline and Associated Products Regulations*, 2003 as amended, under the *Environmental Protection Act*.

5. Contaminated soil or snow must be disposed of at an approved treatment facility.

1.2.6 Clean Up of Site

Waste material is to be disposed of at an approved waste disposal site with the prior permission of the owner/operator. Prior to disposal it must be contained in a manner not to attract wildlife. All equipment and waste materials are to be removed from the operating area when operations are completed.

2.0 FOREST ACCESS ROADS GUIDELINES

2.1 Planning of Roads

2.1.1 Permits Required

1. Any alteration within 15 metres of a natural waterbody (i.e. any water identified on the latest 1:50,000 topographic map) or development within a protected public water supply area, will require prior approval by the Water Resources Management Division of the DEC. (For alteration of a waterbody, a permit is required under Section 48 of the *Water Resources Act*, SNL 2002 cW-4.01. For any development in a protected public water supply area a permit is required under Section 39(6) of the *Water Resources Act*, SNL 2002 cW-4.01.) Alteration of a waterbody may include culvert installations, stream crossings (temporary or permanent), outfalls, infilling; or bridge, dam, and wharf construction. **A** Letter of Advice is also required from DFO for any alterations. Appropriate protection (permit and Letter of Advice) is still required for streams greater than 1.0 m in width not found on the 1:50,000 topographic map.

2. In addition to approvals from Water Resources Management Division and DFO, approvals are also required for culverts, bridges and abutments on navigable waters (any waterbody capable of being navigated by floating vessels of any description for the purpose of transportation, commerce or recreation. This includes both inland and coastal waters) from Transport Canada.

3. Resource road construction or any forestry activity is considered a development under the *Urban and Rural Planning Act*. Where this activity occurs within a planning area boundary or within 400 metres of a protected road, a development permit is required from Service NL before any activity takes place.

2.1.2 Areas to Avoid

Forest access roads, borrow pits, and quarries shall, wherever possible:

(i) deltas, floodplains or fluvial wetlands
(ii) terrain with high potential for erosion
(iii) known sensitive wildlife areas such as:
- caribou areas (calving, post calving, migrations routes, rutting areas, and winter areas)
- waterfowl areas (nesting and staging areas)
- raptor nest sites
- species at risk habitat, rare flora or fauna habitat, and other unique habitats as determined by qualified authorities

(iv) known sensitive fish habitat areas such as spawning and rearing grounds
(v) historically significant areas such as archaeological sites
(vi) existing reserves such as parks (municipal, provincial, national), wilderness areas, ecological reserves and wildlife reserves
(vii) riparian buffer areas

2.1.3 Waterbody Crossings

Waterbody crossings shall:

(i) have stable approaches
(ii) be at right angles, wherever possible, to the waterbody
(iii) be located where channels are well defined, unobstructed, and straight
(iv) be at a narrow point along the waterbody
(v) allow room for direct gentle approaches wherever possible

2.1.4 Burrow Pits and Quarries

With respect to borrow pits and quarries, the operator shall wherever possible, avoid:

(i) minimize the number of new borrow areas opened for construction and/or maintenance
(ii) use existing borrow pits whenever practical
(iii) be in possession of a valid quarry permit from the Mineral Lands Division, DNR, for borrow pits outside resources roads right of way, prior to aggregate extraction activities as per the *Quarry Materials Act.*
(iv) not locate borrow pits and quarries in sensitive areas as identified by planning processes

2.1.5 Wildlife Values

1. Wherever possible, forest access roads shall not obstruct wildlife movement. The following guidelines should be followed:

(i) roads should be of low profile (less than 1 m above the surrounding terrain)
(ii) slash and other debris shall be removed or buried
(iii) the slope of ditches and road banks shall be minimized

2. Where road construction is to occur around identified waterfowl breeding, moulting and staging areas, mitigating measures will be identified during the 5 year planning process.

2.1.6 Road Access

1. Areas proposed for harvest using winter roads shall not be harvested without an approved reforestation plan.

2. A regeneration survey is required for all forest areas that will be affected by access due to road decommissioning and/or bridge/stream crossing removals. Prior to decommissioning, an approved (i.e. by Silviculture and Research Section of the Forest ecosystem Management Division) reforestation plan is required for all areas that fail to meet the provincial silviculture stocking standards.

2.1.7 Decommissioning Roads

On a site specific basis, roads may be decommissioned. Levels of decommissioning include:

(i) barring access
(ii) removal of watercourse crossing(s)
(iii) restoration of roadway including planting of trees.

Decommissioning is as decided through the planning team process or, under compelling circumstances, as decided by DNR (e.g., emergency closures).

2.2 Construction and Decommissioning of Roads

2.2.1 Road Construction

1. There shall be no bulldozing or burying of merchantable timber or poor utilization of merchantable softwoods and hardwoods during cutting of road right-of-ways. All merchantable timber shall be utilized and processed.

2. Where brush mat or corduroy is required, sub-merchantable or non-merchantable stems should be used first. In the event that these are not present or sufficient, permission must be obtained from a DNR official prior to merchantable stems being utilized. Stems are to be placed in a "butt to top" alternating fashion for the entire length of the area to be brush matted.

3. Earth shall be excavated as required to complete earth cuts, ditching, sub-excavation and shall include hauling, handling and disposal as directed. Only with the approval of the Engineer or Inspector may excavation occur outside the limits of the roadway for the purpose of obtaining suitable and/or sufficient material to complete embankments. All holes/pits are to be rehabilitated.

4. Fill materials for road building must not be obtained from any waterbody, from within the floodplain of any waterbody, or within the 30m no-grub zone.

2.2.2 Pits and Quarry Activity

1. Where borrow pit or quarry activity is likely to cause sediment-laden run-off to contaminate a waterbody, sediment control measures such as filter fabric berms or sedimentation ponds are to be installed. Contact is to be made with the DNR official prior to construction where such conditions exist.

2. Overburden or grubbed material pushed off any gravel pit site must be retained in a manner that allows it to be pushed back into the pit after construction and spread in a neat and tidy fashion.

3. Existing pits are to be used, where possible, to minimize the opening of new pits.

4. Borrow pits are to be located at least 50 metres from the nearest waterbody.

2.2.3 Working near Waterbodies and In-stream Work

1. A "no-grub" zone of 30 metres of undisturbed ground vegetation must be maintained around any waterbody crossing to minimize the damage to the lower vegetation and organic cover, thus reducing erosion potential.

2. Trees are to be felled away from all waterbodies. Slash and debris should be piled above the high water mark so that it cannot enter waterbodies during periods of peak flow.

3. Right-of-way widths at waterbody crossings should be kept to a minimum, preferably to the width of the driving surface plus water control features.

4. Unnecessary side casting or backfilling in the vicinity of waterbodies is not permitted. Where topographical constraints dictate that the roadbed must be constructed adjacent to a waterbody, road slope stabilization is to be undertaken at the toe of the fill (an area where active erosion is likely). The placement of large riprap, armour stone or slope stabilization material is recommended in such areas.

5. Take-off ditching should be used on both sides of the road or in conjunction with culverts to divert the ditch flow off into the woods or stable vegetation areas before reaching the waterbody. The ditch itself shall not lead directly into the waterbody.

6. Grades in excess of 10% shall have culverts with baffle/ditch blocks on one end and cut-off ditches every 150 meters along the road. A baffle/ditch block can be constructed from gabion baskets, wooden structures, rock walls, or other approved materials. Unless otherwise specified, the height of the baffle shall be a minimum of one-half the diameter of the culvert requiring the baffle.

7. When working near waterbodies, road building operations causing erosion or siltation are to be suspended during periods of intense rainfall or when soils are saturated.

8. Any forestry operation that directly or indirectly results in sediment and/or turbid water entering a waterbody must be dealt with immediately. See Guideline 1.2.2.5 for further information.

9. Fording of equipment for stream crossing installation is to be kept to a minimum. Equipment activity in water crossing areas is to be kept to a minimum. All work is to be carried out from dry stable areas. Permission for exceptions must be obtained from DFO.

10. Heavy equipment and machinery are not permitted in any waterbody, on a wetland or a bog (unless frozen) without a permit from the DEC and without contacting the DFO Area Habitat Biologist.

11. Exposed mineral soil shall be stabilized during bridge construction and culvert installation.

12. All in-stream work is to be performed as per the DFO March 1998 "Guidelines for Protection of Freshwater Fish Habitat in NL." Marine Environment and Habitat Management Division Science Branch.

13. Coffer dams are to be used to separate work areas from the stream when installing bridges or similar structures requiring abutments, or footings.

14. Water pumped from work areas and coffer dams is to be directed into a settling pond or stable vegetation areas.

15. Not more than one-third of the stream width is to be blocked at any one time.

16. The stream banks are to be rehabilitated upon completion and removal of a coffer dam.

17. All culvert in fish bearing streams are to be installed as per the DFO March 1998 "Guidelines for Protection of Freshwater Fish Habitat in NL." Marine Environment and Habitat Management Division Science Branch.

18. In fish-bearing streams;
    (i) culverts having a diameter equal to or exceeding 2000mm should be countersunk a minimum of 15% of the diameter below the streambed elevation,
    (ii) a minimum water depth of 200mm should be provided throughout the culvert length. To maintain this water depth at low flow periods an entrance/downstream pool should be constructed,
    (iii) downstream outlet pools are of particular importance for long culverts or culverts to be installed on steep slopes.

19. In-stream work should be scheduled to avoid potential adverse impacts on spawning activities, egg incubation, spawning habitat and fish migration in consultation with the DFO Area Habitat Biologist.

2.2.4 Archaeological Find

When an archaeological site or artifact is found, the condition in Guideline 1.2.2 should will apply.

2.2.5 Petroleum Products

In the event of a spill and/or leak of petroleum products, see Guideline 1.2.6.1 for further details.

Guidelines 1.2.5.2 to 1.2.5.5 relating to petroleum products also apply in road construction and decommissioning operations.

2.2.6 Winter Roads

As with all season roads, soil disturbance and impacts on waterbodies are to be minimized with winter roads. Culverts or temporary bridges are to be used. Erosion control measures are to be maintained while the winter road is in use and, thereafter, left in an environmentally acceptable condition. All temporary crossings are to be removed at the end of the operating season and an inspection done by a DNR official, engineer or other qualified person to ensure any remediation that may be required is applied.

2.2.7 Decommissioning Roads

1. When roads are decommissioned or barred by gating or ditching or placement of obstacles, appropriate signage warning of any hazardous condition shall be placed in open view.

2. When decommissioning is through removal of watercourse crossings, areas adjacent to former culverts or bridge locations shall be stabilized to reduce potential for erosion. Appropriate signage shall also be placed.

3. When decommissioning roads by replacing soil, overburden and other natural obstacles on former roadway (so as to deny vehicular access and to enable planting in order to restore productive forest on the site), standard precautions such as silt fencing shall be used to prevent entry of silt in waterways.

4. Decommissioning shall not normally be undertaken until all necessary reforestation activities beyond the decommissioning point have taken place.

3.0 SILVICULTURAL GUIDELINES

3.1 Planning of Silviculture

3.1.1 Permits Required

Silviculture is considered a development under the *Urban and Rural Planning Act*. Where this activity occurs within a planning area boundary or within 400 metres of a protected road, a development permit is required before any activity takes place.

3.2 Conduct of Silviculture Operations

3.2.1 Preventing Erosion

To prevent erosion on sites proposed for row scarification, every effort should be made to follow the contours where slopes exceed 15%. If in such instances scarification has to occur parallel to the slope, the scarified trenches are to be intermittent (i.e., for every 20 m of trench, an un-scarified section 2 m in length should be left).

3.2.2 Protection of Waterbodies

1. Heavy equipment and machinery are not permitted in any waterbody, on a wetland or a bog (unless frozen) without a permit from the DEC and without contacting the DFO Area Habitat Biologist.

2. Any forestry operation that directly or indirectly results in sediment and/or turbid water entering a waterbody must be dealt with immediately. See Guideline 1.2.1.5 for further information.

3. Trees thinned during pre-commercial thinning, diameter limit thinning, commercial thinning or any other silvicultural treatment shall not be felled into waterbodies.

3.2.3 Placement of Windrows

Where slash is piled into windrows, windrows should be located where slash cannot be washed into streams at peak flooding conditions.

3.2.4 Trees Left for Wildlife and Other Values

1. There is to be no cutting of white pine.

2. Hardwood species, such as birch, are to be left when encountered in a stand scheduled for thinning where these do not compete with the conifer crop trees. Portions of thinning areas which are pure hardwood may be left unthinned when encountered. In mixed regeneration, various hardwood or softwood species may be favoured in future stand development in accordance with management objectives stated in the approved operating plan for the area.

3.2.5 Timing of Silviculture

Where possible, silviculture operations are to be reduced/avoided in areas identified by Wildlife Division during the periods of birth and/or hatching.

3.2.6 Archaeological Find

When an archaeological site or artifact is found, the condition in Guideline 1.2.3 will apply.

3.2.7 Fuels and Petroleum Products

1. In the event of a spill and/or leak of petroleum products, see Guideline 1.2.5.1 for further details.

2. Guidelines 1.2.5.2 to 1.2.5.5 relating to petroleum products also apply in silviculture operations.

3.2.8 Scarification Method

Where mechanical site preparation is required, methods selected shall be best suited for preparing the area for planting and for minimizing ground disturbance.

3.2.9 Choice of Species to Plant

In most planting situations, use of native species is preferred; however, judicious planting of non-invasive exotic tree species (such as those species which have been established in the province for decades, or other species which may come under review) may be planted in certain situations.

4.0 FOREST PROTECTION GUIDELINES

4.1 Planning for the Application of Pesticides (Insecticides and Herbicides)

4.1.1 Regulation of Pesticides

The use of pesticides is regulated by Health Canada and provincially by the DEC. The federal *Pest Control Products Act* states which products are registered for use in Canada. Hence, any products used must be contained in this list; and the provincial *Environmental Protection Act* , *Pesticide Control Regulations* state that you must obtain a license to purchase, sell or handle Commercial or Restricted class pesticides in NL.

4.1.2 Licenses Required

1. To apply pesticides (e.g., insecticides) in the province, two licenses are required from Pollution Control Division, DEC. The first is a Pesticides Operators License which is issued for a specific program and valid for five years. To obtain this the applicant must submit project details including a map of the area to be treated, product to be used, and time of the year to be used. Following the completion of the project, a report must be submitted to DEC. The second license required is a Pesticide Applicators License. To obtain this license, the applicator must complete an exam. Only people in possession of this license may use the pesticide. It is valid for a period of five years.

2. To apply herbicides, the same conditions apply as above. An Operators License must be obtained for the project and is valid for five years. In addition, each member of the crew involved with application of the herbicide must complete an exam and obtain a Pesticide Applicators License.

3. A third program which requires an Operators License and a Pesticide Applicators License is the tree nursery program which may uses pesticides to grow seedlings. Again the same conditions apply.

4.2 Conduct of Operations

4.2.1 Pesticides Use

Only bio-degradable pesticides will only be used and then only as part of an integrated pest management strategy.

5.0 GUIDELINES FOR FORESTRY OPERATIONS WITHIN PROTECTED PUBLIC WATER SUPPLY AREAS

The primary function of a Protected Public Water Supply Area is to provide the public with an adequate quantity of safe and good quality water on a permanent basis, to meet its present and future demands. By definition, a Protected Public Water Supply Area means the area of land and water designated as a Protected Public Water Supply Area, for a municipal authority operating a waterworks or using or intending to use a water sources, under Section 39 of the *Water Resources Act*. Any other activity within a Protected Public Water Supply Area is considered secondary and, if permitted, must be strictly regulated and monitored to ensure that the water supply integrity is not threatened and the quality of the water is not impaired.

In Newfoundland and Labrador, forestry operations are permitted in most Protected Public Water Supply Area on a limited and controlled basis provided the proposed operations have no, or minimal, water quality impairment potential. More specifically, commercial forest harvesting of any more than 10% of the total land area of the Protected Public Water Supply Area, or 10% of the total merchantable timber, whichever is less, in any 12 month permit will not be permitted.

The following permits and approvals are required prior to the beginning of any forestry operations (whether commercial or domestic operations and including road construction, silviculture activities, and harvesting) within a Protected Public Water Supply Area:

(i) Approval of the Five-year operating plan by the Environmental Assessment Division of DEC,

(ii) Issuance of a permit under section 39(6) of the *Water Resources Act* which will include consultation with the community involved. Applications for development inside Protected Public Water Supply Area can be obtained from the Water Resources Management Division website (see Appendix I for link).

5.1 Conduct of Operations

The permits issued to contract harvesters should include the conditions indicated on the section 39 permit. In addition to environmental guidelines specified in sections above, the following will apply in Protected Public Water Supply Areas;

5.1.1 Map of the Operating Area

The Forest Service or appropriate Company official will provide the operator with a map indicating the harvesting area and the location of no-cut treed buffer zones, and will ensure that the operator is familiar with the boundaries and conditions of the approved detailed plan of operations.

5.1.2 Prevention of Erosion

In areas sensitive to erosion, depending on the nature and location of the proposed forestry operation, the Water Resources Management Division may not permit the activity to take place. However, where permitted the following mitigating measures should be put in place:

1. Sensitive areas prone to erosion and areas which have high potential for erosion can be harvested if proper harvesting and site restoration techniques are a part of a detailed plan.

2. Wherever possible, extraction trails should run along contours and avoid wetlands.

3. Use of landings will be minimized. Any approved landing area shall be less than 0.25 ha and located at least 150 metres from PPWSA intake ponds.

5.1.3 Buffer Zones

No ground disturbance riparian buffer zone requirements in Protected Public Water Supply Areas are as follows:

Water Body	**Width of Buffer Zone**
Intake Pond or Lake or Reservoir	A minimum 150m
River intake (for a distance of 1000m upstream and 100m downstream)	A minimum 150m
Main river channel	A minimum of 75m
Major tributaries, lakes or ponds	A minimum of 50m
Other water bodies	A minimum of 30m

Any deviations will require approval from Water Resources Management Division.

5.1.4 Petroleum Products

Fuel storage and the operation of fuel storage equipment are regulated by the *Storage and Handling of Gasoline and Associated Products Regulations*, 2003 as amended and the *Heating Oil Storage Tank System Regulations*, 2003 as amended.

In addition to the above regulatory requirements and Sections 1.2.5.1 to 1.2.5.5 the following are to be adhered to;

(i) If fuel must be stored in the PPWSA, it must be in the least sensitive area and be approved by Water Resources Management Division.

(ii) Refueling must not take place within 150 metres of an intake pond.

(iii) All tanks must be located at a minimum distance of 500 metres from any major waterbody.

(iv) A fuel or oil spill clean-up kit must be kept on site to facilitate any clean-up in the event of a spill. This kit must include absorbent pads, loose absorbent materials such as dried peat, speedy-dry or sawdust, a container such as an empty drum for recovering the fuel or oil, and a containment boom.

5.1.5 Structures Prohibited in Water Supply Areas

1. Dormitory camps, garages or any other structures are prohibited within a Protected Public Water Supply Area.

2. The establishment of new sawmills is not permitted in Protected Public Water Supply Areas.

5.1.6 Reporting Water Quality Problems

Any water quality impairment problem should be reported immediately to the Water Resources Management Division.

APPENDIX I: RELEVANT LINKS

Applications:

Development Applications in Protected Public Water Supply Areas
http://www.env.gov.nl.ca/env/waterres/regulations/appforms/index.html

Impacted Sites:

http://www.env.gov.nl.ca/env/env_protection/ics/Guidance_Document_For_the_Management_of_Impacted_Sites_V2.0_Feb_6_2014.pdf

Federal Legislation Links:

Canada Fisheries Act
http://laws-lois.justice.gc.ca/eng/acts/F-14/index.html

http://www.dfo-mpo.gc.ca/Library/240270.pdf

Canada Navigable Waters Protection Act
http://laws.justice.gc.ca/eng/acts/N-22/

Canada Species at Risk Act
http://www.sararegistry.gc.ca/approach/act/default_e.cfm#1

Provincial Legislation Links:

Newfoundland and Labrador Endangered Species Act
http://www.assembly.nl.ca/Legislation/sr/statutes/e10-1.htm

Newfoundland and Labrador Environmental Protection Act
http://www.assembly.nl.ca/legislation/sr/statutes/e14-2.htm

Newfoundland and Labrador Forestry Act
http://www.assembly.nl.ca/legislation/sr/statutes/f23.htm

Newfoundland and Labrador Historical Resources Act
http://www.assembly.nl.ca/legislation/sr/tableregulations/tableofregulations_h04.htm

Newfoundland and Labrador Quarry Material Act
http://www.assembly.nl.ca/legislation/sr/statutes/q01-1.htm

Newfoundland and Labrador Urban and Rural Planning Act
http://assembly.nl.ca/Legislation/sr/statutes/u08.htm

Newfoundland and Labrador Wildlife Act
http://www.assembly.nl.ca/Legislation/sr/statutes/w08.htm