Forest Management Districts 4, 5, 6, & 8 (Planning Zone 3) Sustainable Forest Management Plan - Crown (2007 - 2011)

Table of Contents

List of Tables

List of Figures

List of Appendices

INTRODUCTION

This Five Year Operating Plan is one of the first of its type that reflects the new legislated planning requirements of the Newfoundland Forest Service. In the past, there were five major planning documents; Provincial Sustainable Forest Management Strategy, District Strategy Document, Five Year Operating Plan, Annual Operating Plan, and 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 dealt with 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 is the creation of eight planning zones on the Island which are based loosely on ecoregion location. Forest Management Districts (FMD's) that share common ecoregion characteristics are combined to form these zones. FMD's 4, 5, 6, and 8 are combined to form Planning Zone 3. The requirement for submission to the Newfoundland Forest Service and for environmental assessment is one Five Year Operating Plan for each tenure owner in each zone. The past requirement was one Five Year Operating Plan by each owner in each district. In this zone there will be three separate submissions by the Crown, Corner Brook Pulp and Paper Limited (CBPP), and Abitibi Consolidated Company of Canada (ACCC). Throughout this Five Year Plan, references will be made to FMD's 4, 5, 6 and 8 individually but when combined they will collectively be referred to as Planning Zone 3 or the zone. Planning teams meetings for this zone were located in Gander. Planning team format and structure will be discussed in a later section.

This document will try to fully integrate presentation of information and discussion for Crown Land and land transferred to the Crown in the zone, where possible. This will be done by combining statistics and other information from each district and reporting for the zone. Tables and figures however, 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 all ownerships in the zone as well as some broad comparative statistics. In this way the reader will get a better overview of the entire zone in the context of all ownerships and not just Crown Land.

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

Section 1 Description of the Land Base

1.0 Description of Forest Management Districts

1.1. General

Planning Zone 3 encompasses Forest Management Districts (FMD's) 4, 5, 6 and 8 (figure 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.

1.1.1. District Boundaries

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

Forest Management District 5, known as the Bonavista North Management District, is located on the north side of Bonavista Bay. Its boundaries include the Gander River to the west and Gander Lake, Gambo Pond, and Terra Nova Lake to the south. To the east, the district is marked by Bonavista Bay and Terra Nova National Park. To the north, it ends at 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, 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 (49^{th} 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,

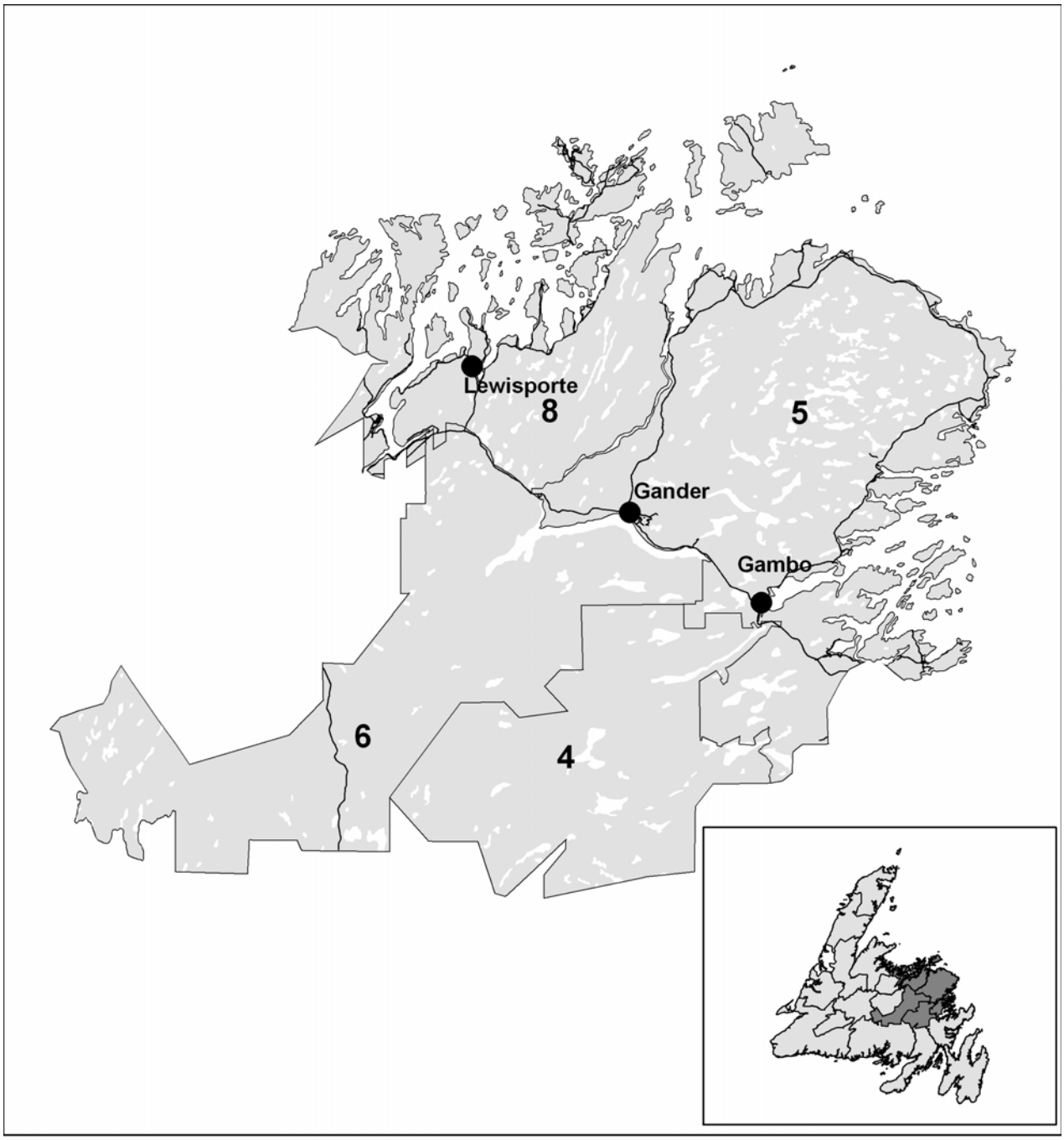


FIgure 1. Location of Planning Zone 3

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 A copy of CNR 777/96 can be viewed in appendix14.

The FMD's 4 and 5 headquarters is located in the town of Gambo, while FMD's 6 and 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 district offices at Gambo, Clarenville and Bishops Falls, while in FMD 6 they are shared between Lewisporte and Bishop's Falls. This arrangement results from the existing road access points to FMD's 4 and 6 in relation to DNR offices.

1.1.2 History

With the exception of Gander, the major communities within the planning zone area were built around the fishery, the railway and lumbering. Approximately 62,200 people live here 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.

These districts have a history which 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 when, because of the towns strategic location, as many as 10,000 military personnel were stationed there. 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 were used in the 16th and 17th centuries as French, Spanish, and Portuguese summer fishing stations, and which began to be settled around 1680. The Wesleyville-Badgers Quay area is the birth place of many great sealing captains. Greenspond, a small fishing community today, can trace its origins back to 1,698. 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 around 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. The timber limits associated with most of that district were originally secured by Norwegian developers, who in 1920, started construction on a sulphite pulpmill at Glovertown. 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 which 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 Reids 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 Reids negotiated a deal which allowed the Bowater interests in England to acquire the Gander Valley and other properties for the Corner Brook mill in 1938, in what became known as the Gander Deal.

As with most areas of rural Newfoundland, historical settlement of communities in FMD 8 developed around the fishing and shipping industries. The community of Twillingate recorded settlers as early as 1700, making it one of the Provinces oldest seaports. During the early 1900's, Campbellton was an industrial town with a lumber mill, pulp mill and its own miniature railway. Over the past 30 years, commercial forestry activities have increased to the point where they now account for a significant portion of employment in the area. Small scale farming is carried out in the Comfort Cove, Laurenceton and Northern Arm areas, while 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.

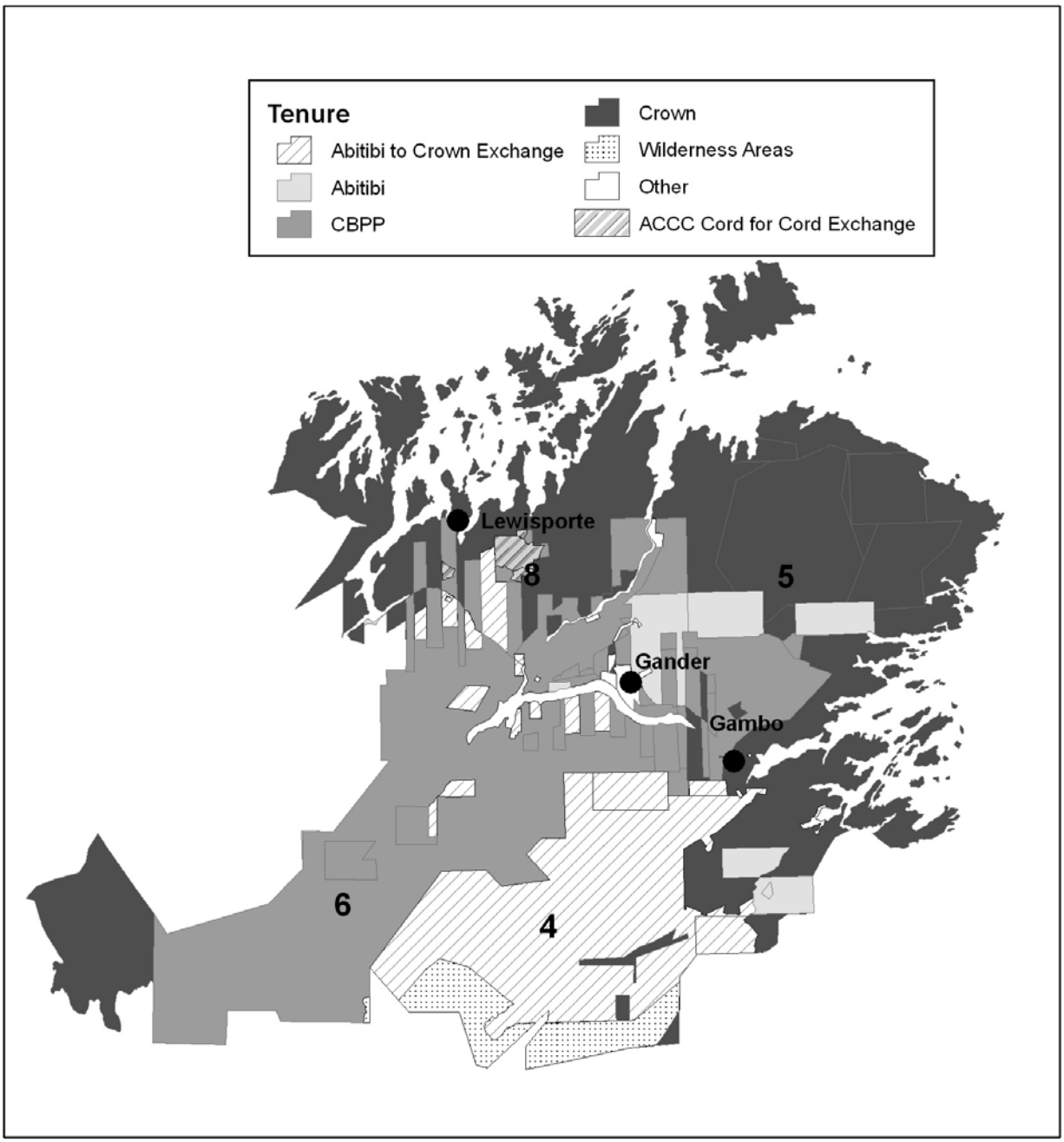
There isn't much doubt that the four districts have strong ties to the development of the forest industry in Newfoundland. In more recent years the infrastructure, especially the network of forest access roads originally used to support the logging industry, is cited as an important component of other industry developments such as hunting and fishing.

1.1.3 Ownerships

There are three major ownerships in the zone; Crown, Corner Brook Pulp and Paper Limited (CBPPL) and Abitibi Consolidated Company of Canada (ACCCC) (Figure 2). Crown land accounts for 43 percent of the timber ownership and is located around the extremities of the zone near the coast, from the Town of Leading Tickles to Terra Nova National Park. The next largest timber ownership belongs to CBPPL at 31 %. These holdings are in the form of long term licenses that are not due to expire until 2037. Abitibi Consolidated accounts for 21% percent of the ownership in the zone and its holding are in the form of both licenses and freehold land. The licenses are due to expire in 2010. Finally, miscellaneous timber holdings (eg private, DOT, parks, etc.) account for 5 %.

Within these ownerships there have been a number of exchanges and transfers between the Crown and ACCC that are mutually beneficial to both parties (figure 2). There are transfers for all the ACCC licenced land in FMD's 4, 6 and 8 to the Crown which provides a sawlog supply for FMD 2, 5 and 8 sawmillers.

Figure 2 Ownership map of Planning Zone 7 showing transfers and exchanges



These areas represent poorer logging chances and all pulpwood and chips flow to mill at GrandFalls-Windsor. ACCC has also exchanged an area near Brinks and Otter Ponds on CBPPL limits in FMD 8 to the Crown. These areas which also provide sawlog supply for FMD 8 are part of the "Cord for Cord Exchange" between ACCC and CBPP. All transfer areas also help to ensure a supply of domestic timber for the residents of many communities in the zone.

1.2 Physical Features

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

1.2.1 Topography and Physiography

Planning Zone 3 contains a diversity of terrain types. The area has generally rolling topography dissected by several large valleys, including Southwest Gander River, Northwest Gander River and Gander River valleys. These rolling hills are commonly between 100 and 200 metres (asl), and rarely extending above 300 metres (asl). Hillsides drop steeply into the major valleys. A 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, which 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 lineations. The highest point in the management area is Mount Peyton (482 m asl) near Glenwood in FMD 6.

This region contains one of the largest lakes in the province; Gander Lake. 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 are the 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 sawlogs and pulpwood. This is evident by the remnants of a number of large dams as well as the occasional man-made channel.

1.2.2 Quaternary Geology

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

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

The valleys of the lowlands were the main channels for meltwaters 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 meltwater during deglaciation. 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. Some sediment has been reworked by the present channel into an alluvial plain up to 1 km wide. Meltwater outflow from the Southwest Gander, Careless Brook valley and from the Northwest Gander River valley flowed northward through The Outflow into the modern Gander River valley.

Evidence of higher water levels was found in the Gander Lake valley (Batterson and Vatcher, 1991). Beach sediments up to 39 m above Gander Lake have been identified. It is possible that higher water levels were the result of marine incursion. Raised marine features on the coast have not been examined in detail, but Munro and Catto (1993) reports Late Wisconsinan marine limits near Carmanville on the north coast at 43 m asl. Marine limit at the coast at the eastern end of the lake has been reported at about 30 m asl (Jenness, 1960; Grant, 1980). Undated marine shells have also been reported from the Gander River valley, north of Gander Lake. Higher water levels drained through the modern Gander River valley.

During the Holocene, organic deposits developed in the poorer drained areas, and colluvial deposits formed at the base of the steeper slopes. Both these processes continue today, although vegetated slopes have retarded the rate of colluviation.

1.2.3 Bedrock Geology

FMD's 4, 5, 6 and 8 straddle three technostratigraphic zones of the Newfoundland Appalachians. These are, from east to west, the Avalon, Gander and Dunnage zones (Govt of NL, 1987).

The Avalon Zone lies in FMD 5 east of a line drawn from Terra Nova Lake northward to the Dover area. This zone is characterized by thick successions of upper Precambrian volcanic, plutonic and sedimentary rocks that are overlain by fossiliferous mudstone, quartzite, limestone and shale of Cambrian age. These various rock types are well exposed in the areas around Bonavista Bay. Granitic and gabbroic rocks of late Precambrian age occur east of Traytown. Granitic rocks of Devonian age occur in the Terra Nova Lake area.

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

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

1.2.4 Soils

Portions of the districts have been surveyed with respect to soil profile but information is lacking in other areas, particularly near the coast. A soil survey was conducted in the Gander - Gambo area and the following information relates to that location. The remainder of the districts should not vary greatly with regard to these soil types due to similar parent materials mentioned above (Wells and Heringa, 1972).

The survey concluded that the soils developed from glacial till. These include mainly ground terrain deposits ranging from a few inches to over 20 feet thick and are composed largely of material derived from locally underlying rock. Podzolic soils are the main soils in the area with some orthic gleysols which are characterized by the lack of aeration and poor drainage.

There are some large areas of organic soils which may be broadly divided by the degree of decomposition and the vegetation apparent on the site. Sphagnum peat is the predominant type of organic deposit. Other types of organic soils found in the districts would be ericaceous peat and muck peat, both of which are less shallow in depth when compared to sphagnum peat.

In relation to tree growth, the podzolic soils support the following species: black spruce - *Picea mariana* (Mill.) B.S.P.; balsam fir - *Abies balsamea* (L.) Mill.; white birch - *Betula papyrifera* (Marsh); and others of lesser importance than the three mentioned. The orthic gleysols support mostly black spruce, the growth of which is somewhat retarded due to the lack of available nutrients. Little, if any, tree growth is supported by the organic soils. The organic mucks support some vegetation depending on slope. Some shallow mucks occur on lower slopes under mixed forest and alder.

1.2.5 Climate

The climate of the four districts can be broken down into two main categories, in accordance with the two larger ecoregions of this area. The Central Newfoundland Ecoregion has the most continental climate on the island. As a result it has the warmest summers and the coldest winters. The mean daily temperatures for July and February are $^{+}15^{o}$C to $^{+}16^{o}$C and $^{-}4^{o}$C to $^{-}8^{o}$C, 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 $^{+}15^{o}$C to $^{+}16^{o}$C, while the February mean temperatures range from $^{-}5^{o}$C to $^{-}7^{o}$C. 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. This region is also influenced by the cold Labrador Current flowing from the north, especially with its pack ice in the spring. This causes the growing season to be delayed when the ice is heavy. For additional information about the climate of the four districts refer to Meades and Moores, (1994).

1.3 Ecosystems

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

1.3.1 The Forest Ecosystem

A forest ecosystem, as the term implies, is an ecosystem dominated by tree cover. At the coarsest level, the forests of Planning Zone 3, like all forests on the island, form part of the boreal forest ecosystem. The boreal forest is a green belt which spans much of the northern hemisphere. It stretches from the Atlantic shores of Scandinavia through Russia, across Alaska, through the mid latitudes of Canada until it reaches the Atlantic Ocean again in Newfoundland and Labrador. One of the distinguishing characteristics of the boreal forest is the phenomena of periodic, catastrophic stand replacement natural disturbances such as fire and insect outbreaks which typically give rise to uniform, even aged forests dominated by a few tree species.

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 favoured 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 which 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 morainal 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 FMD4, 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, morainal 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 are frequent and extensive in north-central Newfoundland and result 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 influence the understory plant community present throughout the district.The species composition and structure of these plants significantly impact on the suitability of a site as wildlife habitat for various species. Some animals are very general in terms of habitat requirements and can occupy a wide range of site conditions, yet have specific seasonal requirements that can determine habitat quality. For example, the moose requires wintering areas with suitable combinations of available cover and browse. It is widely accepted that a variety of forest age classes can provide increased habitat and sustainability for many wildlife species. On the other hand, some species require a specific age class or habitat condition to maintain healthy populations (e.g., Newfoundland marten (*Martes americana atrata*)).

Aquatic ecosystems of the boreal forest are heavily dependant on forest cover for temperature regulation, nutrient cycling and stream flow regulation. Consequently, forest harvesting activities adjacent to riparian areas are critical to sustainability of fish habitat and maintenance of fish migration routes. Suitability of various streams and ponds as waterfowl breeding, feeding and resting areas are also dependant on adjacent forest cover. Biological production in streams is based on a combination of internal and external nutrient and energy pathways. Stream side vegetation has a strong influence on both since they are so closely linked to surrounding terrestrial events. Small streams in forested areas receive much of their materials from the surrounding terrestrial ecosystem. Detritus in the form of needle and leaf litter, twigs and branches, forms the major energy base for consumer organisms. In highly shaded headwater streams, algae production is often low and yields only a small and seasonally variable contribution to the overall energy budget. As streams become larger further downstream, sufficient light penetrates the forest canopy, and consumer populations can take advantage of both particulate detritus and algae (Toews and Brownlee 1981). For these reasons, maintenance of suitable riparian zones for protection of aquatic ecosystems, as well as providing wildlife travel corridors is a primary consideration of any forest management strategy.

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

1.3.2 The National Ecological Land Classification System

A hierarchical framework of ecological land classifications has been recognized for some time in most jurisdictions as a means of stratifying the earth into progressively smaller areas of increasingly uniform ecological units. In Canada, the Canadian Ecological Land Classification

System (Wiken, 1986) provides for seven levels of examination or organization based on ecological principles. This system of classification is better suited than a classical forest inventory for use in an ecological approach to forest management. The seven categories are listed and described in the following table.

Table 1 Canadian Ecological Land Classification System

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

1.3.3 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 Subregions 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 subregions. Labrador has ten ecoregions. Each of the Newfoundland and Labrador ecoregions and subregions contain many of the same ecosystem variables. It is the dominance and variance of these variables (e.g., vegetation and climate) that determine their classification.

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 Northcentral Subregion); III - North Shore Ecoregion; VII - Eastern Hyper-Oceanic Barrens Ecoregion and VI - Maritime Barrens Ecoregion (which contains VID - the Central Barrens Subregion) (see figure 3). Of these, IIA contains the largest portion in the district. The following descriptions are taken from *Forest Site Classification Manual - A Field Guide to the Damman Forest Site Types of Newfoundland* (Meades and Moores, 1994).

1.3.3.1 Central Newfoundland Ecoregion

The Central Newfoundland Ecoregion has the most continental climate in insular Newfoundland. It has the highest summer and lowest winter temperatures. Because of the warm summers and the high evapo-transpiration losses, soils in the northern section of this ecoregion have a soil moisture deficiency.

The *Hylocomium*-Balsam fir forest type occupies the zonal soils of this area. These soils are generally lighter in color and have a lower organic matter content compared to other ecoregions. Forest fires have had an important role in the natural history of this region. Many sites have been converted to black spruce, while some of the richer sites are occupied by white birch and trembling aspen.

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

Northcentral Subregion

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

1.3.3.2 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 subregions in this ecoregion.

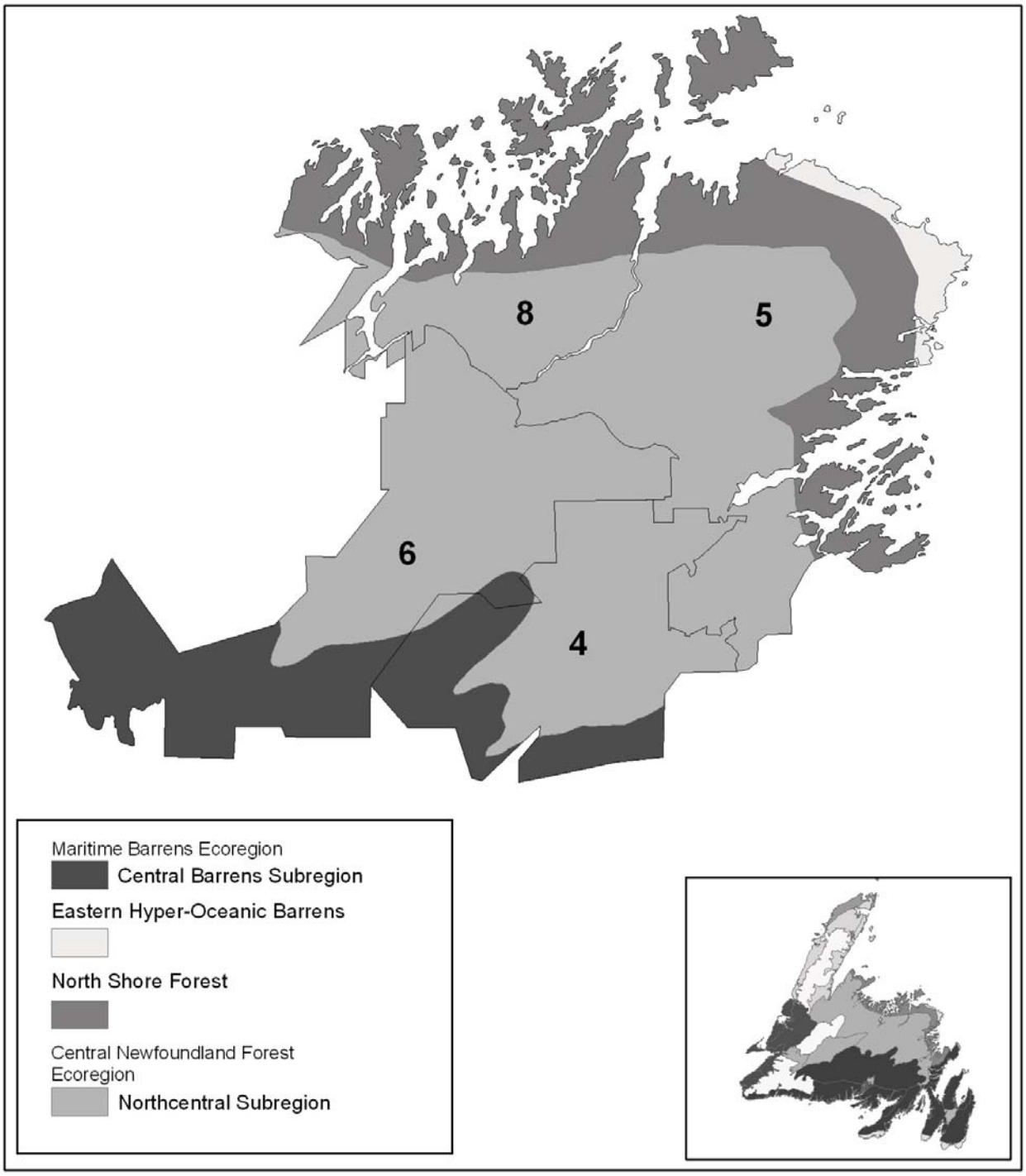
1.3.3.3 Eastern Hyper-Oceanic Barrens Forest Ecoregion

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

1.3.3.4 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. It is characterized by relatively mild winters with intermittent snow cover and the coldest summers with frequent fog and strong winds. The dominant landscape pattern consists of usually stunted, almost pure stands of Balsam fir, broken by extensive open heathland. Good forest growth is localized on long slopes of a few protected valleys. The heaths are dominated by *Kalmia angustifolia* on protected slopes where snow accumulates and by cushions of *Empetrum nigrum*, or *Empetrum eamesii* on windswept ridges. The southern portions of FMD's 4 and 6 extend into the northeastern extent of this ecoregion.

Figure 3 Ecoregions and Subregions of Planning Zone 3.



1.4 Ecosystem Dynamics

1.4.1 Ecosystem Condition

As with other parts of the Newfoundland's boreal forest, those of Planning Zone 3 have evolved in concert with a history of fire, insect attack and subsequent disease and wind throw. Human intervention in this forest has been extensive and widespread with a resultant significant impact on current landscape patterns.

Landscape patterns determine the variety, integrity, and interconnectedness of habitats within a region. These landscape patterns are a direct result of the relationship between physical landforms and soils, disturbance history, and relationships among various species that make up 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. Specific examples of strategies and linkages to the Provincial Sustainable Forest Management Strategy will be detailed in subsequent sections.

1.4.1.1 Productivity

Productivity is the accrual of matter and energy in biomass. In simple terms, primary productivity is the sum total of all biomass produced through photosynthesis. Secondary productivity occurs when this "primary" biomass is ingested and is added to that organism's biomass. Since secondary productivity is directly dependant on primary productivity, it is this primary productivity component that drives the system.

The level of primary production is dependant on the ability to produce biomass. This in turn is dependent on landscape features, soil, climate etc. In general terms, the more productive (ability to grow trees) a site is, the higher level of primary productivity. For example a forested stand would have a higher primary productivity than a bog or a good site would have a higher potential than a poor site.

Overall, the landscape in Planning Zone 3 has approximately 43 percent productive forest. This distribution of productive sites across the landscape and range of productivity within these sites is largely dependent on landscape patterns, climate, and soils. The more productive areas of the zone occur in the lowlands of the river valleys. These areas have deeper soils and less exposed bedrock. The landscape patterns are more consistent and the growing season is longer. In contrast, the northern parts of FMD's 5 and 8 along the coast have soils are shallower with bedrock at or near the surface. The terrain in northern parts is much rougher and the growing season is shorter than in the valley lowlands (130 as opposed to 160 days).

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

1.4.1.2 Resilience

Ecosystem resilience reflects the ability of the ecosystem to absorb change and disturbance while maintaining the same productive capacity and the same relationships among populations. Healthy forest ecosystems maintain their resilience and adapt to periodic disturbances. The renewal of boreal forest ecosystems often depend on these disturbances. Resilience is characterized by the forest's ability to stabilize vital soil processes and maintain succession whereby the system is returned to a community composition and the productivity level is consistent with the ecosystems physical constraints. To a large degree, a forest ecosystems' resilience is controlled by properties such as climate, parent soil, relief and flora.

The potential for populations to recover from low levels following disturbance by having

adequate regeneration capacity and a balanced distribution of forest types and age classes provides a reliable measure of resilience at the landscape level. Other measures include the percent and extent of area by forest type and age class and the percentage of disturbed areas that are successfully regenerated. Resilience is determined by measuring and monitoring these parameters. Forest activities must be carefully planned to not upset the natural balance and lower an ecosystem's resilience. An example is harvesting on the more fragile sites where steep slopes and shallow soil over bedrock increase the potential of site degradation beyond repair.

1.4.1.3 Stability

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

There are three levels of stability; species stability, structural stability, and process stability. Species stability is the maintenance of viable populations or meta-populations of individual species. Structural stability is the stability of various aspects of ecosystem structure such as food web organization or species numbers. Process stability is the stability of processes such as primary productivity and nutrient cycling. To put stability in perspective, it must ensure that the system does not cross some threshold from which recovery to a former state is either impossible, (extinction) or occurs only after long time periods or with outside inputs (loss of topsoil)

Some indicators of stability which can be monitored are: area of forest converted to non-forest use, area, percentage and representation of forest types in protected areas, percentage and extent of area by forest type and age class, and change and distribution and abundance of various fauna. These indicators can be measured and monitored to ensure stability is maintained and to evaluate the impact, if any, of forest activities on ecosystem stability.

1.4.1.4 Disturbance Regimes and Success ional Patterns

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

1.4.1.4.1 Harvesting

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

In the balsam fir types, regeneration failure is much lower than the black spruce types averaging 15-20 percent across all ecoregion and site types. The majority of these sites will regenerate back to balsam fir after harvesting. There is also some regeneration of these sites to mixed balsam fir/black spruce and/or mixed softwood/ hardwood types.

Regeneration pattern in the mixed wood types is generally back to mixed wood that is dominated by white birch and balsam fir with a minor spruce component. There is a higher component of white birch regeneration after harvesting in types that had a higher percentage of hardwood (hS) before harvest. Generally, the better the site class the more hardwood regeneration. Regeneration failure on the mixed wood types is highest in poor sites and lowest on the better sites averaging 10-15 percent.

There are two main white birch site types in the zone. The basic difference between them is terrain which impacts site quality. The G and H white birch sites are typically located on sloped terrain resulting in continual ground water movement or seepage slopes. These sites are prone to revert to alder dominated NSR sites in the absence of very hot ground fire as the disturbance mechanism. Consequently the management prescription to ensure productivity on these valuable sites is to plant fast growing softwood species. The medium white birch sites are typically on more level terrain and will revert to white birch /balsam fir or white birch/black spruce after disturbance. Regeneration failure on these sites is low (10 percent). The management prescription to regenerate these site to white birch is to remove the overmature birch in a seed tree cut to provide a seed source for the next rotation of birch. Intermediate treatments of precommercial thinning to maximize sawlog potential of these stands is recommended in future.

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

1.4.1.4.2 Fire

Since black spruce is a fire adapted species, it is not surprising that it is the most prolific regeneration species after fire across all forest types, site types and ecoregions within the zone. It regenerates as pure stands or in combination with white birch. Balsam fir is conspicuously absent after fire because most advanced regeneration in the under story is killed by the fire. Black spruce regeneration is somewhat correlated with the amount present in the pre fire stand. Generally, the higher the component of black spruce in the original stand, the higher the percentage of regeneration to black spruce. In mixed wood stands a higher component of white birch and sometimes trembling aspen is present after fire. Regeneration after fire in white birch dominated stands is typically back to white birch, but can also include a black spruce component. Regeneration failure after fire is on average 20-25 percent across all forest types, typically being higher as sites get poorer and ground fire temperatures decrease. Generally, the poorer site types will revert to Kalmia dominated NSR and require planting to ensure adequate regeneration. When ground fire temperatures are lower, less of the humas layer is removed and regeneration failure increases due to lack of adequate seed bed.

1.4.1.4.3 Insect

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

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

1.4.2 Biodiversity

Biodiversity is a term used to describe the variety of life on earth. A basic definition of biodiversity includes the variety of animals, plants and microorganisms that exist on our planet, the genetic variety within these species and the variety of ecosystems they inhabit.

Some scientists estimate the total number of species on earth between two and 100 million, however, the best estimate is considered to be within the range of 10-30 million. This is remarkable considering only 1.4 million species have actually been given names. The largest

concentration of biodiversity on the planet is found in the tropical areas of developing countries. Small areas of rainforest often contain species that are found nowhere else on earth. Mishandling even small tracts of land could lead to extinction of several species, one of which may hold the key for the prevention or cure of some disease.

While the boreal forest does not have the extent of biodiversity that some of the equatorial regions possess, Canada does have just over 70,000 species of plants, animals, and micro organisms in its boreal and other forest regions. An equivalent number remain un-described or unreported by science. While the boreal forest has less diversity of large plants than many other forest regions, it has greater biological diversity in some micro organisms. For example, the boreal forest has fewer tree species than the tropical rainforest but 500 times as many mycorrhizal fungi. Despite the large number of organisms contained within the boreal forest, only five percent are actually plants and vertebrates. The other 95 percent remain largely unrecorded and unstudied. As a result, we need to conduct more surveys and studies and manage with caution so that species are not inadvertently wiped out.

Biodiversity provides such essential services as climate control, oxygen production, purification of freshwater supplies, carbon dioxide removal from the atmosphere, soil generation, and nutrient cycling for humans. Without the species that provide these processes, humanity would be unable to survive.

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

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

1.4.2.1 Species Diversity

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

1.4.2.2 Genetic Diversity

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

1.4.2.3 Landscape Diversity

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

A forest interspersed with barrens, marshes, lakes and ponds provides for diversity across the landscape. Each ecoregion in the province should have representative areas protected which displays the diversity where such exists. With this in mind, DNR supports the development of the Swan Island proposed ecological reserve in FMD 8 as a representative of the North Shore Forest Ecosystem, and the Gambo Pond proposed ecological reserve in FMD's 4 and 5 to represent the Central Newfoundland Forest Ecosystem. These areas can serve as a benchmark from which to measure and guide management decisions. These representative areas protect the wilderness of the ecoregion and are vital for guiding management actions. As benchmark areas, they will illustrate the multi-species mosaic that planning actions must maintain. One unique aspect of landscape diversity in Planning Zone 3 is the high representation of native red pine stands relative to other planning zones on the island. Approximately one-half of the 22 + red pine stands native to insular Newfoundland are located in the planning zone.

Old growth forests are valued for their contributions to society in the sense of heritage, culture, aesthetics, and spirituality. Old-growth forests are best understood within the general context of forest disturbance. Disturbance is ubiquitous in forest ecosystems and may be defined as any relatively discrete event in time that disrupts ecosystems, community or population structure and changes resources, substrate availability, or the physical environment. Disturbances occur over a wide range of spatial and temporal scales and normally interact one with the other to produce the complexity of forest types found across our landscapes.

Theoretically, boreal forests not disturbed by fire, insect or wind disturbance for long periods of time will revert to multi-cohort, self-perpetuating, gap-driven forests. When viewed from the perspective of forest-level disturbance, it may be stated that old-growth forests are common in areas not prone to recurrent or periodic stand replacing disturbance from fire, insects or wind. In situations where stand-initiating events are rare, then old-growth will tend to dominate. The disturbance forces which would naturally recycle mature forests are absent and therefore forests will tend to grow to the old-growth stage. Old-growth forests are thus composed entirely of trees which have developed in the absence of stand replacing disturbance. Old-growth fir-spruce forests will self-perpetuate through small-scale gap dynamics in the absence of large-scale disturbance.

Old-growth conditions in the Canadian boreal forest are rare or uncommon. This is understandable given the ubiquity of landscape-level fires and recurrent insect outbreaks. As well, logging is becoming an increasingly significant disturbance factor in the boreal forests. Wildfire is paramount in controlling the dynamics of the drier, continental boreal forests of western Canada and Alaska. In Newfoundland, fire tends to be important in the forests of central region, characterized by its continental-like climate.

The occurrence of old-growth forests on the Island of Newfoundland is unknown. Except for the old-growth research conducted in the upper Main River watershed, empirical definitions of old-growth according to forest types and edaphic conditions are not available. Furthermore, the frequency of natural forest disturbances and their role in shaping landscape level forest composition and structure of the Island's forests are little understood. However, given our general knowledge of the historic occurrence of fire, insect and wind disturbance in Newfoundland's forests, as well as recognition of a century of logging activity across the Island, it is reasonable to assume that primary old-growth forests on the Island are not common. DNR does acknowledge that the older cohorts in the age class structure of a district are important from many ecosystem perspectives. Accordingly, during the 2006 wood supply modeling, the maintenance of 15 % of the overmature cohort (i.e. 81+ years) on the landscape over the forecast horizon was a requirement on a district basis. This will be discussed further in other sections.

1.5 Forest Characterization

1.5.1 Land Classification

There are four basic categories that currently represent how the land within a forest management district is classified; productive forest, non productive forest, non-forest and fresh water. The total mapped area in the zone is approximately 1.6 million hectares. Of this approx 624,500 ha is productive forest, 429,000 ha is nonproductive, 404,000 ha is non-forest, and 157,000 ha is water.

Productive forest is defined as forested area that is capable of producing 60 m^3/ha at rotation. Essentially, this is the forested area that sustains industry in the province. Table 2 displays the productive forest land classification in Planning Zone 3 broken down by district and tenure. The productive forest land base is divided among seven ownerships: Corner Brook Pulp and Paper Ltd (CBPP), Abitibi-Consolidated Inc. (ACCC), Provincial Crown (Crown.), Federal Crown, Municipal Crown, Private Land, and Provincial Parks. The ratios across ownerships in each district are fairly consistent with some minor variations. As Table 2 illustrates, the three principle land tenures consist of CBPP, ACCC and the Provincial Crown. As a group, they control 95 %

Table 2 Breakdown of productive forest area in Planning Zone 3 by district and tenure.

	C.B.P.P.		**A.-C.**		**Crown**		**Other***		**Total**
District	Area	%	Area	%	Area	%	Area	%	**Area**
4	N/A	N/A	80,479	*92*	2,378	*3*	4,722	*5*	87,579
5	56,905	*28*	28,383	*14*	112,267	*56*	4,718	*2*	202,274
6	148,000	*88*	12,100	*7*	8,761	*5*	67	*1*	168,927
8	23,611	*14*	3,904	2	134,959	*81*	3,262	*2*	165,736
Total	228,516	*37*	124,866	*20*	258,365	*41*	12,769	*2*	624,516

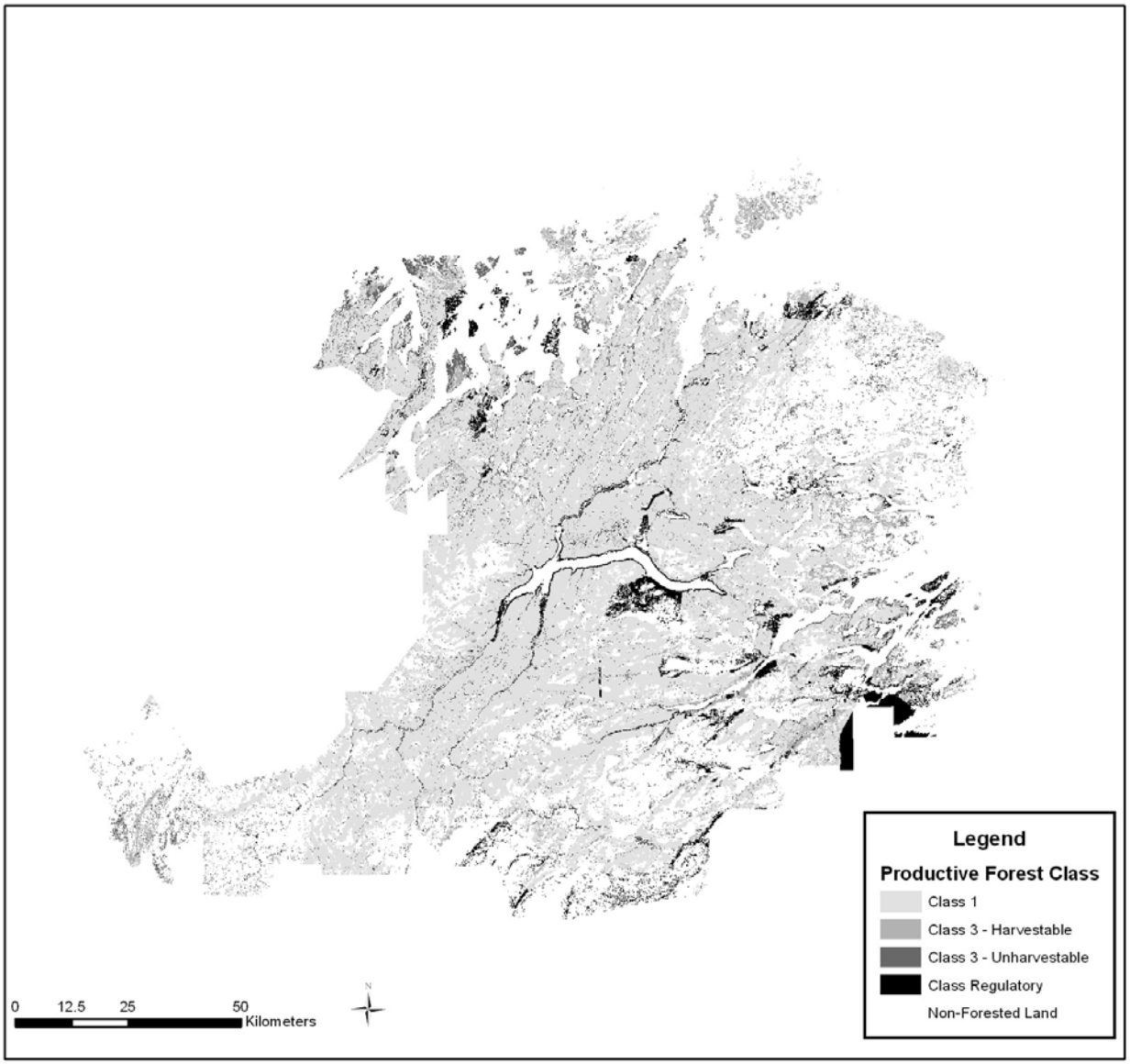
Other* *Consists of Federal Crown, Municipal Crown, Private Land, and Provincial Parks. These owners make up a small percentage of the land base and were grouped together as a result.*

of the productive forest land in FMD 4, 98 % in FMD 5, 99 % in FMD 6 and 98% in FMD 8. Figure 3 displays the relative percentages of each major land class category in each district with all ownerships combined.

1.5.2 Age Class

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

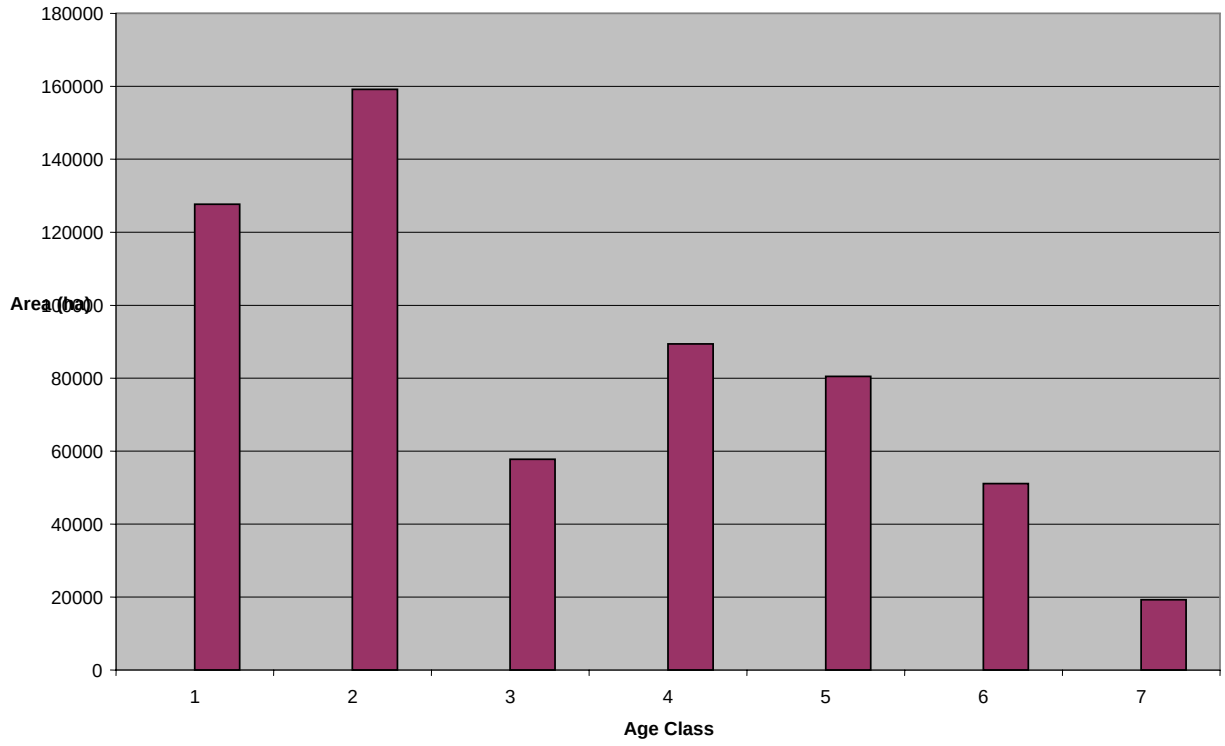
Figure 4 Productive forest land class in Planning Zone 3



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

The combined age class distribution in Planning Zone 3 for the entire productive forest is shown in figure 5 and on an individual district basis in figures 5a to 5d. 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.

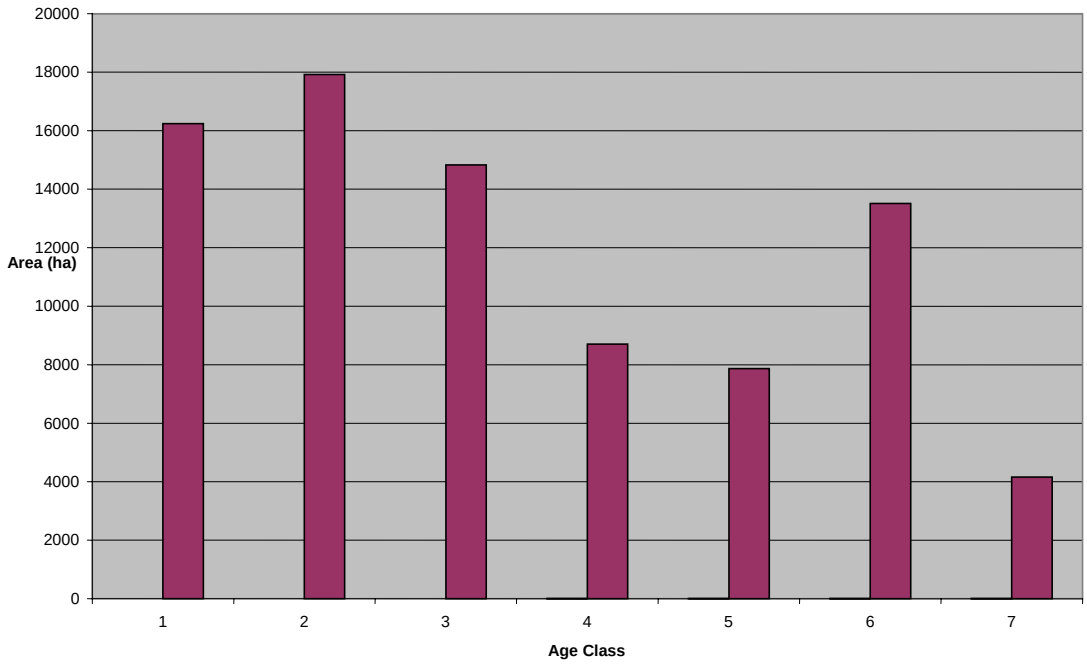
Figure 5 Age class distribution for all ownerships in Planning Zone 3



For FMD 4, Figure 5a shows how the different levels of forest development are represented. As illustrated, the age class structure for the district is basically even-aged in that most of the trees have ages that generally do not span more than 60 years. Currently, Class 5+ represents the most area at 31%. This is followed by Class 2 at 22%, Class 1 at 20%, Class 3 at

18%, and Class 4 at 10%. The imbalance of the district age class distribution causes the various timber owners to rely heavily on Class 5 for their commercial wood supplies (which are the oldest). As each year passes, there is a higher potential for overmature trees to be lost to mortality, resulting in less of the resource being available, from a timber production perspective. The management scheme accepted by the Newfoundland Forest Service is to harvest the oldest stands first. In the case of FMD 4, this will represent a large amount of the harvest for the next 20-40 years because of the limited amount of area in Class 3 and 4 of the current age class structure. Age Class 5+ will have to support both commercial and domestic harvests (with some inputs from Class 4 and even less from Class 3) over the next 20 year cycle. By that time even less fiber will be available in what is currently Class 5+, because of the heavy reliance for harvesting and additional losses due to mortality. Some of the effects of the reliance on Class 5 as a timber source may be reduced by the help of silviculture (primarily thinning, and to a lesser degree, but still important, a program of planting). The thinning will help selected trees reach a merchantable size in a shorter period of time by utilizing resources once taken in by trees before they were thinned out.

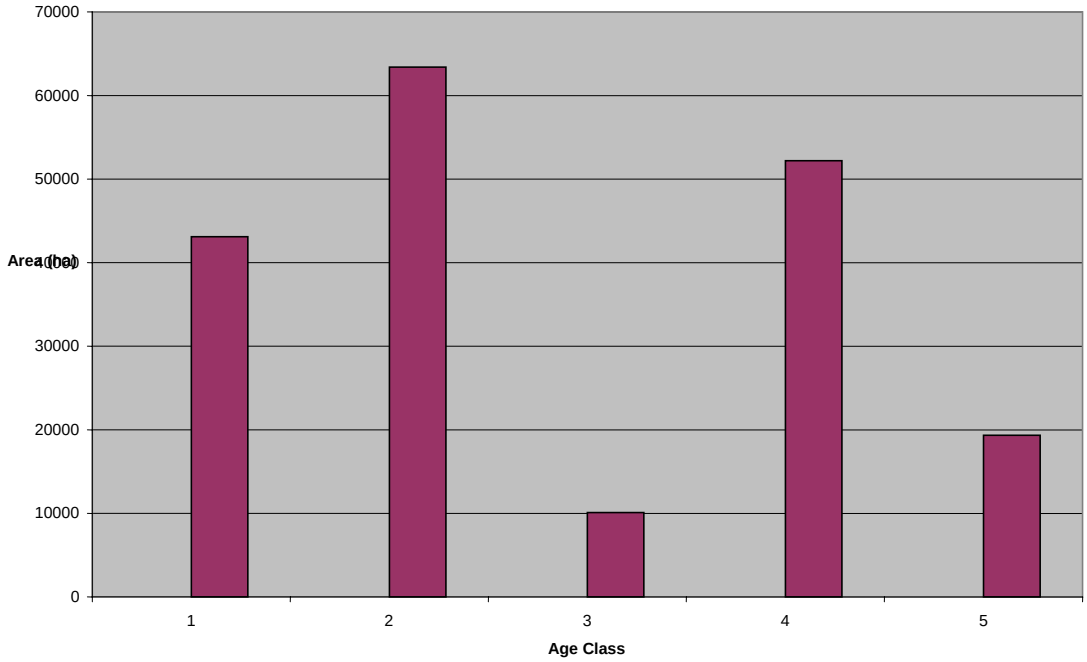
Figure 5a Age class distribution for all ownerships in FMD 4



FMD 5 does not have a balanced aged class structure (Figure 5b) as is the goal to maximize sustainable harvest levels. The breakdown for age class for FMD 5 is as follows: Class 2 (34%), followed by Class 4 (28%), followed by Class 1 (23%), followed by Class 5 (10%), and finally Class 3 (3%). Again, a similar situation is presented here when compared to FMD 4. The bulk of the area is available in Class 4 with just under half as much in Class 5. With the oldest first management policy, Class 5 should be able to support some harvesting for commercial and domestic operations until Class 4 areas are needed. This Class 4 area should be able to support the drain when the age classes advance to the next development stage as the forest ages. This will provide more time for the development of the current Class 3 component. Following that, what is

now Class 1 and 2 appear to be in capable of supporting current drain levels when the trees in these areas become merchantable. As with FMD 4, stands that have been thinned are hoped to lessen the impact when less area becomes available by reaching merchantable sizes at earlier ages. The Forest Service's management goal is to implement management strategies which will ultimately result in balanced age class structure over a period of time (i.e. 1-2 rotations).

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



The age class structure for FMD 6 (figure 5c) indicates Class 5+ occupies the most area at 32%, Class 2 at 28%, Class 1 at 20%, Class 3 at 17%, and Class 4 occupying 4% of the productive forest land in the district. As in the two previous cases, FMD 6 does not have the desired age class structure for maximized sustainable harvest either. Figure 5c shows that FMD 6 has a similar age class structure to FMD 4, with the exception that FMD 6 has a larger land base. As a result, similar effects are expected to take place with regard to Class 5+ carrying much of the harvest requirements until trees in Class 2 become merchantable. This could be sooner if thinned areas produce as expected.

Figure 5c Age class distribution for all ownerships in FMD 6

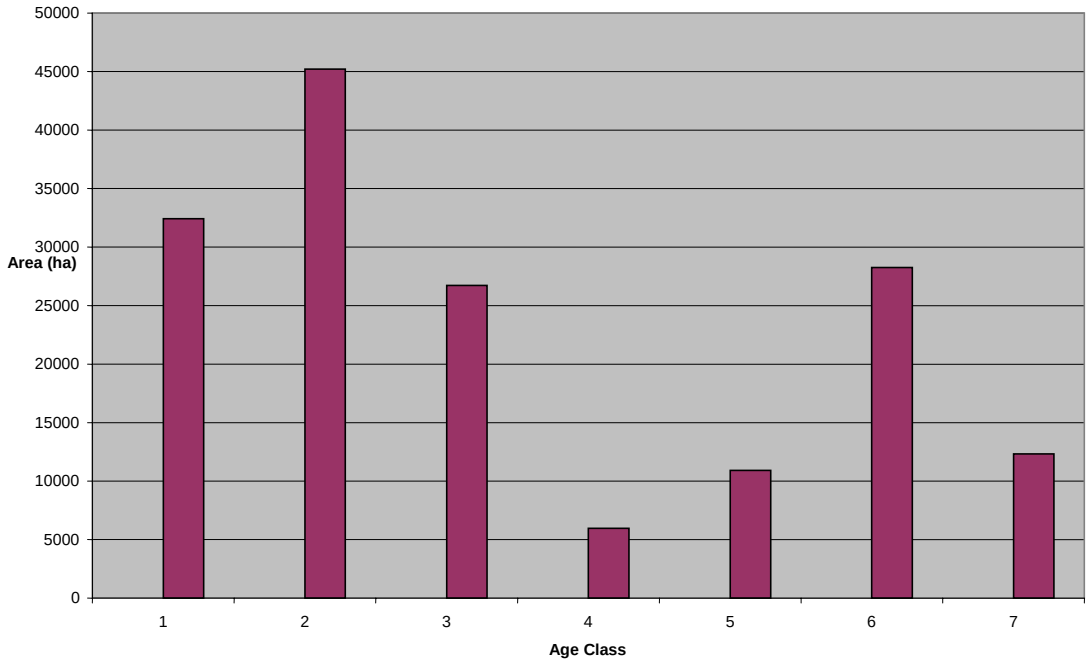


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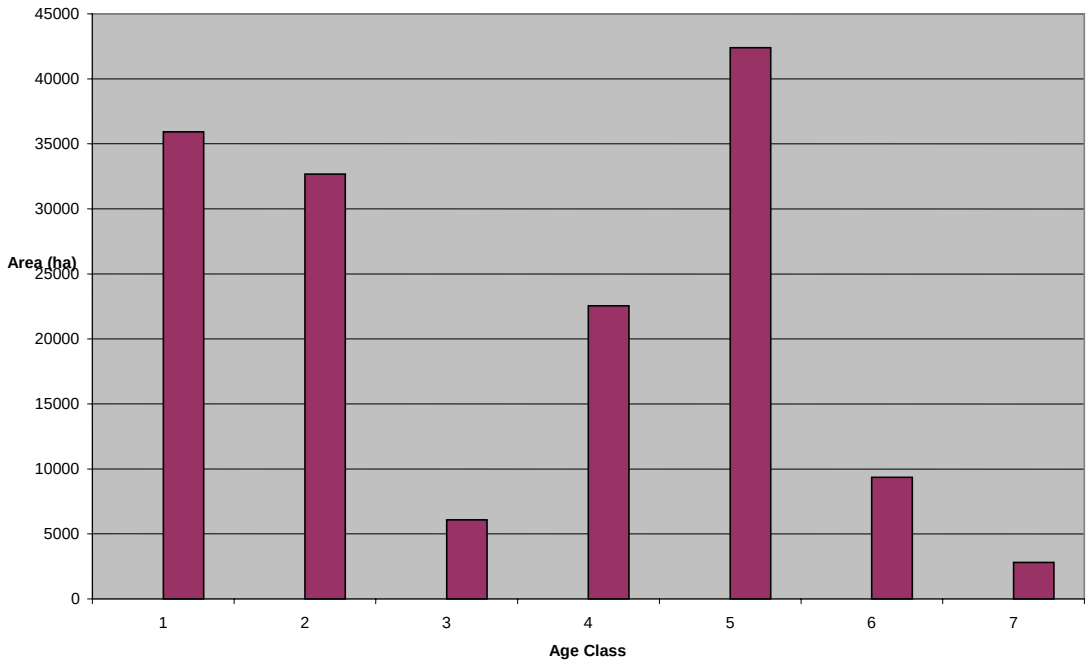
Figure 5d Age class distribution for all ownerships in FMD 8



The present age class structure in FMD 8 is skewed as follows: Class 1 - 24 %; Class 2 -22%; Class 3 - 4%; Class 4 -15 % and Class 5+ - 36% (figure 5d). The major problem in this structure is the disproportionately low percentage of the forest in Class 3. The implication, for the medium term timber supply, of this shortfall is a significant reduction in the amount of available merchantable-size timber, once stands in the older age classes are either harvested or cycled through natural disturbance. It is projected that this will occur within the next 20 years. In order to achieve a regulated forest, it is fundamental that measures be taken to promote a balanced forest age class structure

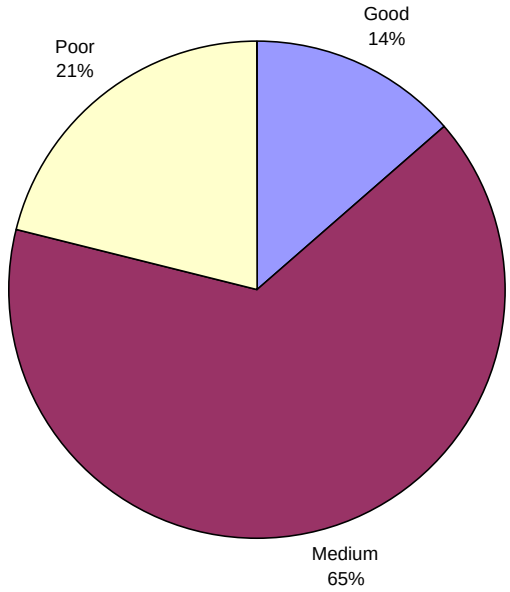
1.5.3 Site Class

The Newfoundland Forest Service has identified four site classes that refer to the potential of a given site to produce timber. These are high, good, medium and poor. The classes are based on a number of factors, some of which are soil type, moisture content, slope, and fertility. Site class is determined through air photo interpretation supplemented with field checks. The classes indicate the volume of wood fiber 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 table indicates the average potential in cubic meters per hectare for each site class at maturity (based on the provincial average).

Class	**m^3 /ha**
High	200+
Good	150
Medium	120
Poor	80

The medium site class is by far the largest in the districts within Planning Zone 3, holding 66% of the total productive area found in the three major landowners. The next largest class is poor (19%), followed by good (14%) and high (<1%). This pattern holds true, generally, for the individual land holders; however, Corner Brook Pulp and Paper has the largest area in the good site class. Figures 6a to 6d present the site class information in graphic form to show the levels of site class in each district.

Figure 6a Site Class breakdown for all ownerships in FMD 4



6b Site Class breakdown for all ownerships in FMD 5

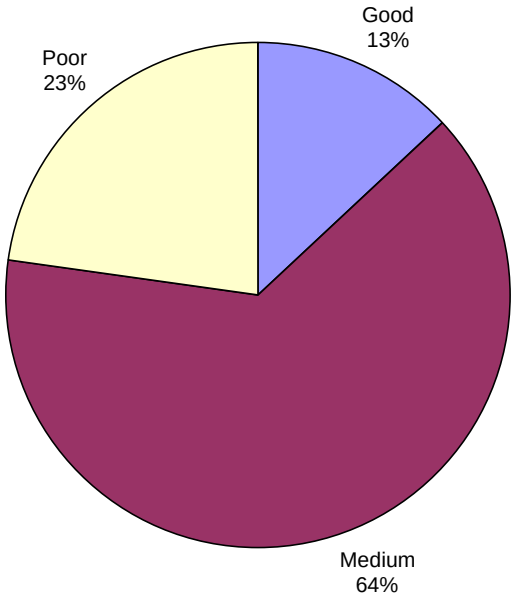


Figure 6c Site Class breakdown for all ownerships in FMD 6

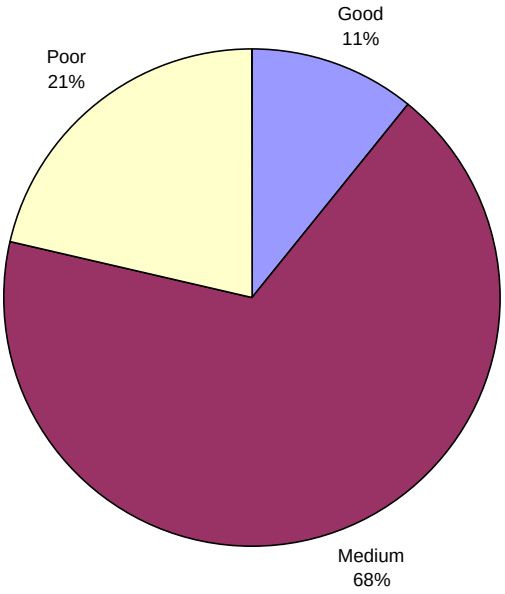
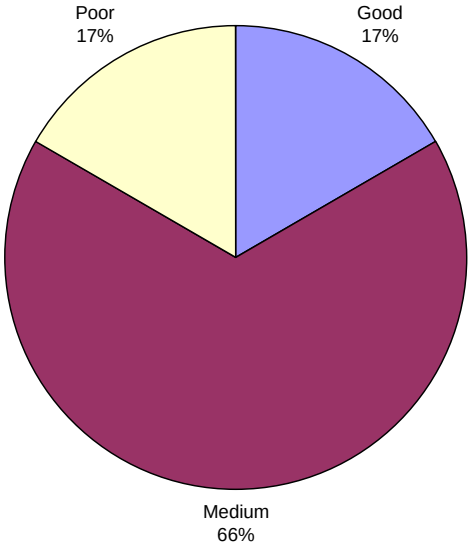


Figure 6d Site Class breakdown for all ownerships in FMD 8



1.5.4 Forest Types (Working Group)

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

There are twelve working groups within the four districts. In this zone, the softwood working groups dominate accounting for over 85 percent of the productive forest. The black spruce (bS) working group is by far the most prolific accounting for 60 percent of the working groups in Planning Zone 3 (see table 3). Black spruce can occur as pure stands or in association with other species listed below. Balsam fir (bF) is the second most abundant accounting for 15 percent in the four districts. Balsam fir can occur in pure stands or in association with one or more of black spruce, white spruce, white birch, trembling aspen, or larch in varying species compositions.

Softwood/Hardwood and Hardwood/Softwood working groups occupy 10 and 4 percent of the productive forest area in FMD's 4, 5, 6, & 8. These working groups occur as varying mixtures of fir, spruce, birch and aspen. The hardwood softwood (hS), and white birch (wB), trembling aspen (tA), white spruce (wS) and jack pine (jP) working groups occupy less than 10 percent of the productive forest in the four districts. Approximately 7 percent of the productive forest is classed as disturbed (NS). NS or not stocked include disturbances other than harvesting, which accounts for most of the total, insect damage, fire, wind throw, and flooding. The relative percentages hold true for all ownerships in all four districts.

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

Black Spruce - *Picea marina* (Mill.) B.S.P.

Within this working group there are three main forest types that characteristically represent black spruce. These include: black spruce forest, black spruce fen, and *kalmia*-black spruce forest. A general description for the black spruce forest includes a forest that has a thick humus layer with mainly black spruce as the dominant tree species. The sites within this forest type have a wide range of moisture from dry to wet and the fertility ranges from very poor to rich. Because there is such a wide range in both moisture and fertility, this forest type had to be broken down into six specific forest types. These include: *sphagnum*-black spruce, black spruce-feathermoss/bedrock, black spruce-feathermoss/very dry, black spruce-feathermoss/dry, black spruce-feathermoss/bog, and black spruce-feathermoss/moist. This forest types produce merchantable timber. Most of these forest types are common throughout the four districts.

The second forest type, black spruce-fen is characterized by an abundance of understory that is usually described as fertile but poorly drained. Due to this poor drainage the black spruce in this forest type are usually stunted. These forests are considered important wildlife and plant habitats because of the high fertility, and usually grow in open settings. As a result of the open grown,

stunted trees, this forest type is not usually merchantable from a commercial harvesting perspective. This forest type is divided into two forest types: *carex*-black spruce and *osmunda* - black spruce, both of which are not common in the four districts.

The third forest type *kalmia*-black spruce represents a black spruce forest that is associated with bogs. The trees are open grown with black spruce as the dominant tree, which is usually stunted with abundant shrubs and mosses growing throughout its understory. These sites are normally infertile but range from dry to very moist. This forest type, because of small variations, can be broken down into four forest types: *nemopanthus-kalmia* black spruce, *sphagnum-kalmia*-black spruce, *kalmia*-black spruce, and *cladonia-kalmia*-black spruce. These forest types are usually considered unmerchantable and are common throughout the 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.

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

Another major forest type is the balsam fir forest. In some districts of the province this type is the dominant species, but in District 4, 5,6 and 8 it is not. This species occupies sites that are usually fertile and moist but because these districts have a recurring history of fire, balsam fir cannot become established as they do not naturally occupy burned areas. Due to the complexities of the balsam fir forest type, it can be divided into several types. These are: *equisetum-rubus*-balsam fir, *rubus*-balsam fir, *clintonia*-balsam fir, *taxus*-balsam fir, *dryopteris-hylocomium*-balsam fir, *dryopteris*-balsam fir, *dryopteris-rhytidiadelphus*-balsam fir, *dryopteris-lycopodium*-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 *dryopteris-lycopodium*-balsam fir forest type has narrow moisture regime from moist to somewhat moist that is nutrient rich. This forest type has ground cover that is dominated by ferns and certain moss types and plants that are specific to this type. The *hylocomium*-balsam fir forest type is also moist to somewhat moist but is dominated by a layer of moss instead of the ferns. The *pleurozium*-balsam fir forest type has balsam fir and black spruce as the main tree species with few white birch. The moss layer is made up mainly of *pleurozium* schreberi and is found on dry

to well drained areas such as dry ridges and outwash deposits. The *carex*-balsam fir forest type has willow found in it. The *sphagnum*-balsam fir is dominated by *sphagnum* moss on the forest floor and is poorly drained.

White Birch - *Betula papyifera* Marsh.

This working group represents the major hardwood component for the forests of the province, and FMD's 4, 5,6 and 8. White birch is normally found on the fertile sites along streams and rivers, as well as flood plains. It can also be found on fire origin locations as it is a pioneer species that seeds into an area once the forest cover is removed by fire. Pure white birch stands are not that common in the province, especially in the four districts. Three noteworthy sites are the north shore of Home Pond and the ridge of Jonathon's Pond, both in FMD 5 and the west shore of Burnt Lake in FMD 8. There are a number of white birch forest types, all depending upon the understory growth and the associated soil type. This forest type doesn't make up a large portion of the four districts.

For FMD's 4, 5, 6 and 8, all known working groups and their codes are outlined below.

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

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

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

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

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

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

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

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

9. eS - as above, with Engelmann spruce (*Picea engelmannii* Parry) the major species.

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

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

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

Table 3, below illustrates the distribution of working groups both by district and by the four districts combined. The main feature of the table is the dominance of bS which comprises over 60% of the four districts, with the next working group bF representing approximately 15% of the four districts.

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

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

FMD 4				**FMD 5**			
Working Group	Area	% FMD	Rank	Working Group	Area	% FMD	Rank
bF	9,584	11	2	bF	25,356	13	3
bS	67,148	76	1	bS	112,828	56	1
hS	1,301	1	5	hS	13,282	7	4
NS	4,714	5	3	NS	13,174	7	5
sH	2,840	3	4	sH	26,336	13	2
wB	1,027	1	7	wB	7,956	4	6
wS	1,283	1	6	wS	1,433	1	7
Other	57	0	8	Other	917	0	8
Total	**87,954**	**100**			**201,283**	**100**	

FMD 6				**FMD 8**				Total Area by Working Group		
Working Group	Area	% FMD	Rank	Working Group	Area	% FMD	Rank		% of Four FMDs	Rank
bF	22,206	13	2	bF	36,945	22	2	94,092	15	2
bS	121,098	71	1	bS	71,588	43	1	372,662	60	1
hS	4,176	2	5	hS	8,994	5	5	27,753	4	5
NS	7,865	5	4	NS	15,756	9	4	41,509	7	4
sH	9,991	6	3	sH	21,129	13	3	60,296	10	3
wB	3,472	2	6	wB	7,124	4	6	19,579	3	6
wS	0	0	8	wS	3,774	2	7	6,489	1	7
Other	892	1	7	Other	1,821	1	8	3,687	1	8
	169,700	**100**			**167,131**	**100**		**626,067**	**100**	

Section 2 Past Activities Planning Zone 3 - Crown

2.1 Overview

As stated in the introduction, there has been a change in the planning process and requirements for the province by combining certain districts into planning zones. In this case Forest Management Districts 4, 5, 6 and 8 have been amalgamated to form Planning Zone 3. To do this it was necessary to change the start and end dates of some existing five year plans so that they could be synchronized for the new planning process. The five year plan for FMD's 4 and 5 were extended by 1.75 years while the plan for FMD 8 will be cut short by 1 year to flitate this change. For consistency purposes, the description of the past five activities will cover the period from 2001 to 2005 inclusive.

This section will indicate the activities on Crown Land and on ACCC limits transferred to the Crown occurred in FMD's 4,5,6 and 8. Also included in the Crown harvest is CBPPL limits transferred to ACCC through a cord for cord exchange at Brink's Pond/Otter Pond in FMD 8.

2.2 Harvesting

There was significant harvest activity by the Crown in Planning Zone 3 from 2001 to 2005. The harvest was distributed throughout FMD's 4, 5 and 8 and occurred both commercially and domestically. There was over 1.3 million m^3 harvested on Crown land and on land transferred to the Crown from and ACCC from 2001 to 2005 in the zone. Approximately 70% of this harvest was softwood while approximately 30 % was white birch and other species. Table 4 summarizes the total harvest administered by the Crown by each AAC source in the districts of Planning Zone 3 and compares it to the AAC's for the five year period. Additionally, there was some miscellaneous harvesting of approximately 131,000 m^3 from various sources including residual white birch, scrub spruce, trembling aspen, eastern Larch and red maple, as well as utilization of unmerchantable fiber on commercial cutovers by domestic firewood harvesters. All areas harvested in the past five years can be viewed on maps in Appendix 12.

There was approximately 821,000 m3 of softwood harvested commercially under Crown permit in Planning Zone 3 from 2001 to 2005, which represents approximately 78 % of the harvest. This total represents a ratio of 66:34 sawlogs:pulpwood. Approximately 61 percent of this harvest occurred on Crown Land, 31 % on ACCC tenure with the balance (8%) on CBPP tenure. In addition, there was over 159,000 m3 of hardwoods harvested commercially at 95 % fuelwood, 4 % sawlogs, and 1 % pulp wood. All of the pulpwood was trembling aspen while most of the sawlogs and fuelwood were white birch. Approximately 93 percent of this birch harvest occurred on Crown Land, 5 % on CBPPL tenure with the balance (2 %) on ACCC tenure.

Table 4 Summary of Crown harvest in Planning Zone 3 for 2001 to 2005.

District	Tenure	AAC Source	Harvest (m3)	5 Year AAC (m3)
4	ACCC	CI Softwood Base	209618	222500
		CI Softwood Partition	18477	30500
		CIII Softwood	8568	80000
		CI Birch	2878	2600
		CIII Birch	0	0
5	Crown	CI Softwood Base	153933	154500
		CI Softwood Partition	24719	2700
		CIII Softwood	76278	145000
		CI Birch	18957	20500
		CIII Birch	2547	6500
8	ACCC	CI Softwood Base	11694	12000
		CI Softwood Partition	1895	2000
		CIII Softwood	1611	1500
		CI Birch	295	750
		CIII Birch	0	500
8	Crown	CI Softwood Base	307503	310500
		CI Softwood Partition	31467	50500
		CIII Softwood	125262	124000
		CI Birch	65680	68500
		CIII Birch	5704	7650
8	CBPP	CI Softwood Base	65570	77000
		CI Softwood Partition	0	13000
		CIII Softwood	3403	4500
		CI Birch	17454	17650
		CIII Birch	339	650

There was over 250,000 m3 of softwood harvested domestically under Crown permit in Planning Zone 3 at a ratio of 90:10 fuelwood:sawlogs. Approximately 91 percent of this harvest occurred on Crown Land with the balance (9%) on CBPPL tenure. Most of the harvest occurs on Class 3 land (55 percent) which represents the poorer logging chances. In addition, approximately 83,000 m3 of hardwood was harvested during the period. Approximately 78 percent of this harvest occurred on Crown Land, 21 % CBPP tenure, with the balance (< 1 %) on ACCC tenure. There is a slightly upwards trend in domestic cutting due to the increase in home heating fuel. It

is expected that the domestic demand will level out at 5,200 permits.

For the most part all harvests were kept at or below the set AAC's over the five year period from 2001 to 2005. Insignificant over harvests were recorded for Class III softwood in FMD 8 on both ACCC and Crown tenure as well as for Class I birch in FMD 4 ACCC tenure. Sustainability of these AAC's is unaffected in these cases due to the small numbers involved and because the harvests were accounted for in determining the new AAC's for these sources during the 2006 Wood Supply Anaylsis. Several AAC's were underharvesed by significant margins. These cases resulted mainly from either the fragmentation of the forest and the difficult logging chances for commercial operations, or the lack of road access to existing fiber supplies in the previous period. As a result, significant portions of the allowable cuts could not be allocated. The slight under harvests noted in some AAC's resulted mainly from the failure to harvest allocated volumes over a number of users. A complete comparison with AAC for areas harvested on CBPPL limits is not possible as the harvest level indicated only represents only the Crown portion of their AAC in District 8. A complete comparison can only be made by adding the CBPPL harvest in FMD 8, which can be found in the five year plan by CBPPL for Planning Zone 3.

2.3 Silviculture

Table 5 summarizes the silviculture treatments completed for the past five years. There were a total of 9,989 ha of silviculture treatments completed by the Crown within Planning Zone3 from 2001 to 2005. By treatment, 950 ha of precommercial thinning, 4,463 ha of site preparation, and 4,319 ha of planting of core work was done. Some 98 ha of plantation maintenance were completed in FMD 8 to remove balsam fir ingrowth from existing plantations. Additionally, 159 ha of other regeneration treatments designed to meet goals set out in previous 5 year plans were completed. These treatments mainly involved planting in conjunction with other site preparation techniques such as mulching, mounding and double–pass disc trenching to regenerate problem sites such as NSRV, barrens, landings, as well as other techniques to promote natural regeneration such as seed tree retention and strip cutting. The proposed precommercial thinning program in FMD's 4 and 5 was abandoned in favor of a more aggressive planting program, as the sites proposed for balsam fir thinning were rejected for treatment due to aphid infestation, and technical certification of projects to thin black spruce sites on the 1961 burn was not forthcoming. All areas treated in the past five years can be viewed on maps in Appendix 13. Finally approximately 660, 3150 and 1350 liters of white pine, Japanese Larch and red pine cones respectively were collected in FMD 8 to secure future seed sources for these species to be grown at Woodale Provincial Tree Nursery.

Table 5 Summary of Crown silviculture treatments in Planning Zone 3 from 2001 to 2005

District	PCT (ha)	Plant (ha)	Site Prep (ha)	PM (ha)	Other (ha)	Total (ha)
4	0	1558	1639	0	35	3232
5	0	513	424	0	32	969
6	0	193	193	0	0	386
8	950	2055	2207	98	92	5402
Total	**950**	**4319**	**4463**	**98**	**159**	**9989**

2.4 Road Construction

There were 231.85 km of access roads constructed in Planning Zone 3 by the Crown under Tender and by Crown forest operators under contract. Table 6 summarizes the type of roads constructed in each district. All roads built during the period were required to access commercial timber. Of these, 125.1 km of primary road was built by the Crown and 106.75 km of operational road was build by commercial operators. Approximately 33 km of road was reconstruction of existing roads. All roads constructed in the past five years can be viewed on maps in Appendix 12.

Table 6 Summary of Crown access roads built in Planning Zone 3 from 2001 to 2005

District	Primary (km)	Operational(km)	Reconstructed (km)	Total (km)
4	8.4	28.9	12.55	**49.85**
5	43.55	7.5	11.7	**62.75**
6	0	0	0	**0**
8	49.125	61	9.125	**119.25**
Total	**125.1**	**106.75**	**33.375**	**231.85**

2.5 Natural Disturbance

2.5.1 Fire

Planning Zone 3 typically has a cyclic fire history of approximately 10 years, in which large fire(s) outbreak. However, during the period of 2001 to 2005, there were numerous, small fires recorded that did not burn significant area of forested land. In total there were 79 fires reported that burned a total area of 866.1 ha burnt , however 36 of these fires did not burn any measurable area – phenomenal considering the history of the area! Over one half of the burned area (55%) resulted from two fires that mainly burned scrub and non forested area. This indicates a very aggressive and effective fire protection effort supplemented with a measure of good luck from nature. On a district basis, 381.9 ha, 50.8 ha, 0.4 ha and 429.4 ha were burned in FMD's 4, 5, 6 and 8 respectively. From a tenure perspective in the planning zone, 617.7 ha, 200ha, 36.8ha 10.4 ha and 1.2 ha were burned on Crown, Federal Crown, Abitibi, CBPP and municipal lands respectively.

2.5.2 Insect

There has been little insect activity in the Zone over the period 2001 to 2005. 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. Some 98 ha of plantation maintenance has been conducted over the past five year period.

Section 3 Timber Supply Analysis

3.1 Introduction

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

3.2 Guiding Principles and Policy Direction

The key underlying principles that guide this analysis are: (i) the AAC must be sustainable; (ii) the level of uncertainty (risk) associated with the AAC must be minimized by using empirical information wherever possible; (iii) there must be conformity between information and assumptions used in the analysis and actions and decisions taken on the ground; (iv) the analysis must be consistent with other forest values and objectives; and (v) the timber supply calculation must consider economic factors, not solely the physical supply of timber.

In concert with the policy of establishing sustainable timber harvest levels, Government policy requires that harvesting not exceed the established AAC's. Likewise, Governments policy is to optimize forest industry opportunities from the sustainable fiber supply. Government also requires consultation be conducted during the timber analysis. In this analysis, public input was achieved through the District Managers and, in some cases, planning teams. The forest industry was consulted directly throughout the process. As well, there was a 30 day consultation process whereby a draft of the gross AAC's and methodology was published on the Government web site for public review and comment.

3.3 Factors Affecting Timber Supply

The forests of insular Newfoundland are very variable in terms of age distribution. Typically, there are significant amounts of mature/over-mature forest and regenerating forest, and limited intermediate age forests. This imbalance is not unusual in a boreal forest where cyclic catastrophic disturbances are common. Figure 5 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. These range from an aggressive forest protection program to keep the mature and over-mature stands alive as long as possible so that they can be harvested before they collapse naturally, harvesting programs that attempt to exclusively target the oldest stands first in order to minimize the harvesting pressure on the naturally weak intermediate age classes, and thinning of the regenerating forest so that it becomes operable at an earlier age.

Another important aspect of the Province's forest that poses a challenge to forest managers is the natural fragmentation of the resource. The Province's landscape is carved by many ponds, bogs, rivers, streams, and rock outcrops resulting in relatively small pockets of timber scattered across the landscape. This makes the determination of an economic timber supply very challenging given that each stand has unique economic characteristics.

Arguable the most important factor affecting present and future AAC's is land base. The land base available for forest activity is constantly being eroded by other users. There is an approximate correlation between AAC and land base in that a one percent loss of land base represents a one percent drop in AAC. It is important therefore that we minimize loss to the forest land base and continue to explore ways to grow more volume on the existing land base to mitigate this loss.

3.4 Timber Supply Analysis

In 2003, the Forest Service began another review of the provincial timber supply which was completed in March of 2006. 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 requires careful and detailed consideration of a broad range of both timber and non-timber values. More specifically, the following was considered in determining the sustainable timber supply.

3.4.1 Forest Characterization

To get a current description of the forest resource (or stock), the Province has invested significant resources into creating and maintaining a Provincial Forest Inventory. Although the latest inventories used in the 2006 Wood Supply Analysis for FMD's 4, 5, 6 and 8 were done in 1991, 1988, 1991 and 1986 respectively, the estimate of forest stock is kept current through an update program which is conducted each year to account for all natural and man-made disturbances such as fire, insects, and harvesting, and any enhancement programs such as 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. Both FMD's 5 and 8 have new aerial photography flown in 2005 and 1999 respectively. The new forest inventory for FMD 8 is now completed, while FMD 5's is expected to be completed in early 2007. FMD's 4 and 6 have new aerial photography flow in 2006 with expectant new inventories by the end of 2007.

3.4.2 Land Availability

The updated Forest Inventory was reviewed and classified at the stand level on the basis of the availability of each stand for harvest. The classification system consists of two broad classes; Class 1 - available for harvest under normal conditions, and Class 3 - has restrictions for harvesting due to economic constraints. The Class 3 has been further subdivided into a) can be harvested with reasonable economic restrictions (expensive wood) and b) highly unlikely to be harvested under current economic conditions. Only the former portion of Class 3 is used to calculate an AAC for that category. The categories associated with the portion of Class 3 land, which are deemed unavailable for harvest, incorporates a broad range of timber and non-timber values. These values include:

3.4.2.1 Non-Timber Related

Consideration of these non-timber values had a direct impact on Provincial AAC's. It is obvious that as the amount of productive forest land available for timber management drops, so too will the AAC. With the current restrictions, the AAC land base (area where harvesting operations can occur) is only 17% of the total landmass on the island or 66% of the total productive forest land base. In any one year, less than1% of the productive forest land base is influenced by harvesting operations.

3.4.2.1.1 No-Cut Buffer Zones

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

3.4.2.1.2 Pine Marten and Caribou Habitat

Habitat specialists are working in consultation with industry to ensure adequate habitat will be available for the pine marten and caribou into the future. This work is examining the quantity and quality of habitat as well as the connectivity of habitat. The team is also looking at how this arrangement of habitat would change over time. Once the marten and caribou Habitat Suitability Index models are fully operational, results can be incorporated into our land base designation process.

3.4.2.1.3 Wildlife Corridors

As part of the evaluation process for harvesting plans, wildlife specialists recommend no-cut corridors to ensure the many species of wildlife have sufficient cover to move around the landscape. These corridors are temporal in nature and have little impact on timber supply. Both this section and the previous work toward achieving Value 1.3, Wildlife Habitat, of the Ecosystem Diversity Element of Criterion 1, Biodiversity, in the Provincial Sustainable Forest Management Strategy.

3.4.2.1.4 Protected Areas

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

3.4.2.1.5 Watersheds

For each of the forest management districts in Planning Zone 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. This is in line with Value 3.1, Water, of the Soil and Water Element of Criterion 1, Biodiversity, in the Provincial Sustainable Forest Management Strategy.

3.4.2.2 Timber Related

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

3.4.2.2.1 Insect/Fire/Disease Losses

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

3.4.2.2.2 Logging Losses

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

to reduce the available AAC.

3.4.2.2.3 Operational Constraints

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

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

3.4.3 Growth Forecasting

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

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

3.4.4 Management Strategies

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

3.4.4.1 Harvest Flow Constraints

An even-flow harvest constraint was used in the analysis to maximize the sustainable harvest level. This strategy produced the maximum even flow harvest but resulted in less than optimum economic use of the forest resource. If no even flow constraint is used and harvest levels are permitted to fluctuate in response to market value, the overall economic potential of the forest will increase. However, the lower economic potential is offset by stability in mills and employment. This is in line with Goal 1 of Value 5.1, Commercial Timber, of the Economic Benefits Element of Criterion 5, Economic and Social Benefits, in the Provincial Sustainable Forest Management Strategy.

3.4.4.2 Spatial Analysis

A major improvement in this wood supply analysis is the introduction of 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. While, the 2001 approach was an improvement over previous wood supply analysis were no harvest scheduling was done, the software used cannot realistically know all the operational restrictions within a forest management district. In the manual process used, the on the ground conditions that restrict harvesting are accounted for when a spatial harvest schedule is defined. The proposed harvest schedule is then played back through the modeling software to see if it is sustainable and see if non-timber objectives are met. In most cases, this harvest scheduling has to go through several cycles before an acceptable harvest schedule could be found. The spatial arrangement of areas for timber harvesting was 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 to identify other forest stands that are not as accessible for harvesting.

Manual harvest scheduling has several major benefits. First, it fosters the long tern sustainability of our AAC's by mimicking current harvest practices and accounting for actual on the ground conditions that delay or restrict the harvesting of stands. These restrictions which were previously unaccounted for, have made our past AAC's higher than was realistically sustainable. Secondly, the mapped 25 year harvest schedules build credibility into the forest management process. Every stand that will be harvested over the next 25 years must already be in the second (20-40 years old) or third (41-60) age class and can be easily identity and highlighted on the harvest schedule maps. Being able to see the wood that will be harvested in the future will help reassure people that 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, and these forest areas

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

3.4.4.3 Planning Horizons

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

3.4.4.4 Operable Growing Stock Buffer

The Province imposed an operable growing stock constraint in the analysis to ensure the sustainability of calculated timber supplies. The constraint imposes a condition that in any period there must be a minimum operable growing stock of two times the harvest level on the landscape. In other words, for every hectare that is harvested another harvestable hectare must exist on the landscape. The requirement for a growing stock buffer is based on a number of factors. First, several of our non-timber objectives are not explicitly accounted for in our planning process and therefore will require a growing stock buffer to achieve them. Second, we are unable to follow optimum harvest schedules explicitly due to operational restrictions on harvesting. Third, the Province is not willing to assume high risk with the sustainability of the timber supply. For these reasons a growing stock constraint of two times was used. This constraint was used in concert with harvest scheduling to help map out a reasonable harvest for the next 25 years.

3.4.4.5 Targets for the Maintenance of Older Forest

Consistent with the Forest Service's ecosystem approach, the Province introduced into the analysis an old forest target that at least 15 percent of forests be older than 80 years. This was designed to provide a course filter approach to maintaining representative forest structure. It ensures the presence of certain amounts of old forest across the landscape into the future. With advances in modeling, this target can 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, an attempt has made to connect these areas across the landscape for the first 25 years in the form of 81+ corridors. This is in line with Value 1.1, Representative Landscapes, of the Ecosystem Diversity Element of Criterion 1, Biodiversity, in the Provincial Sustainable Forest Management Strategy.

3.4.4.6 Operability Limits

Operability limits are the time windows in which forest management actions such as harvesting can be undertaken with forest stands. Stand growth development as measured in stand merchantable timber volume and individual piece size of trees determine a stands readiness for harvest. In some young stands one can have acceptable harvest volumes, but still have trees that are too small to harvest. In the 2006 wood supply analysis both stand volume and tree size were used to determine the earliest age when a stand could be initially harvested. In addition to determining the absolute earliest age a stand can be harvested, it was recognized that not all stands on the same site develop exactly the at the same rate. A small portion of a stand will develop faster, a small portion will lag behind, with the bulk of the stand type representing the average condition. Therefore, the first operability limit was staggered by 5 year intervals with the 10 percent, 60 percent, and 30 percent assigned to each availability class.

The ending operability limits or the last age in which a stand can be harvested before it become 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.

3.4.4.7 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 modeling software. The main silvicultural actions used in the 2006 analysis include; 1) precommercial thinning of balsam fir, black spruce, and softwood hardwood stands, and full plant of any areas that do not regenerate naturally mainly with either black spruce, white spruce and to a lesser with red pine, or Norway spruce and larch (both eastern and Japanese).

3.5 Inventory Adjustments

One of the limitations of the current wood supply model is its inability to account for volume depletions outside of what is reported for harvesting operations. The model produces a gross merchantable volume (GMV) figure which needs to be adjusted to account for volume losses as a result of; fire, insects and disease, timber utilization practices and the presence of stand remnants. In previous analyses the lack of province wide digital stand information, the absence of computer tools and the small number of people involved with the wood supply analysis resulted in a high degree of uncertainty around values derived for each depletion. It was recognized that a need existed to study each component more intensely and to expand the time frame and staff responsible for such an analysis. Such was the task of the Forest Engineering and Industry Services Division whose staff, over a seven year period, completed an analysis of the individual components.

3.5.1 Fire

An estimate of productive area loss as a result of fire was based on an analysis of the historical fire statistics maintained by DNR. The fire deductions for are 1, 1.5, 0.1 and 0.1 percent respectively in FMD's 4, 5, 6 and 8. The fire deductions for CBPP are 1.5, 0.1 and 0 percent respectively in FMD's 5, 6 and 8. The fire deductions for the Crown are 1.5 and 0 percent respectively in FMD's 5and 8.

3.5.2 Insects

No forest mortality was documented by Forest Insect and Disease Surveys by DNR in FMD's 4, 5, 6 and 8 during the last five year period. Long term averages of area of timber mortality from insect defoliation were used as the deductions in Planning Zone 3. The insect mortality deductions for, CBPP and the Crown are 1, 1 and 3, percent respectively in all districts.

3.5.3 Timber Utilization

Information for this adjustment was derived from a series of intensive on-the-ground surveys which measured the amount of wood remaining on cutovers following harvesting. This wood was comprised of solid merchantable wood (logging losses) and wood with inherent cull (butt/heart rot). Surveys were conducted province wide and on all tenures over a five year period. Information was analyzed by harvesting system and season. The utilization deductions for ACCC are 6.1, 5.5, 5.8 and 5.8 percent respectively in FMD's 4, 5, 6 and 8. The utilization deductions for CBPP are 5.8, 5.9 and 3.9 percent respectively in FMD's 5, 6 and 8. The utilization deductions for the Crown are 8.5 and 10 percent respectively in FMD's 5 and 8.

3.5.4 Stand Remnants

Following harvesting operations, small fragments of stands often are left for a variety of reasons (operational constraints, low volume stands, terrain conditions). These often result in the inability of the operator to achieve volumes predicted by the computer models. A series of surveys were conducted across the province and the results analyzed to determine the amount of productive area attributed to remnants. The stand remnant deductions for are 7, 7, 8 and 8 percent respectively in FMD's 4, 5, 6 and 8. The stand remnant deductions for CBPP are 7, 8 and 10 percent respectively in FMD's 5, 6 and 8. The stand deductions for the Crown are 8 percent in both FMD's 5 and 8.

The total inventory adjustment for ACCC is 15 percent in FMD's 4, 5, 6 and 8. Similarly, the total inventory adjustment for CBPP is 15 percent in FMD's 5, 6 and 8. The total inventory adjustment for the Crown is 21 percent in FMD's 5 and 8. The Class III inventory adjustment figures are the same for all districts/tenures with the exception of Crown FMD 5. On this tenure higher utilization losses have been experienced in Class III areas due to the roughness of the operating conditions as a result of the terrain and rock outcrop prevalent in the shoreline headland areas of the district. Hardwood inventory adjustment figures for all tenures/districts are the same as the Class 1 softwood figures noted above. Hardwood stands are resistant to fire and it is anticipated that there will be little utilization loss due to the high value for fuelwood.

3.6 Timber Supply

3.6.1 Methodology Overview and Results

Table 7 summarizes the results of the 2006 timber supply analysis for District 4, 5, 6 and 8. There are three major differences between the AAC's for from 2001 to 2006. Firstly, inoperable areas (eg slope > 30 %) were removed from the Class 3 landbase and hence the available supply calculation. Secondly, the Class 3 AAC's for the 2001 analysis were calculated using a simple area to volume ratio. Thirdly, the 2001 white birch AAC's were calculated using the same methodology as with Class 3 softwood, and as well rudimentary yield curves for white birch were used. Conversely, in 2006 both Class 3 softwood and white birch AAC's were calculated in the same manner as for Class I softwood. Additionally, the yield curves for white birch were improved upon with some empirical data. For these reasons it is probably unfair to compare the white birch and Class 3 AAC's for 2006 with those of the 2001 analysis.

Table 7 Annual Allowable Cut results for districts in Planning Zone 3 for 2007-2011

District	Tenure	Class 1 Softwood	Class 3 Softwood	Class 1 White Birch	Class 3 White Birch
4		40,500	11,200	521	110
5	Crown	25,200	26,200	2,940	1,050
		17,800	5,100	280	130
	CBPP	53,200	5,600	1,680	240
6		8,900	580	230	20
	CBPP	127,900	9,200	1,660	40
8	Crown	52,000	24,700	6,690	250
		2,400	740	0	0
	CBPP	16,900	2,200	1,190	100

3.6.2 District Discussion

3.6.2.1 Forest Management District 4

The 2006 Class 1 softwood AAC for FMD 4 ACCC tenure is 40,500 m³/yr which is down significantly (20 %) from the 2001 AAC of 50,600 m³/yr. The major reasons for this decline is change of land base from Class 1 to class 3 and the effects of harvest scheduling. Additionally, accounting for other values, predominately caribou habitat had a slight impact. Similarly, the Class 3 AAC for this tenure has decreased by 30 % from 16 000 m³/yr in 2001 to 11,200 m³/yr in 2006. This has mainly resulted from the change in landbase from C 3- harvestable to C3-unharvestable. The overall softwood AAC (on paper) has decreased from 66,600 m³/yr to 51,700 m³/yr. It is questionable whether all the Class 3 can be harvested however, as was the case in the previous five year period.

The 2006 Class 1 white birch AAC for FMD 4 is 520 m³/yr which is a slight reduction (5 %) from the 2001 figure of 550 m ³/yr when the area to volume ratio method was used. However, when the Class 3 white birch is added (i.e.100 m³/yr), the overall volume available is increased slightly.

3.6.2.2 Forest Management District 5

The 2006 Class 1 softwood AAC for FMD 5 ACCC tenure is 17,800 m³/yr which is down slightly (3 %) from the 2001 AAC of 18,400 m³/yr. The major reasons for this decline are the change of land base from Class 1 to Class 3 and the effects of harvest scheduling. Conversely, the Class 3 AAC for this tenure has increased by 28 % from 4, 000 m³/yr in 2001 to 5,100 m³/yr in 2006. The overall softwood AAC (on paper) has increased slightly from 22,400m³/yr to 22,900 m³/yr.

The 2006 Class 1 white birch AAC for FMD 5 tenure is 280 m³/yr which is a significant reduction (57%) from the 2001 figure of 650 m3 when the area to volume ratio method was used. However, when the Class 3 is added (i.e.130 m³/yr), the overall difference is much less.

The 2006 Class 1 softwood AAC for FMD 5 Crown tenure is 25,200 m³/yr which is down significantly (31%) from the 2001 AAC of 36,300 m³/yr. The major reasons for this decline are also the change of land base from Class 1 to Class 3 and the effects of harvest scheduling. The Class 3 AAC for this tenure has also decreased by 10 % from 29, 000 m³/yr in 2001 to 26,200 m³/yr in 2006. This has mainly resulted from the change in landbase from C 3- harvestable to C3- unharvestable. The overall softwood AAC (on paper) has decreased from 65,300 m³/yr to 51,400 m³/yr.

The 2006 Class 1 white birch AAC for FMD 5, Crown tenure is 2,940 m³/yr which is a significant reduction (32 %) from the 2001 figure of 4,300 m³/yr when the area to volume ratio method was used. However, the Class 3 white birch AAC has increased slightly by 5 % to 211 m³/yr.

The 2006 Class 1 softwood AAC for FMD 5 CBPP tenure is 53,200 m³/yr which is up significantly (15%) from the 2001 AAC of 46,400 m³/yr. The major reasons for this increase are change of land base from Class 3 to Class 1, and a reduction in the utilization deduction from 2001. Similarly, the Class 3 softwood AAC for this tenure has increased by 12 % from 5,000 m³/yr in 2001 to 5,600 m³/yr in 2006. The overall softwood AAC (on paper) has therefore increased from 51,400 m³/yr to 58,800 m³/yr.

The 2006 Class 1 white birch AAC for FMD 5, CBPP tenure is 1,680 m³/yr which is a significant reduction (54 %) from the 2001 figure of 3,200 m³/yr when the area to volume ratio method was used. However, when the Class 3 is added 240 m3, the overall difference is much less.

3.6.2.3 Forest Management District 6

The 2006 Class 1 softwood AAC for FMD 6 ACCC tenure is 8,900 m³/yr which is up

significantly (14 %) from the 2001 AAC of 7,800 m³/yr. The major reasons for this increase are the change of land base from Class 3 to Class 1 and a reduction in the utilization deduction from 2001. Conversely, the Class 3 AAC for this tenure has decreased by 3 % from 600 m³/yr in 2001 to 580 m³/yr in 2006. The overall softwood AAC (on paper) has therefore increased from 8,400 m³/yr to 9,480 m³/yr. It is questionable whether all the Class 3 can be harvested however.

The 2006 Class 1 white birch AAC for FMD 6 ACCC tenure is 230 m³/yr which is a significant reduction (80 %) from the 2001 figure of 1,170 m³/yr. This situation is not significantly increased with the addition of the Class 3 AAC of 20 m³/yr.

The 2006 Class 1 softwood AAC for FMD 6 CBPP tenure is 127,900 m³/yr which is up significantly (30%) from the 2001 AAC of 98,500 m³/yr. The major reasons for this increase are the change of land base from Class 3 to Class 1 and a reduction in the utilization deduction from 2001. Conversely, the Class 3 softwood AAC for this tenure has decreased by 52 % from 19,000 m3 in 2001 to 9,200m3 in 2006. The overall softwood AAC (on paper) has therefore increased from 117,500 m³/yr to 137,100 m³/yr.

The Class 1 white birch AAC for FMD 6, CBPP tenure is 1,650 m³/yr which is a significant increase of more than double the 2001 figure of 650 m³/yr. The Class 3 AAC is insignificant at 40 m³/yr.

3.6.2.4 Forest Management District 8

The 2006 Class 1 softwood AAC for FMD 8 ACCC tenure is 2,400 m³/yr which is down slightly by 400 m³/yr (14 %) from the 2001 AAC of 2,800 m³/yr. The major reasons for this decline are change of land base from Class 1 to Class 3 and the effects of harvest scheduling. Conversely, the Class 3 AAC for this tenure has also increased significantly from 300 m³/yr to 740 m³/yr. The overall softwood AAC (on paper) has therefore increased slightly from 3,100 m³/yr to 3,140 m³/yr.

The 2006 Class 1 white birch AAC for FMD 8 ACCC tenure is 220 m³/yr. Comparatively, for 2001, when the area to volume ratio method was used there was no AAC available. There is no Class 3 AAC for this tenure.

The 2006 Class 1 softwood AAC for FMD 5 Crown tenure is 53,200 m³/yr which is down significantly (28%) from the 2001 AAC of 36,300 m³/yr. The major reasons for this decline is change of land base from Class 1 to class 3 and the effects of harvest scheduling. The Class 3 AAC for this tenure has insignificantly decreased by less than 1 % from 24, 800 m³/yr in 2001 to 24,700 m3 in 2006. The overall softwood AAC (on paper) has decreased from 97,000 m³/yr to 76,900 m³/yr.

The 2006 Class 1 white birch AAC for FMD 8, Crown tenure is 6,690 m³/yr which is a significant reduction (54 %) from the 2001 figure of 14,700 m³/yr. The Class 3 AAC has also significantly decreased to 1000 m³/yr.

The 2006 Class 1 softwood AAC for FMD 8 CBPP tenure is 16,900 m³/yr which is down

slightly (6 %) from the 2001 AAC of 18,000 m³/yr. The major reasons for this decline is change of land base from Class 1 to class 3 and the effects of harvest scheduling. Conversely, the Class 3 AAC for this tenure has more than doubled to 2,200 m³/yr in 2006 up from 900 m³/yr in 2001. The overall softwood AAC (on paper) has therefore increased slightly from 8,900 m³/yr to 19,100 m³/yr.

The 2006 Class 1 white birch AAC for FMD 8 CBPP tenure is 1,190 m³/yr which is a significant reduction (66 %) from the 2001 figure of 3550 m³/yr. The Class 3 AAC is up marginally (10 %) to 100 m³/yr.

3.6.3 Sensitivity Analysis

In the 2001 timber supply analysis, a number of new management objectives like, reserve of operable growing stock, 81+ forest targets, and operability limits were introduced. Since these were new, a significant effort was put into sensitivity analysis to determine the impact of these objectives. The more sensitive objectives were thoroughly evaluated and subcommittees were formed to gather more information to refine any assumptions used. These refined assumptions were used as a basis for the 2006 timber supply analysis, therefore little sensitivity analysis is needed.

The resultant AAC's for the districts in Planning Zone 3 were not sensitive to the levels of silvicultural inputs tested in the wood supply forecast model. Unfortunately, increasing silviculture levels will not result in a corresponding increase in AAC's of FMD's 4, 5, 6 and 8. The projected shortfall period in the wood supply of these districts will be realized before the impact of increased volume growth from precommercial thinning or planting can be realized for positive AAC impact. Although doing the maximum silviculture is an unrealistic option due to both operational and monetary constraints, it is anticipated that sliviculture treatments by all tenure holders in the zone during this five year period will be well beyond minimal levels. This will ensure AAC's increase beyond the shortfall period when even flow harvest constraints can be relaxed. DNR also investigated the potential of increased yield from silivcultural prescriptions to positively impact AAC's, but it was concluded that the current yield curves have been constructed using the best available data, so a further increase in projected yield is unwarranted. Similarly, lowering the operability limits would also increase the AAC. Again, from the department's perspective, this would also represent a significant and unwarranted risk as some stands situated at the lower end of operability will not be operationally ready when queued for harvest.

The old growth target was not constraining for this analysis. The 15 percent target will be maintained or exceeded in 25 years as a result of planned forest management activities and it is also maintained over the 160 forecast horizon in all forest management districts in the zone.

The harvest scheduling was the most constraining objective. AAC reductions in the planning zone as a result of the implementation of manual harvest scheduling ranged from 3 % -6%. This is due mainly to the natural fragmentation of our forest and hence resultant harvest pattern. As noted in section 3.4.4.2, the forecast model provided forest planners with the ability to mimic realistic timber harvest schedules based on current practices and to identify other forest stands

that are not as accessible for harvesting. Reductions from harvest scheduling also resulted from the limitations in our baseline data used to describe the forest. Basically to date, we have described the forest into 20 year age classes while the model uses 5 year age classes. A major initiative is required for the 2011 analysis to describe the forest into 5 year age and condition classes particularly at the lower operability limits.

There have been improvements to the inventory adjustments from the last analysis particularly in utilization. Since these adjustments are used to convert from gross to net AAC there is a direct relationship (e.g. a one percent drop in inventory adjustment represents a one percent gain in net AAC). For this reason a significant effort must be made on behalf of forest harvesters to keep this adjustment to a minimum.

3.6.4 Forest Composition and Structure Change

A positive advancement with the use of computer models is the ability to track the forest through time. This ability allows the user to evaluate the effects of management activities on the structure of the forest at any point in the simulation period. For this analysis, age and species composition through working group was tracked at three time intervals; time 0 (current forest), time 25 years (after the 25 year harvest schedule) and time 160 years (at the end of the simulation period). The change in the area of working groups Planning Zone 3 as a result of forest management activities for the next 25 years does not appear to be significant. Essentially, the same forest tree species components will be represented in similar proportions as they are today. The model's capability to predict working group distribution (and hence its sensitivity) is based solely on our input assumptions which can change during the horizon. Some of these changes include outbreak of fire or insects. The inputs for these depletions are our best guess based upon historical patterns. Moreover the forecast of working group distribution is based upon the model inputs for silviculture, which are minimal in these districts due to the low sensitivity. However, as noted in previous sections it is anticipated that these levels will be surpassed in this planning period, thus impacting the resultant working group distribution.

Figures 7 a, b, c and d show the changes in total forest age on in each of the districts in Planning Zone 3 by 20 year age classes for the simulation period. The age distribution in all districts tends towards a more balanced distribution throughout the short term and long term simulation periods compared to today. The shifts in age classes from period to period are a result of a combination of interventions (ie harvesting and silviculture) as well as natural progression as stands age. Currently, the age class structure is skewed towards the overmature cohort in all districts within the planning zone. These types of age class structures inherently give rise to a lot of risk to wood supplies as the older cohorts are more susceptible to wind throw, fire, insect attack and the onset of rot. In all districts this imbalance is reduced over the planning horizon and should result in wood supplies with lower risk than today, while still ensuring that the overmature component of each district will be well represented. Generally the short term age class structures (i.e.25 yrs) are more equally distributed than at the end of the simulation period.(i.e. 160 yrs).

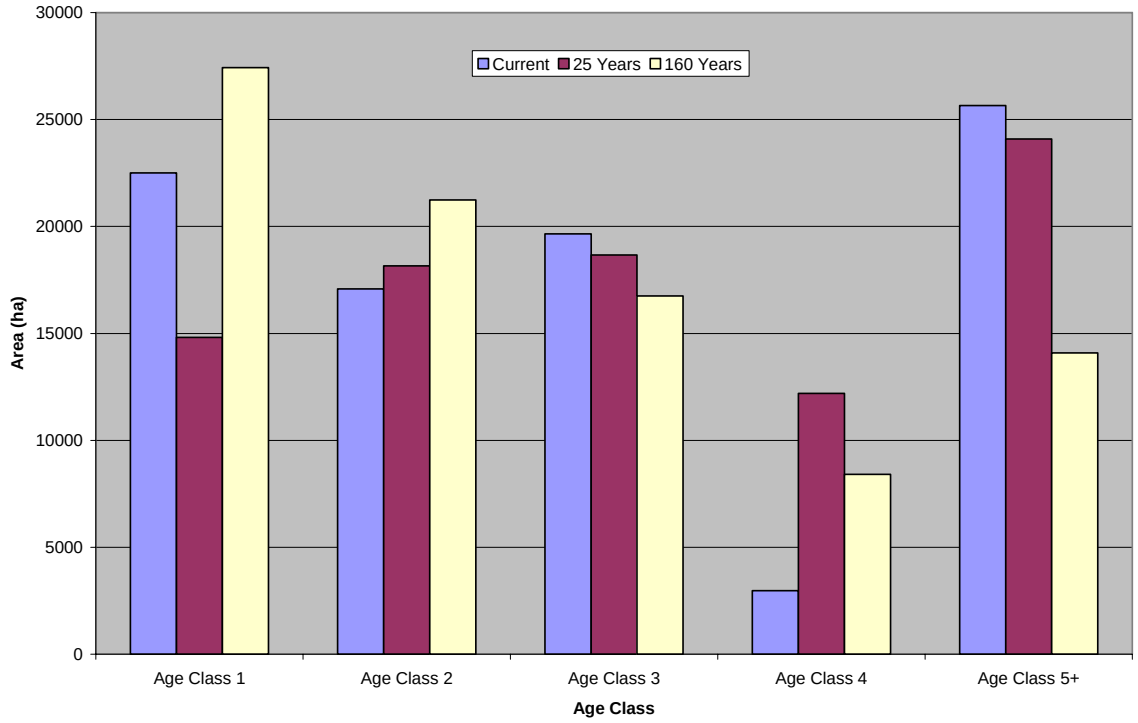


Figure 7a Change in age class structure in FMD 4 for the 160 year simulation period.

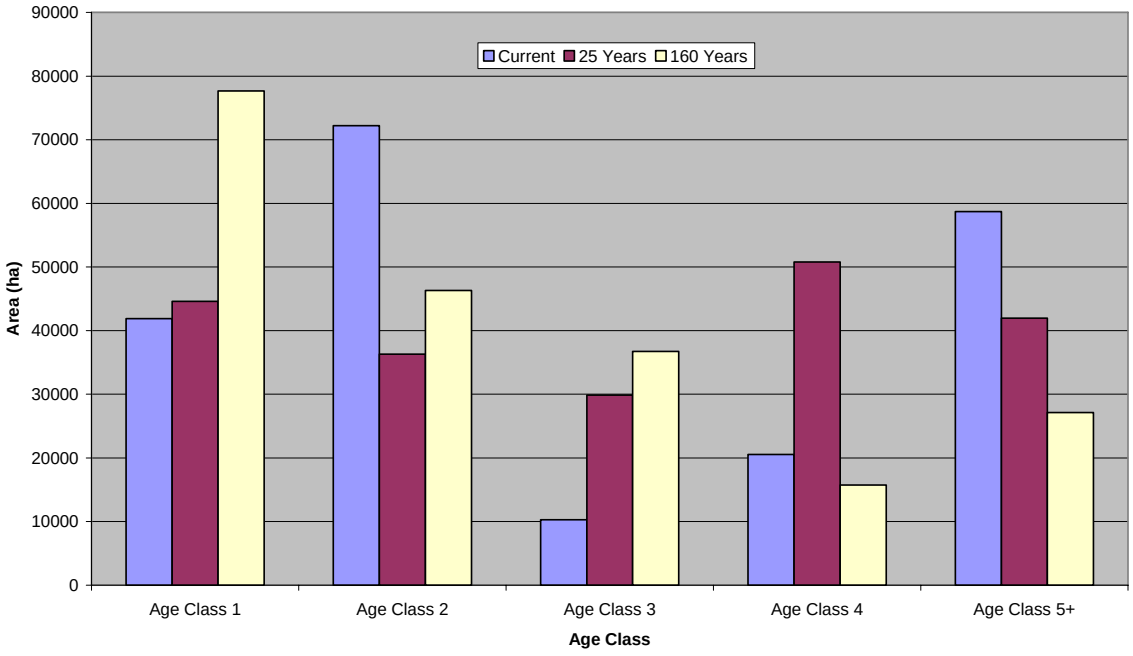


Figure 7b Change in age class structure in FMD 5 for the 160 year simulation period

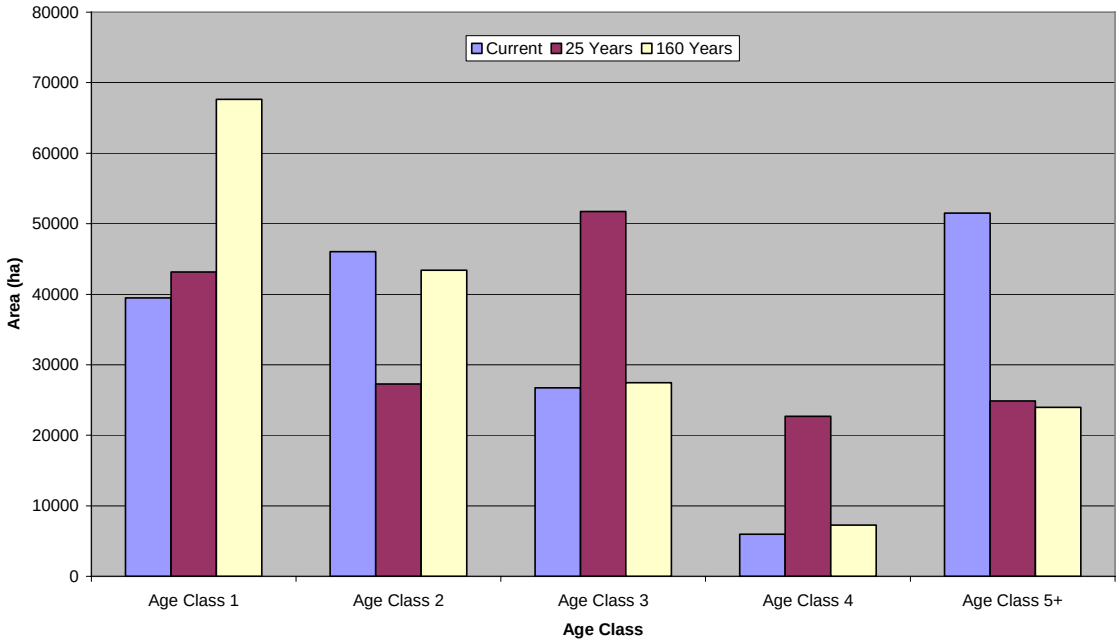


Figure 7c Change in age class structure in FMD 6 for the 160 year simulation period

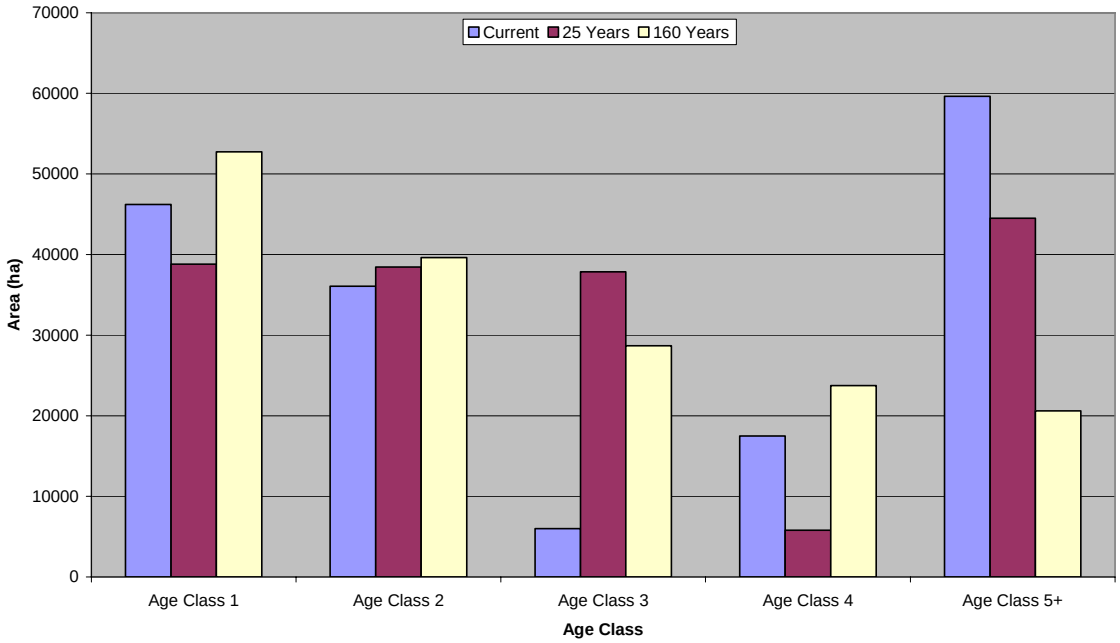


Figure 7d Change in age class structure in FMD 8 for the 160 year simulation period

This stems from the model requirement to maintain an even flow of fiber in each period while managing the district's wood supplies through their respective projected fiber shortfalls. Once the fiber shortfall period is over (approximately 25- 35 years time) the even flow constraint can be relaxed. This will result in higher future AAC's in these districts and better balanced ending age class structures.

Section 4 Values

4.1 Guiding Principles of Sustainability

There are five guiding principles of overall sustainability; environmental, economic, political, social, and cultural sustainability.

Environmental sustainability looks directly at ecosystem health, both now and in the long run. Ecosystem health is determined by such factors as ecosystem integrity, biodiversity, productive capacity, and resiliency as previously discussed. The five year operating plan must ensure that these factors are intact or there would be very few values left to manage.

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. This will probably remain the case until the economy improves. However, economic development should not proceed without the incorporation of the other factors into the decision making process.

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

Social sustainability means fairness and equity to all stakeholders. The forest management strategy should not jeopardize the basic needs of the public; therefore, public involvement and awareness, participation, and decision-making clout are a necessity.

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 has had free range in our pristine wilderness, a fact that can not be ignored when planning for the zone.

All are key interlocking components and each must be maintained if sustainable development is to be achieved.

4.2 Value Description

The forest ecosystems of the zone provide a wide range of values to different individuals and groups. These include consumptive values such as timber products, hunting,

trapping, sport fishing, and berry picking, and non-consumptive values like skiing, snowmobiling, hiking, and bird watching. Also, there are intrinsic and intangible values such as a feeling of wilderness and peace which some people describe as spiritual. Although difficult to spatially describe or quantitatively measure, these spiritual values are considered to be a product or an accumulation of all values. Other values such as water quality, parks and protected areas etc. provide for the protection of the forest ecosystems which can enhance the other values listed above.

Many of the values in the zone were identified by this or previous or planning teams. Presentations of pertinent information on each value by knowledgeable individuals or groups provided stakeholders with relevant information to make informed decisions. Other values, while not specifically outlined by the planning team, are also identified and discussed to provide a more complete description of the range of values found in the zone. The following represents a framework for characterizing values in a clear and consistent manner. This approach consists of three components:

Characterization

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

Critical Elements

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

Guiding Principles

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

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

Each individual value was discussed both at the strategic and operational level. Strategic level information (characterization, critical elements, and guiding principles) are the focus of discussion in this section. They provide a mechanism to resolve conflicts that might arise throughout or after the five year planning process. Where possible, the physical location of the value on the landscape (operational level) was also identified during the discussion of each value (see appendices 7-10). This will help facilitate the preparation of the five year operating plan by identifying potential areas of conflicting use early into the process.

In many instances, the Environmental Protection Guidelines **(**EPG's, Appendix 2**)** form the guiding principles for a value. Quite often the spatial extent or location of all values is not known (eg., raptor nests). Specific guidelines are still listed in order to provide a direction or course of action when and if these values are encountered.

4.2.1 Biotic Values

4.2.1.1 Big Game

4.2.1.1.1 Moose

Characterization:

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

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

4.2.1.1.2 Caribou

Characterization:

Caribou is the only native ungulate species on the island. Biologists estimate that prior to the railway being built in 1898 the population on the Island was approximately 100,000 animals but by 1930 the population had declined to about 2,000 animals. Between 1980 and 2000 the number

of caribou has increased considerably on the Island with a population estimated at 70,000+ animals. In the past few years however populations have declined significantly with Planning Zone 3 being no exception. All or portions of 5 caribou management areas 63, 64, 67, 68, 72, are located in the zone. The sensitive caribou habitat (i.e. calving and wintering areas) in Planning Zone 3 is shown in appendix 7.

Critical Elements:

Given that there is limited information about the distribution, movements, and habits of caribou in the zone, it is hard to determine what impact timber harvesting will have on these animals. Past studies have shown that forestry activities in the immediate vicinity of calving areas during the calving period have an impact on caribou populations. Recent studies and anecdotal information has indicated that the harvesting restriction zone around caribou calving zones may be significantly larger that first thought. It has also been shown that as roads are constructed and access is improved into remote areas, there is generally an increase in the number of animals which are killed due to road-kill and poaching. The abundance and distribution of arboreal lichens has also been shown to impact caribou populations.

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 Inland Fish and Wildlife Division (IFWD) 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 IFWD 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 moose yards, they will be identified in consultation with the Wildlife Division.

Caribou

- to ensure the continued protection of these animals the following EPG's will be followed during forestry activities;

- in areas where caribou utilize lichens, a minimum amount of lichen forest must be maintained for caribou. (This amount is to be determined through consultation with IFWD);

- harvesting and road construction will be minimized during the May 15 to July 30 calving period in operating areas adjacent to known calving areas;

- forest access roads, borrow pits and quarries shall avoid: known sensitive wildlife areas such as, calving grounds, post calving areas, caribou migration routes, caribou rutting areas and wintering areas.

Because the caribou population is in decline, the IFWD is in the process of identifying critical caribou habitat areas and is currently reviewing its guidelines for forestry activities within these areas. These guidelines will be developed cooperatively by wildlife division, forestry division, and the pulp and paper companies. Once finalized, they will replace and/or enhance those listed above.

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 IFWD.

4.2.1.2 Furbearers

Characterization:

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

Critical Elements:

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

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

Guiding Principles:

Fur Bearer Management Strategy:

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

Environmental Protection Guidelines:

To protect beaver habitat, all hardwoods within 30 metres of a waterbody occupied by beaver are to be left 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 in waterways surrounded by forested areas. There are 23 scheduled salmon rivers in Planning Zone 3 and population counts are conducted on four major rivers including the Exploits, Campbellton, Gander, and Terra Nova as well as on the Middle Brook system. Currently, there are two areas in Planning Zone 3 where estimates of brook trout populations are recorded. These include Indian Bay system and the Rodney Pond system (see appendices 7 and 8).

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. The Gander River system has 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 Inland Fish and Wildlife Division (IFWD) 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 IBEC and FABEC and DNR staff through surveys and research.

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 (GRMA, IBEC and FABEC). A one kilometre-wide management zone is currently regulated along the Gander River for protection of salmon habitat. The Crown and both paper companies have negotiated with IBEC, FABEC, and GRAMA resulting in increased buffers on waterways within the Indian Bay, Middle Brook, Terra Nova and Gander River Systems.

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 keep these populations in check. Consequently, their value cannot be underestimated. The relative abundance of songbirds in our forest ecosystems, at different times during the year, and the maintenance of a tracking record for songbirds can help to indicate the overall quantity and quality of habitat in the districts.

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.)

As with the moose, protection of these species will mainly involve protection of their habitat through the various methods indicated earlier.

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. The location of sensitive avian habitat is shown in appendix 7.

Critical Elements:

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

Protection

- Under the Guidelines for Ecologically-based Forest Management, no forestry operations are to occur within 800 metres of a raptor nest during the nesting period and not within 200 metres in the off nesting season. These guidelines are attached as terms and conditions to all commercial operator permits.

- The locations of all known bald eagle and osprey nests will be identified on all cutting maps, and harvesters will be informed of their locations by DFRA staff. Regular operator checks and routine patrols of domestic cutting areas by DFRA staff will ensure compliance of these guidelines.

- Sensitive waterfowl habitat has been protected through the increase of buffers to 50 meters on certain ponds on recommendation by the CWS, and the establishment of municipal wetland conservation areas in the planning zone by the Eastern Habitat Joint Venture through stewardship agreements with municipalities.

4.2.1.3 Rare and Endangered Species

4.2.1.3.1 Pine Marten

Characterization:

Before 1900, marten ranged over most of the forested areas of the island but, unfortunately, today is listed as an endangered species by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC). Habitat loss, predation, disease and accidental trapping and snaring are thought to be the primary reasons for the marten population decline in Newfoundland.

Marten still naturally occurs in three main areas on the island including the 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 as 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, DNR Forest Service, IFWD and the paper companies sit 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 to recommend ways which this may be accomplished. The Team is now in 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 3 0.

It is important that marten habitat be protected in this area. Furthermore, it is important that some remnant stands of old growth (80+) forests be left throughout the zone and provision made to have connectivity (i.e., unbroken corridors of forest) between such stands. 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. Potential critical habitat for pine marten in Planning Zone 3 is shown in appendix 7.

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;
- core marten area in Main River (i.e., the marten study area) remain closed to snaring and

trapping
- 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. Pine marten is also being evaluated as part of an ongoing biodiversity assessment project (BAP). The Forest Service is a cooperative partner in this project and progress is closely monitored. 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.

4.2.1.3.2 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 that the status the status of special concern should be maintained. Banded killifish populations in Newfoundland are scattered over a wide range, but local populations are restricted to very confined regions within their respective watersheds. Populations in Newfoundland appear to be locally abundant in representative populations that were sampled (i.e. Indian Bay watershed, Loch Leven and Freshwater Pond). Although multi-year data is not available, population estimates from 1999 indicate that over 20,000 individuals exist in the Indian Bay watershed (see appendix 7). Estimates are not available for other local populations (Chippett, 2003). Additional population information, including catch per unit effort in the three population sites, is outlined in Chippett (2004). Although no killifish have been officially reported in other areas of the planning zone, it is thought many other areas may contain suitable habitat.

Critical Elements:

- water quality maintenance;
- riparian buffer zones along water systems

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 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).

- Furthermore, protection for these species is strengthened locally through partnerships with the community-based watershed management group IBEC. Both paper companies have negotiated with IBEC resulting in increased buffers on waterways within the Indian Bay.

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

4.2.1.3.3 Red and White Pine

Characterization:

Provincially, the range of white pine in the province is shrinking, due to past harvesting practices and infection from blister rust. Significant stands of white pine however, still exist in all forest management districts of Planning Zone 3. Red pine is the rarest tree species in the province, with a distribution of some 22+ small scattered stands (<15,000 trees in total). It is, however, represented fairly well in Planning Zone 3. For example, a 400 ha (approx.) mature stand exists at Grant's Pit in FMD 5. There are native red pine stands in FMD's 4 and 8 as well. The Grant's Pit stand is the largest (5000 trees approx.) known to exist in the province (Roberts, 1985). Since both of these species occur in Planning Zone 3, local protection is required to maintain local and provincial biodiversity. The location of known natural red and larger white pine stands within the planning zone is shown in appendix 10.

Critical Elements:

- maintenance or enhancement of stands on the land base
- minimizing loss of trees/stands through public education
- minimize losses to fire, insect and disease
- enhancement of younger age classes through planting natural regeneration and pruning to

ensure continuance of the species
- maintenance of native genetic stock

Guiding Principles:

- enforcement of forestry act, regulations, guidelines and policies

- gene preservation gardens for these species and a 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 policy of no cutting 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 will be strengthened by public education, 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.

4.2.1.3.4 Red Crossbill

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

4.2.1.4 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 is approximately 157,000 ha or 11 percent of the total area of lakes, ponds, rivers, brooks and streams. In the zone, water is used beneficially for numerous purposes (see appendix 8). There are 77 communities within the zone which derive their potable water from 58 Public Protected Water Supply Areas (PPWSA's). The Department of Environment monitors the water quality of these protected areas. Recreational waters within this zone are used for activities such as fishing, boating and as a water supply source for numerous cabin owners. Industrially, waters within the zone are primarily used for hydroelectric production on the Exploits River at Bishop's Falls and Rattling Brook in Norris Arm and for irrigation on agriculturally developed land, primarily in the Wooddale area.

Human activity on the land has the potential to alter water quality and water quantity. Commercial forest harvesting is the predominant industrial activity and occurs throughout the zone. There is a vast array of roads associated with the harvesting and traditional access routes as well as newly constructed roads which dissect the zone. 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, use and 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 major resource values of the forest ecosystem is the 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 and equipment and for heating and cooking. With the increase in population, more commercial uses have arisen to supply lumber and pulp and paper products. The zone supports a combined annual allowable cut (AAC) on Crown land of 51,500 m^3 softwood and 3990 m^3 hardwood in FMD 5 and 76,900 m^3 softwood and 6,940 m^3 hardwood in FMD 8. Additionally, an annual harvest of approximately 5,000 m^3 and 8,000 m^3 of residual hardwood associated with softwood stands from Crown land in FMD's 5 ad 8 respectively is anticipated.

Domestic harvesting still provides fuelwood to heat many homes and sawlog material for residential house construction in the zone. In fact, the latter domestic use is one of the reasons why this Province has the highest rate of home ownership in the country. There are approximately 2000 permits issued on Crown land in FMD 5 and 3000 permits in FMD 8. As well, approximately 1500 and 400 domestic permits are issued annually on CBPPL and ACCC tenure respectively in the zone as well.

Commercial activity accounts for over 78 percent of all harvest by the Crown in the zone. There are on average 110,000 m^3 of timber harvested commercially for sawlogs and 55, 000 m^3 harvested for pulpwood in Planning Zone 3 each year. Commercial activities provide many jobs in harvesting, sawmilling, trucking, pulp and paper manufacturing and related spin off industries for local residents. There are approximately 280 full time and 654 part time direct jobs created by the industry in the zone, with an estimate of nearly twice that many in spin off industries. An analysis of the forest industry from a harvesting perspective in Planning Zone 3 was completed by the Newfound and Labrador Lumber Producers Association (NLLPA) and presented to the planning team (see Appendix 15).

Silviculture treatments are important to the forest resource of the zone because they ensure a vigorous and healthy forest is maintained. Forest renewal activities are critical because they ensure that the productive land base is maintained by planting areas that are not sufficiently restocked. Forest improvement activities help improve and enhance the growing stock which can reduce harvest cost, enhance forest product options and increase sustainable timber supply. There is approximately $1,000,000 spent on Crown conducted silviculture in the zone each year, supporting more than 75 seasonal jobs.

Timely access to timber is critical to planning any forestry operations. Primary, secondary and tertiary roads form an integral part of operating areas and are used after timber extraction is completed for recreational purposes. In excess of $750,000 is spent by the Crown to construct forest access roads each year in the zone.

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 will be required. A large fire today in the older softwood cohort 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 balsam fir thinning in the zone that is paramount to future AAC's. Protection of other resource values through modification of activities and enforcement is also important.

Spruce and Fir

Black and white spruce and balsam fir are the main sawlog and pulpwood species in the province. In the planning zone, black spruce accounts for more than 90 % of the softwood harvest for these products. 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 district. These species will be 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 current AAC's as the land base changes.

White Birch

Traditionally, white birch has been a valued species for domestic fuelwood. Today, however, it is emerging as an important value-added species in 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 CBPP limits in the planning zone (see appendix 10). 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 only 15% of the forested land base in the planning zone. Recently, there has been a departmental policy shift to manage this species on a maximum sustainable basis as with spruce and fir. In 2002, the first AAC's were developed for white birch that have been refined in 2005 (see section 3). Paramount in sustainability of a species is its ability to regenerate. To ensure sustainability of white birch in the planning zone, silvicultural prescriptions designed to favour its regeneration are being investigated (see section 7). This will ensure a birch component is maintained on the landscape, increase the diversity of both flora and fauna and maintain natural processes within managed stands.

Critical Elements:

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

- maintenance or enhancement of productive land base
- planting of non-regenerating areas
- maintenance of the white birch component in the land base
- minimizing loss of land base to other users
- minimize losses to fire, insect and disease
- timely access road construction
- enhancement of younger age classes through thinning to correct age class imbalance

- maintain both a sawlog, pulpwood and firewood industry in the zone through timber exchanges
- 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 forest activities. These EPG's are outlined in their entirety in Appendix 2 with some highlighted subject areas listed below:
- silviculture and harvesting activities
- mineral soil exposure
- buffer requirements
- road and bridge construction
- garbage disposal
- fuel storage

4.2.2.2 Agriculture

Characterization:

Studies show 100,000 ha or 0.9% of the Island has mineral soils suitable for farming. There is substantial agriculture industry in the zone, an industry with considerable potential to expand and provide increased economic benefits to the local area. Commercial agriculture is concentrated in Campbellton, Comfort Cove, Gambo, Northern Arm and Pleasantview and the agricultural products produced represent a significant portion of the total agriculture industry in the province. There are 70 commercial farms in Planning Zone 3 (see appendix 10) with total farm cash receipts amounts of $5.7 million annually with $3.2 million contributed from the livestock sector (poultry, beef, hogs, sheep and fur) and 2.5 million contributed from the Crops Sector including which includes vegetables, small fruit, forages, Christmas trees and greenhouses production. There is also a peat harvesting industry (Hi Point Peat) near Bishop's Falls. Recently, in the province there has been a thrust to develop more area for blue berry management. Blue berries originating from managed areas will fetch a higher market value than wild berries. In the past few years, 40 + ha have been developed for intensive blueberry management. Two areas, namely Northern Arm and Cotrell's Cove have been developed in Planning Zone 3.

Critical Elements:

Surveys indicate that approximately five percent of the soils in the province are suitable for

agriculture. It is not possible to identify and plan all sites for future agriculture use and often there is a conflict with other land uses particularly forestry because these sites are of high growing capability. Although a suitable land base is the first critical element necessary for a successful agriculture operation, markets and the interest of individuals are also prime factors in the development and location of future farms. In the spirit of managing the ecosystem for multiple benefits, provisions must be given for the agriculture industry to expand. This is particularly important for areas outside established agriculture areas.

Guiding Principles:

Lands designated for forest management can include areas with high potential for agriculture. Consequently, the forest landholders will work with the Department of Agriculture to determine if opportunities exist for an exchange between agriculturally viable forest areas with unsuitable agriculture land within the Agriculture Development Areas.

The agriculture leasing policy initiated in 1976 ensures that 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. Also it is a policy for the Forestry Branch in Planning Zone 3 to support the development of new agricultural leases in the zone that have the approval of the Agrifoods Division of the Department of Natural Resources.

4.2.2.3 Mining

Characterization:

In 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 can be viewed in 18 sites of geological significance (designated GS in appendix 9 in FMD 8. These sites illustrate geological features, such as rock types and rock formations that indicate the processes and geologic ancestry of the parent material from which some of the soils of the planning zone's ecoregions were derived. Some sites are also known to contain fossils. These Geostops can therefore be considered as important educational sites, as well points of interest for tourists.

In the zone there are 5600 mineral exploration claims staked and registered. The majority of these claims have been staked for their precious (e.g. gold, silver) and base (e.g. zinc, copper) metal potential and dimension stone (e.g. granite, gabbro) potential. 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. The activities have been concentrated in the Gander River Valley. Exploration activities typically consist of prospecting, geological mapping, grid line-cutting, geochemical surveys, ground and airborne geophysical surveys, mechanized trenching and diamond drilling. In addition, there are a large number of active quarries in the zone which generate significant royalties. These figures

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

Critical Elements:

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

Guiding Principles:

Harvesting timber for prospecting lines must meet the same rigor as commercial harvesting. The mining industry should enact best management practices to ensure little to no impact on ecosystem values.

4.2.2.4 Historic Resources

Characterization:

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

Archaeological sites are non-renewable resources and play a vital role in understanding our heritage. It is important to professionally record as much information as possible at an archaeological site in order that one may fully understand its history. In order to do this properly the site must not be disturbed. Very often, 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 found in the zone. 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 the native peoples, indigenous to this part of the island in the past. While some of these sites have been developed (Boyd's Cove, the Beaches, the Quarry and Wigwam Point, (appendix 9), 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. Boyd's Cove and Burnside, for example, 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. These businesses include bed and breakfasts, boat tours, restaurants and gift shops.

Critical Elements:

Major threats to historic resources are projects involving activities which disturb soil layers and/or provide unintended public access to the archaeological resources. Forestry activities such as construction of access roads and bridges, harvesting and mechanical site preparation have the potential to destroy 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 and preserved.

Guiding Principles:

Any project involving land-use has the potential to adversely impact historic resources therefore it is important that the Provincial Archaeology Office be involved at the planning stage in order to ensure that mitigative measures to protect historic resources are developed at the earliest possible time.

In order that known archaeological sites and potential unknown sites are protected from forestry activities, buffer zones will be necessary in some areas whereas archaeological assessments may be required in others. Known archaeological sites must be avoided and buffers will be required around them. This also requires that the site and applicable buffers be removed from the operational forestry landbase. Archeological buffers are typically required along rivers and ponds, as well as along the coastline where there is potential for archaeological resources to be found is greater.

Occasionally there are accidental discoveries made of historic resources. In the event that 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 to maintain ecological integrity. Although

enshrined in policy for many years, this role has recently been given prominence in legislation by the passing of the Canada National Parks Act in October 2000. The Report of the Panel on Ecological Integrity of Canada's National Parks (February 2000) noted that parks all across the country (including TNNP) are under threat from stresses both within and outside the national parks. Ninety percent of forested parks are under stress from external forestry activities.

The primary challenge for national parks in maintaining their ecological integrity is that most parks are part of larger ecosystems and the area set side for the parks is not large enough to protect the full integrity of that ecosystem. Large-scale changes on the landscape surrounding parks can isolate the park ecologically creating an "island". Parks Canada must work with adjacent land managers in striving to achieve its mandate.

Biodiversity goes beyond the range of wildlife and plant species to include the range of habitats and landscapes. Loss of special habitats such as old-growth forest and associated species may impair the ecological integrity of TNNP in ways that are not currently understood. In recent history, the endangered Newfoundland pine marten has been relocated to the park and in some of the adjacent forest area in FMD 4. Habitat connectivity with other core populations may be critical to long term survival of marten in TMNP. While ecological integrity has prominence regarding the management of national parks, legislation and policy dictate broader responsibilities for national parks. These include providing opportunities for Canadians and others to have high-quality experiences in a natural setting.

Critical Elements:

- to maintain ecological integrity

- to maintain native biodiversity and natural processes.

- to maintain viable wildlife populations

Guiding Principles:

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

- maintain species composition as well as the age structure and ecological functions of the various forest-types across the landscape over the long term.
- maintain proportion of interior forest (mature forest >250 m from an “edge”)
- maintain landscape connections between the park and the surrounding landscape. This would require effective, permeable movement zones between populations and/or critical habitats.
- manage and operate according to the precautionary principle, particularly as it relates to species at risk.
- ensure landscape characteristics are maintained that allow marten to achieve their habitat requirements at the landscape scale. This could mean ensuring forest management practices allow for a continuous distribution of marten habitat and home ranges to the park boundary. A conservative approach that preserves future options should be adopted until the marten guidelines are fully developed.

4.2.2.6 Recreational Trails

Characterization:

Newfoundland T'Railway

A large section of the Newfoundland T'Railway Provincial Park lies in the zone (see appendix 9) 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 the 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. The T'Railway 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, quarry and mining access and cabin access are also permitted with a special permit.

Other Trails

In addition to the T'Railway Park just described, there are at least another 45 + recreational trails that protect heritage and provide for expanded recreational opportunities within the planning zone8. Some of these are shown in appendix 9. Among the more important historic trails are the trails of Eastport and Twillingate, New World, Cottle's and Fogo Islands. These trails are traditional walking links between the communities and now lead to vantage points to scenic ocean vistas, whale and iceberg watching. Today, they provide recreational opportunities for hiking, skiing, viewing of exceptional landscapes, and nature walks, as well as preserving our heritage of isolated fishing and logging communities.

Critical Elements:

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

Guiding Principles

- coordination of activities with various other agencies responsible for land management outside the T'Railway corridor to ensure that the integrity of the park is maintained
- coordinate and build partnerships with other stakeholders and user groups such as communities, industry and recreational organizations for the long term maintenance and

development of the trails
- in an attempt to preserve the natural value of the T'Railway, other land management agencies are requested to maintain a 100 m buffer along the right of way 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 by DNR.

4.2.2.7 Parks and Protected Areas

Characterization:

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

There are many types of protected areas in the province. The Wilderness and Ecological Reserves Act enables the Province to establish the following; wilderness reserves (Component 1), ecological reserves (Component 2) and protected sites (Component 3). Component 1 reserves are defined using the critical habitat of high level, wide ranging species i.e. caribou. They generally cross ecoregion boundaries, protect complete systems and are large (> 1000 km^2). Component 2 reserves protect representative samples of ecoregions (not included in Component 1 reserves) and are mid-sized (50-1000 km^2). Component 3 reserves protect exceptional natural features, such as, rare species or areas of unusual biological richness and are generally small (< 50 km^2).

The benefits of protected areas are to preserve biodiversity, provide areas for scientific research, provide opportunities for environmental education and provide standards against which the effects of development can be measured.

Protected areas in the zone include: the T'Railway, Terra Nova National Park, Bay Du' Nord Wildnerness Area, and Notre Dame Junction, Dildo Run and Johnatahn's Pond Provincial parks. 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. Appendix 10 illustrates the location of existing protected areas in relation to the districts.

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 that they do not compromise the integrity of the reserve
- prohibit all forms of new development such as mining activity, hydroelectric projects, forestry activity, agriculture activity, roads and trails and cabins and new structures.
- where forestry operations are within one kilometre of provisional and ecological reserves, wilderness reserves or provincial parks, modified operations may be necessary

4.2.2.8 Outfitting

Characterization:

An economic impact study conducted in 1995 by the Department of Industry, Trade and Technology suggests that 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. Appendix 9 indicates the location of out fitter lodges in the planning zone.

Over the past 10 years, a significant number of traditional hunting and fishing flities have diversified into the non-consumptive areas 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 impacting 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. Forest access roads inevitably impact the ability of a camp to maintain its remote status. Increasing accessibility through increased access roads can also lead to increased hunting and fishing pressures in a given area. This can in turn lead to decreased success rates of tourists. This is of particular concern since Newfoundland is often the hunting destination of choice due to success rates upwards of 80 percent. An increase in access roads also tends to lead to increased cottage development that in turn can have an impact on both remoteness and game availability.

Removal of large areas of forest has the immediate effect of destroying big game habitat,

particularly winter cover, although this impact has been poorly studied (particularly in remote areas). Forest harvesting also has the ability 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 that which has been experienced by the senses (i.e. sights, sounds, smells, etc.).

In some cases, past harvesting practices has resulted in increased levels of garbage (skidder tires, abandoned buses, heaps of oil containers, etc.). This can be frustrating for outfitters who concentrate on not leaving permanent marks on the landscape. Possible erosion caused by hillside logging and heavy equipment use is also a concern - particularly due to its possible effects on water quality for fish habitat.

Guiding Principles:

It is necessary that "no harvest" buffer zones be left around outfitting camps that are agreed to by all parties involved. Buffer zones can be difficult to negotiate due to varying ranges of activity from operator to operator. Some operators make use of areas that are 8 to 10 kilometers away from their camps.

- consideration should be given to decommissioning roads and bridges (where possible) after harvesting is completed. This will eliminate damage to the hunting area by reducing the possibilities of increased hunting pressure. When roads are in use actively for harvesting purposes, access to hunters should be restricted or limited.
-cottage development should be prohibited in areas adjacent to outfitting operations. This requires more vigorous enforcement of buffer zones and development of buffers for spike camps.
- harvest in the winter whenever possible. Winter roads are less passable in summer and fall and will help to reduce traffic. These roads will also be cheaper and easier to decommission.
- construct new roads as far away from existing outfitting camps as possible. The benefits of this are obvious. 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 should be carried out in compliance with existing regulations
-efforts should be made to ensure that the integrity of the view from outfitter cabins is maintained when conducting forest operations.
- forest operations should ensure that whatever is brought into an area is removed from the area once harvesting is complete.

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. Appendix 9, illustrates the location of the known existing recreational areas in the planning zone.

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 will result in a decrease in these recreational activities for some period of time.

Accessibility

An increase in forest access roads will inevitably increase the amount of accessibility to remote areas. This in turn will increase the amount of traffic in an area (both vehicular and pedestrian) and decrease the value of the experience for many recreational activities.

Viewscapes

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

Guiding Principles:

To prevent negative ecological effects and to ensure a positive experience, 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. If operations are necessary, stakeholder meetings could prevent conflicts through temporal scheduling.

Limiting Accessibility

Decommissioning of forest access roads could be a possible option when harvesting operations are completed. Harvesting should be conducted using winter forest access roads where possible. Winter roads create less traffic and require less effort to decommission. If possible, the Crown

Lands division of the provincial government should implement a complete moratorium on cabin development on newly developed forest access. Cabin development will increase traffic in areas where many recreational activities occur. This in turn will negatively impact those recreational activities that require remoteness, and a pristine environment.

Viewscape

In areas where forest operations must occur to sustain industry in association with high concentrations of recreational activities, aesthetic views should be maintained using landscape design techniques where possible when conducting forest operations. This is especially relevant in areas where the recreational activities are occurring because of the aesthetic view.

4.2.2.10 Tourism

Characterization:

The tourism industry in Newfoundland and Labrador is based on our natural and cultural resources. Protection of these resources is critical for our industry to survive and grow**.** We currently have the resources to compete internationally with tourist destinations however, competition for the international traveler is high in the tourism marketplace. The tourism industry in Newfoundland and Labrador has experienced significant growth since 1997. Tourism has been contributing between $580 million 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 (appendix 9). 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 to minimize the visual impact of harvesting operations on the aesthetic values associated with viewscapes. Also in other important tourism areas including the Gander River, Indian Bay water system and the Freshwater, Alexander Bays water systems the Forest Service, CBPPL and will continue to work with GRMA, IBEC and FABEC to examine the viewshed issues where applicable. Strategies can then be discussed, negotiated, and implemented to provide a balance between harvesting and the values associated with tourism.

Section 5 Public Consultation Process

5.1 Planning Objectives

Resource managers in Canada in the 21st century are striving for a society that successfully integrates economic, environmental and social considerations into all resource-related decision making. Since the early 1990's, there has been a country-wide shift from single resource management to a more comprehensive approach of forest ecosystem management. In attempting to provide the greatest good for the greatest number of people for the greatest period of time, sustainable forest management (SFM) must be balanced in light of social, economic, and environmental issues. In the context of SFM this shift has resulted in a move from the traditional, narrow focus of timber management to incorporate non-timber values into the management planning framework. Another term that has become closely associated with SFM is "sustainable development." Sustainable development, or in this case "sustainable forests", not only takes into account the social, cultural, economic, and environmental benefits of the present, but those of future generations also. Public engagement is recognized by the Department of Natural Resources as a key component to achieving sustainable development and the department is appreciative of the enduring level of interest and support demonstrated by stakeholders.

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

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

1. Establish a productive planning framework to include all stakeholders. An effective planning framework must have information and issues defined at the beginning of the process.

2. Learn more about forest ecosystems while they are being actively managed (i.e., adaptive management). Adaptive management incorporates strategies which help us to learn about the forest ecosystem and to deal with uncertainties.

3. Establish an ecosystem approach to forest management which integrates the scientific knowledge of ecological relations and limits of growth with social values. This will help to attain the goal of sustaining natural ecosystem integrity and health over the long term.

Adaptive management makes decisions based on input from all the stakeholders involved, and it establishes a continuous learning program. The adaptive approach allows us to communicate,

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

5.2 Planning Framework

As previously stated, this plan is being written for Planning Zone 3 and not a specific district. During previous planning processes there were planning teams established for each district. A strategy document was prepared for the entire district and separate five year operating plans were prepared for each major tenure holder within the district. With the recent legislative change to planning on a zonal basis, the decision was made to combine individual district planning teams into a single zonal team which would meet in one central location. Accordingly, a combined planning team made up of members from both the FMD 4, 5 & 6 and the FMD 8 stakeholder groups was formed. Consultation meetings were held in Gander, a central location within the zone.

5.3 Planning Team Participation

An initial news release was made by The Minister of Natural Resources on January 24, 2006 announcing that public meetings to form district planning teams to develop new five-year forest ecosystem management plans would soon start at various locations across the province. Ed Byrne, Minister of Natural Resources, emphasized the importance of the district planning teams in providing the public with the opportunity to have input into forest management throughout the province. Through participation in the planning teams, individuals and stakeholders could take part in open, consensus-based forums that address a wide range of forest management issues. The Minister encouraged participation in the forest management planning process.

This release was followed by a widespread email sent to potential interest groups and individuals (developed from two previous planning exercises) which was circulated to inform potential participants of an initial meeting in Gander on February 1, 2006. A listing of all individuals and the interest groups they represented that actually participated during the consultation process is presented in appendix 1. The initial meeting was designed to inform attendees of the change in the planning framework as a result of the new legislation, the ground rules for participation, and to invite stakeholders to form the new planning team for the districts within Zone 3. A professional facilitator (David Smallwood and Associates Ltd.) was contracted by the department to conduct the stakeholder consultation meetings, gather and maintain minutes and support the dissemination of resource material to the various stakeholders via a secure Department web site. Planning team membership was not restricted to those listed in appendix 1; rather it remained open to anyone who wanted to join the process at any time.

As outlined previously in the Timber Supply Analysis section, harvest scheduling was used to identify, on maps, where harvesting should take place for the next 25 years. These maps which formed the basis of the eventual proposed harvest blocks were posted on the planning team's secure departmental web site prior to meeting #2 of the planning process. They were used in subsequent meetings to give particular emphasis to harvest areas for the next 10 years. Each of

the ten meetings focused on a particular value or values, thus the maps were available to identify any particular area of conflict when the values were discussed. Through this approach, areas where conflicts exist were identified and any remedial action or process to mitigate the conflict could be developed for inclusion in the plan.

Changes to harvest areas or processes adopted to resolve conflicts, wherever possible, were adopted throughout the planning process and reflected in the final operating areas presented in this plan. The changes or modifications to areas or processes that were established will be discussed in later sections of this plan.

5.4 The Consultative Process: Issues and Consensus

Significant discussions revolved around the harvest strategy for districts 4, 5, 6 & 8; protection of fresh water resources, big game (specifically caribou), waterfowl and endangered species habitat protection, protection and enhancement of valuable tourism assets, establishment of protected areas under the Natural Areas Systems Plan, agrifoods development opportunities, alternative value added products (birch sap, manufactured wood products) riparian buffers; decommissioning of roads and cottage development. The planning team was able to come to a consensus on a number of these issues, including the harvesting strategy for the district, riparian buffers and decommissioning of roads, species habitat protection, agrifoods, value added products. Consensus was not reached on management of cottage development within the planning zone, establishment of an ecological reserve, or protection and enhancement of some valuable tourism assets.

The harvest strategy, which focuses on targeting the oldest and poorest condition stands in the districts during the next 5-10 years, is detailed in section 6. Implementation of the harvesting strategy will require the local forest industry to utilize a poorer quality resource for a number of years. Altering from the prescribed harvest schedule in Zone 3 could result in a future reduction in the District's sustainable harvest level. The forest harvesting sector had good representation at the planning team table. There were no dissenting positions from any team member with respect to the department's overall harvest strategy.

Protection of the freshwater resources in the planning zone as they related to their importance as fish habitat in addition to their use a public water supplies warranted significant discussion both within the stakeholder team and between the various timber harvesting proponents and the three fresh water fisheries management groups. Separate discussions with freshwater fisheries management groups were facilitated by DNR managers and resulted in several Memoranda of Understanding. The function of riparian buffers and the appropriate local management of these ribbons of landscape generated discussions during the planning process. At this time, the minimum (and by fare most common) riparian buffer requirement in the planning zone is 20 metres. The planning team had an advocate for harvesting trials within these no-cut buffers. Consensus was achieved by an agreement that trials could be conducted in riparian buffers that were laid out in a wider configuration specifically designed to accommodate future trials.

The issues of road decommissioning was discussed and debated, particularly between the Forestry Branch of the Department of Natural Resources, Tourism, Culture and Recreation, DFO and freshwater fisheries management groups. All parties eventually reached a consensus on

decommissioning of forest access roads. It was agreed that decommissioning can take many forms ranging from complete rehabilitation approximating pre-disturbance conditions to limiting access by particular vehicular traffic e.g. automobiles based on the value to be protected and the stakeholder objectives.

Agrifoods development within the planning zone could be a significant competitor for productive forest land. However, DNR will make best efforts to support agricultural development proposals provided they are approved and fully supported by the Agrifoods Branch and they do not encompass previously silviculturally treated areas. Growth in the value added forest products industry is reflected in the emergence of both non-timber forest products (birch sap) and expansion of manufactured wood products (log homes, panelling, siding and flooring) within the planning zone. DNR is supporting the research of birch sap production by facilitation of the temporal reserve from harvesting of three study areas located on CBBP limits in FMD 5. DNR also supports the development of manufactured wood products by encouraging business relationships between harvesters and emergent manufacturing facilities.

The potential impact of harvesting activities on big game, waterfowl and endangered species habitat was identified and discussed by stakeholders representing the Wildlife Division, DFO, Eastern Habitat Joint Venture and Terra Nova National Park. Subsequent strategies designed to minimize potential impacts are detailed in Sections 4 and 8.

Exhaustive efforts by the stakeholder planning team to influence the development of the Provincial Natural Areas Systems Plan have, to date, been unsuccessful. A majority of the team members fully support the establishment of a representative ecological reserve in a large area south of Gambo Pond; however these attempts have not been supported by the Wilderness and Ecological Reserves Advisory Committee. DNR will continue to support the Gambo Pond Alternate area during this planning period. Accordingly, DNR is not currently proposing any commercial harvesting operations within the boundaries of the Gambo Pond Alternate area.

Consensus was not reached on how future cottage development should occur in the planning zone. It was acknowledged by the planning team that the cabin get-away offers a popular recreational opportunity to many Newfoundlanders and represents an important social value. Cottage development and use also provides and economic stimulus in rural Newfoundland. On the other side of the debate, cottage development is a permanent fixture on the landscape. It can have negative ecological impacts by potentially impairing water quality; encroaching upon wildlife habitat; increasing hunting and fishing pressure; and, in some instances, leading to ATV access into remote ecologically sensitive areas. Cottage development can also have negative economic consequences by potentially leading to crowding of strategic fish and game resources (and potentially abrogating tourism development opportunities) directly or, through its sphere of influence (i.e. protected buffers) indirectly removing productive forest land-base from access to the forest industry. The current Crown Land approval system does not provide an opportunity for all values to be fully considered when making Crown land management decisions and therefore, Crown land developments may compromise other sustainable development activities.

Forestry activities in the vicinity of clusters of tourism assets are recognized to have the potential to degrade the ambience of these assets in the short term and promote crowding through

increased accessibility to remote areas. DNR has committed to implementation of viewscape management strategies in applicable areas and will continue discussions aimed at minimizing potential impacts of road networks.

Section 6 Management Objectives and Strategies

6.1 Harvesting

As previously stated, the forest in the zone is part of the boreal forest which is characterized as being disturbance driven resulting in the formation of relatively even aged stands. The clearcut silvicultural system most closely emulates this natural disturbance pattern and therefore is the most preferred method employed for harvest. The size, shape, arrangement and juxtaposition of clear cut areas vary across the landscape depending on localized topography and terrain conditions. A modification of the clearcut system takes place in domestic areas whereby the cuts are relatively small and disbursed resulting in the creation of a range of age and development classes.

Operational trials on partial harvest are currently being conducted in the Main River area to address pine marten and other connectivity concerns. The results of these trials will be monitored to determine applicability in other regions of the Province. The clearcut system is the only system being considered in the zone at this time however.

6.1.1 Commercial

Section 3 outlines in some detail the general approach for the timber supply analysis and specific results and sensitivity analysis for both districts in the zone. The model used to calculate the wood supply is a maximization model which outlines 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 that is in the 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 industry. More specifically, sawmills in Glenwood, Cottlesville, Campbellton and Glovertown do not have access to enough Crown timber to continue sustained operations at current production levels. To help alleviate this problem, the Crown has negotiated a series of transfers and exchanges with ACCC (Section 1.1.3) in order to secure a stable supply of timber for these mills. With this arrangement, the sawmills utilize the sawlog material from these areas and sell the pulpwood and pulp chips (sawmills residue) to ACCC. As well, these operators trade pulpwood from their Crown cutting permits with both paper companies for sawlogs which also increases their supply.

Specific commercial strategies are as follows:

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

6.1.2 Domestic

The harvest of domestic fuelwood and sawlogs occurs from three main sources in the zone; from designated domestic cutting blocks on Crown land, from cutover clean up on Crown and Industry limits, and from landing and roadside clean up on both Crown and Industry limits. For the designated cutting blocks, the harvest scheduling and priorities apply, however it may not always be practical to follow. Domestic cutting blocks are generally established near communities where concentrations of timber that is eligible for harvest exist. Mixed within these blocks may be timber that normally would not be scheduled for harvest in the planning period. Ideally, each individual domestic cutter would be issued their own cutting block which would ensure harvest of optimal stands. This is not practical however and domestic cutters are allowed to cut anywhere within the designated area provided that immature timber is not harvested. For this reason, the optimal harvest schedule may not always be followed in domestic areas. Utilization of cutover residue, dead timber and scrub areas which are not part of the timber supply analysis, more than makes up for this difference however.

Specific domestic strategies are as follows:

- target low volume stands that have poor commercial harvest chances
- encourage use of under utilized firewood species (larch, aspen and maple)
- target burned and insect damaged stands that are beyond commercial salvage.
- where possible, target alienation Class 3 lands that have low commercial potential
- in areas of high domestic demand, limit volume allocation in designated cutting areas and encourage alternate sources (cutovers, landings, scrub etc)
- monitor stands harvested in domestic cutting areas for compliance to the harvest schedule

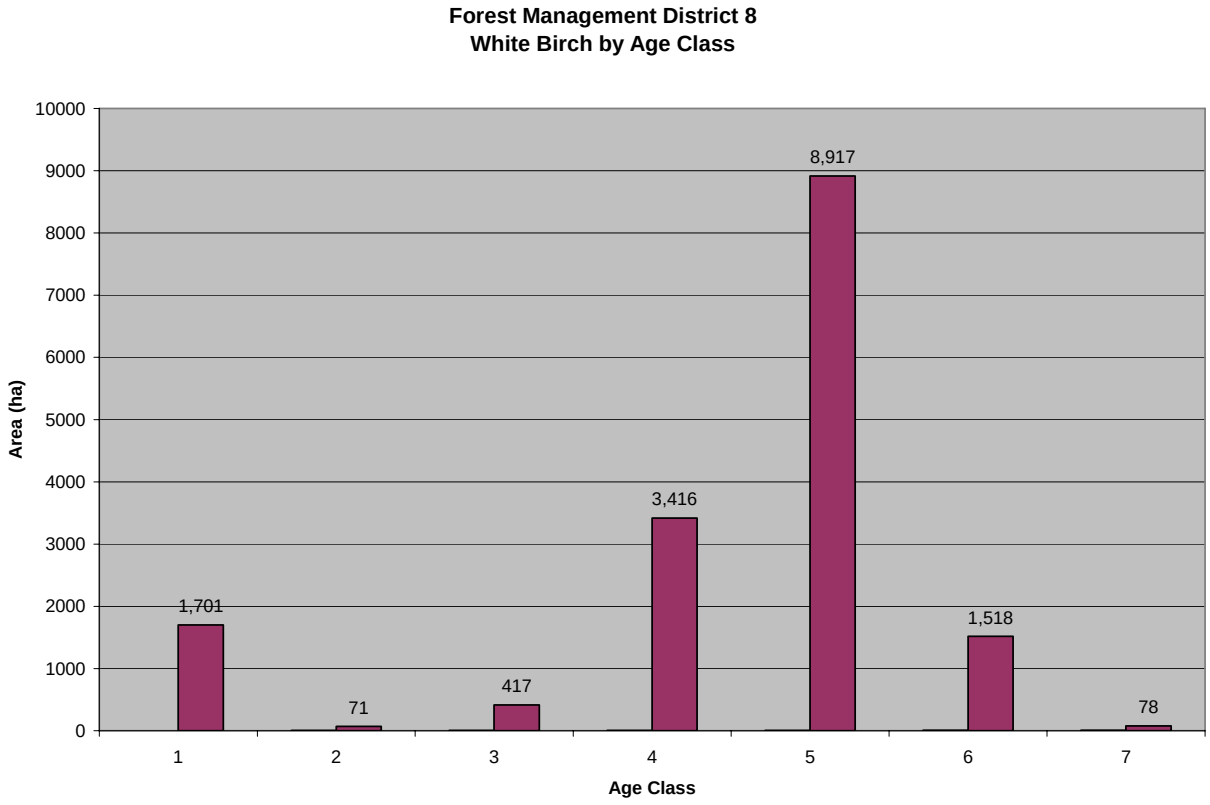
6.1.3 White Birch

The harvest of white occurs throughout the planning zone in close association with the softwood harvest for sawlogs, pulpwood and firewood. In many instances it is an integrated part of both commercial operations and domestic harvesting. In recent years their has been an increase in the

commercial demand for white birch sawlogs as a result of the development of several value added sawmills in the province (two in Planning Zone 3) focusing on products such as cabinet stock, flooring, guard rails posts and pallet stock. This increased demand can be addressed in the short term on Crown land in FMD 8.

During the 2006 -2010 Wood Supply Analysis it became evident that at the sustained level of harvest forecasted by the model a large proportion of the Class I white birch on Crown land in FMD 8 will not be harvested and will be lost to natural mortality.The majority of white birch dominated stands on Crown land in FMD 8 that are harvestable (85 %) have resulted from large wildfires in the early part of the 20th century. The origin of theses stands has resulted in the skewed age class structure of white birch towards overmature. Essentially, 65 % of the Crown's white birch in FMD 8 is overmature (ie 81 + see figure 8). The projected yield curves used in the model for this species indicate rapid volume loss due to mortality beyond age 120. Subsequent analysis of the wood supply files indicate that a significant salvage harvest can be implemented to capture the impending mortality.

Figure 8 Current age class structure for white birch in FMD 8



Specific harvesting strategies are as follows:

- encourage the use of sawlog sorting by commercial harvesters
- encourage the development of relationships between harvesters and value added white birch sawmillers.
- target overmature white birch stands for harvest that are forecasted to succumb to mortality in

the next 20 years.
- implement an annual wB Class I salvage harvest of 17,380 m^3/yr for two periods (i.e. 10 years) in addition to the current AAC harvest of 6,690 m^3/yr to capture the impending mortality.
- where possible, direct the domestic harvest to alienation Class 3 white birch stands that have low commercial potential
- in areas of high domestic demand, limit volume allocation in designated cutting areas and encourage alternate sources (birch, cutovers, landings, scrub etc)
- monitor stands harvested in all areas for compliance to the harvest schedule and AAC's for each fiber source

6.2 Silviculture

Section 1.4.1.4 describes the regeneration patterns of the major tree species by each disturbance type and generally by ecoregion. On average, there is a 20 percent natural regeneration failure rate (NSR) across all disturbance types. Generally, areas that do not regenerate naturally are renewed by some combination of site preparation and planting. Areas that are regenerated naturally are either left to develop naturally or they 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. In recent years however, particularly in FMD's 5 and 8, there is concern about the type (species) of regeneration because of the increased presence of balsam woolly adelgid in the area. In these areas regeneration to balsam fir may not necessarily be acceptable on certain site types. As well, on certain sites in FMD 8, particularly in the Seal Bay area, balsam fir has been regenerating on black spruce sites and often forms the majority of available stocking. This regeneration is "off site" and often becomes chlorotic and stagnates at an early age. As a result of these concerns with balsam fir regen, planting levels tend to be much higher in this zone than 20 %. Strategies to deal with this problematic fir regen will be presented in sections to follow.

6.2.1 Forest Renewal

Since maintenance of the forestry landbase is crucial, forest improvement treatments are the most important silviculture technique in the zone. Forest renewal silvicultural treatments are designed to ensure that a new forest is established after disturbance by harvesting, insect, wind or fire. In most regions of the Province the prescriptions normally involve some form of treatment to prepare the site to accept planted seedlings. Planting, whether full planting or gap planting is done to ensure stocking of desired species is at acceptable levels.

As stated, significant site preparation has been carried out by the Crown during the past five years in the zone. Treatment of black spruce and balsam fir sites that have been harvested normally involves the row scarification treatment of disc trenching the site one year prior to planting to produce an acceptable number of microsites (approx 2,500). Microsites created via row scarification are superior because they are a mixture of organic material and mineral soil. Disc trenching also breaks up Kalmia root mats when present and makes the site more accessible and suitable for planting through the alignment of harvesting slash. Kalmia is an ericaceous species that inhibits the growth of spruce seedlings, in particular, through the production of

chemicals toxic to spruce and by "locking up" available nutrients on the site thereby depriving spruce of enough nutrients to grow. Without scarification, planted seedlings establishment success on sites in Planning Zone 3 would be much lower than realized today.

The majority of the planting requirement in the zone is for full planting of disturbed sites. The seedling species in planting is mainly with black or white spruce and to a lesser extent Norway spruce, larch (eastern and Japanese), red or white pine depending on the site capability. 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 done with the same species as above, and, coupled with the natural regeneration already present on site result 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 s limited locations in the zone. These mainly include Japanese larch and Norway spruce because of their superior growth capabilities on particular sites. However, it is not anticipated that they will form any substantive proportion of the planting program in the future.

In some limited cases a 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 forest land base. The herbicide treatment will and allow the planted crop species to "get the jump" on the competition through suppression of the alders that occupy these sites. Non-crop species and other forest plants and shrubs typically rebound after suppression with herbicide, thereby ensuring that long term biodiversity is not impacted.

Natural regeneration of softwood species has typically relied on the excellent dispersal of balsam fir after clear cutting throughout this planning zone. 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. Natural regeneration of white birch however, is becoming an issue in this planning zone. As noted in earlier sections white birch is an emerging commercial species, but AAC's for this species are in decline. Consequently, to ensure the long term viability of white birch supplies, regeneration methods will have to be implemented. Planting of white birch is not seen as a realist option as the high populations of moose and rabbits in this zone would destroy seedlings as a browse source. It is recognized that replacement of white birch dominated stands

after disturbance will require the establishment of a dense seedling cover. Over time the seedlings that are not browsed can be developed into valuable trees through other silvicultural techniques (e.g. thinning and pruning). 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 (ie 2-10 per ha). The next phase of seed tree regeneration will involve a light broadcast scarification of harvested sites to produce as many microsites for white birch seedling establishment as possible.

6.2.2 Forest Improvement

Forest improvement prescriptions are designed to treat existing, 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 favour any spruce that may be in the stand. In this way a mixed softwood stand is produced (depending on the original density of spruce) which is more diverse and less susceptible to insect infestation. As well, any hardwood species that are not in direct competition with spruce or fir are left to increase the biodiversity of the stand.

Commercial thinning is done on older balsam fir stands and is designed to capture any 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 sawlog material.

Specific silviculture strategies:

- ensure regeneration of areas disturbed by harvest, insect, wind and fire to prevent loss of and/or increase the future productive forest land base
- use thinning/cleaning techniques in young stands to increase stand development, reduce rotation age, improve stand quality through removal of off site and/or aphid attacked balsam fir regen and increase the percentage of sawlogs in stands
- where possible, promote species mixes particularly with spruce and hardwoods to reduce susceptibility to insect attack and increase biological diversity

- where possible, use seedlings grow from local seed sources to protect genetic diversity
- ensure levels of planting and thinning used in the wood supply analysis are achieved
- work towards pre harvest planning to identify areas with potential balsam woolly adelgid problems so that alternate silvicultural prescriptions can be promptly employed
- continue development and implementation of silvicultural strategies designed to regenerate existing white birch dominated stands to white birch where applicable, as well as strategies designed to develop the white birch component of managed stands

6.3 Forest Access Roads

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

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

In sensitive and wet areas, winter harvesting and road construction are encouraged and are often the only option. This minimizes environmental disturbance and provides access to areas that would otherwise be left unharvested.

In many instances forest access roads “open up” new areas which are then subject to cabin development (often illegal). They 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. Road decommissioning may also be considered, depending on cost and mitigation of conflicting uses for that road.

The nature of the current wood supply, particularly on Crown in FMD’s 5 ad 8, is that harvestable areas or stands are becoming smaller and more scattered. Achievement of the allocated harvest is contingent on accessing these areas and stands, therefore more roads are needed to access this timber. It is imperative that additional funding sources become available to construct these roads if harvest allocations are to be maintained. Failure to secure additional road monies will result in potential decreases in commercial timber allocation.

Specific strategies:

- 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
- consider road decommissioning in areas of concern for other values (e.g. near remote outfitting lodges, PPWSA's) where possible
- explore all avenues to secure funding for road construction and encourage operators to build their own roads in exchange for royalty reductions

6.4 Forest Protection

6.4.1 Insects and Disease

Insects while having been a major natural disturbance factor historically in the zone are now of lesser importance. The main tree species, 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 stands. Also, in recent years, quality standards at local pulp mills have changed to require a timely supply of fresh, green timber. As a result, the window to salvage insect damaged timber is now one to two years after mortality. On a positive note, access to most areas has increased and improved, thereby allowing for quicker reaction to salvage insect mortality.

The major insect in the zone today is the balsam woolly adelgid. It seems to be moving further inland to the far central reaches of the Planning Zone, causing growth problems in young balsam fir stands.

As outlined in the harvesting and timber supply analysis sections the timber supply 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 and thus the optimal harvest schedule may not be 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 eventualities, deviations from harvest schedules and inventory adjustment levels will have to be closely monitored to ensure that the validity of the AAC calculations is not compromised.

Specific strategies:

- use silvicultural techniques at the stand level to alter species mix and increase stand vigor to make 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 "setting the table" for severe insect infestation
- use species conversion techniques, where possible, 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) if required
- in cooperation with Provincial insect and inventory divisions, monitor and measure adelgid infested stands to help refine yield curves to be used in the next timber supply analysis

6.4.2 Fire

Fire has been a major natural disturbance factor historically in the zone. The zone has a high fire history (see section 2.5.1) due to the relatively low precipitation and high summer temperatures combined with frequent lighting storms in the summer months. 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:

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

6.4.3 Windthrow

Wind throw or 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 cut overs 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:

- avoid thinning in areas with high wind damage potential (hilltops on high elevations etc.)
- maintain forest in healthy vigorous condition through silvicultural treatments and protection from insects
- design cut blocks to follow contours and natural boundaries to minimize risk of windthrow to residual forest .
-investigate techniques to minimize the risk blow down in buffers (i.e. buffer management).
- ensure harvest schedule is followed to target the oldest worst condition (and hence risk) timber first.
- continue to sample overmature stands for signs of imminent breakup (e.g. windthrow and butt rot) and update harvest schedule on a 5 year basis accordingly to capture mortality.

6.5 Information and Education

Information and education is one of the key elements to providing for more active and effective participation in the planning process at all levels. Through interaction with various user groups and the general public a better understanding of each others values and positions is gained. The more we know about each others values and where these values are located on the landscape the better the ability is to mitigate any potential impacts of harvesting 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.

Many comments were made during the planning team meetings about the good exchange of information and ideas that occurred. It is through such forums that information can be shared which will provide a basis for more effective and informed participation in such processes. Other such vehicles for information and education which will be actively pursued are:

Specific strategies:
- field trips (e.g. Crown and paper company woodlands tours, mill tours)
- school visits
- open houses
- commercial operator environmental training programs
- information meetings
- training courses
- seminars
- general day to day contact

Section 7 Proposed Activities

7.1 Overview

This section will outline all forest activities that are proposed to occur on Crown Land and land transferred to the Crown in Planning Zone 3 from 2007-2011. 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 11. These maps show all proposed operating areas by the Crown, CBPPL and ACCC so that operations can be viewed from a landscape perspective across all ownerships and districts in the zone.

7.2 Allocation of Timber Supply

The allocation of timber supply in Planning Zone 3 is split among industry and domestic use. Overall, the commercial harvest accounts for 75 % of all AAC timber (90% of all softwood and 60 % of all hardwood AAC timber). Accordingly, domestic use accounts for 25 % of all AAC timber (10 % of all softwood and 40 % of all hardwood AAC timber). An in depth discussion of these allocation categories will follow.

7.21 Commercial

Table 8 indicates the Crown's proposed harvest by operating area in FMD's 4, 5, 6 and 8. These areas are shown on 1:250,000 scale maps and on individual 1:50,000 scale maps in appendix 3. The table indicates approximately 2 times the area required for Class 1 and 3 softwood and

hardwood AAC's. The additional area is included so as to provide for operational flexibility over the planning period

Table 8 Summary of proposed Crown commercial harvest areas in Planning Zone 3 from 2007-2011

District 4 Commercial Areas				
Commercial Area	**Tenure**	**Area Code**	**Total Area (ha)**	**Harvest Area (ha)**
Fleighers		CE04-S-1	3,959	718
Camp Ten		CE04-S-2	1,606	231
Deadwolf		CE04-S-3	4,967	972
Triton North		CE04-SH-4	622	124
Triton South		CE04-SH-5	1,113	489
Rocky Brook		CE04-SH-6	4,545	921
First Burnt		CE04-SH-7	547	112
Southwest Pond		CE04-S-8	16,132	1,589
Dennis Brook		CE04-S-9	4,690	558
Little Gander		CE04-S-10	4,937	243
Owl Pond		CE04-S-11	1,924	79
Mile 10		CE04-SH-12	2,623	285
Second Burnt		CE04-SH-13	442	86
Area 36		CED04-36	3,729	288
TOTAL			**51,836**	**6,695**

District 5 Commercial Areas				
Commercial Area	**Tenure**	**Area Code**	**Total Area (ha)**	**Harvest Area (ha)**
Content West	Crown	C05-S-2	2488	770
Content East	Crown	C05-S-2	2869	1270
Cat Bay	Crown	C05-S-3	234	87
Rocky Bay	Crown	C05-S-4	949	169
Goose Cove	Crown	C05-S-5	1220	209
Northwest Arm	Crown	C05-SH-6	695	318
Gambo Hill	Crown	C05-S-7	321	74
Drovers Ridge	Crown	C05-SH-8	1211	323
Northwest Pond	Crown	C05-SH-9	1310	156
Gull Pond	Crown	C05-S-10	545	84
Maccles Lake	Crown	C05-S-11	1054	254
Millers Angle	Crown	C05-SH-12	1030	409
Chain Pond	Crown	C05-S-13	1286	502
Rocky Pond	Crown	C05-S-14	1428	668
Magic Arm	Crown	C05-SH-15	1117	396
Pussells Pond	Crown	C05-S-16	886	159
Weirs Pond	Crown	C05-S-17	1096	208

Fourth Pond	Crown	C05-S-18	558	220
Crown Ridge	Crown	C05-S-19	349	51
Hay Cove	Crown	C05-SH-20	1006	137
Area 21	Crown	C05D-21	3746	192
Area 22	Crown	C05D-22	5474	590
Area 24	Crown	C05D-24	5690	961
Area 25	Crown	C05D-25	2377	69
Area 27	Crown	C05D-27	4988	400
Area 31	Crown	C05D-31	1300	271
Area 33	Crown	C05D-33	6450	816
Area 33A	Crown	C05D-33A	2142	196

District 6 Commercial Areas

Commercial Area	Tenure	Area Code	Total Area (ha)	Harvest Area (ha)
Junction		CE06-SH-2	822	177
Shirly Lake		CE06-S-3	475	67
Fifteen Mile Brook		CE06-S-4	1785	138

District 8 Commercial Areas

Commercial Area	Tenure	Area Code	Total Area (ha)	Harvest Area (ha)
Big Lake	Crown	C08-SH-2	592	282
Southwest Arm	Crown	C08-SH-3	1060	615
Mill Pond	Crown	C08-SH-4	329	139
Loon Harbour	Crown	C08-S-5	75	56
Lily Pond	Crown	C08-SH-6	752	245
Chapel Island	Crown	C08-SH-7	225	114
Beaverton	Crown	C08-SH-8	1003	462
Celies Cove	Crown	C08-SH-9	693	143
Little Indian Pond	Crown	C08-S-10	368	89
Burnt Lake	Crown	C08-S-11	430	134
Rocky Pond	Crown	C08-SH-12	1709	944
Hatchy Brook	Crown	C08-SH-13	1328	344
Duder Lake	Crown	C08-SH-14	303	136
Millord's Arm	Crown	C08-SH-15	1220	458
Bellman's Pond	Crown	C08-SH-16	1008	517
Salmon Pond	Crown	C08-S-17	206	55
South Pond	Crown	C08-SH-18	1621	451
West Arm Peninsula	Crown	C08-S-19	191	74
Rowsell's Lake	Crown	C08-SH-20	473	159
Brink's Pond Exchange	CBPP	CE08-SH-21	2307	1031
Spar Pond Exchange	CBPP	CE08-SH-22	390	329
Pine Pond	Crown	C08-S-23	1374	608

Campbellton River	Crown	C08-S-24	269	109
Bottom Pond	Crown	C08-SH-25	679	189
Osmonton Arm	Crown	C08-SH-26	2974	1599
Shipbuilder's Pond	Crown	C08-SH-27	176	44
Diver Pond	Crown	C08-SH-28	883	620
Baytona	Crown	C08-S-29	189	119
Dan's Pond		CE08-S-30	107	36
Fourth Pond	Crown	C08-SH-31	914	277
Twin Ponds	Crown	CE08-S-32	588	64
Area 6	Crown	C08D-6	4207	255
Area 7	Crown	C08D-7	5284	329
Area 8	Crown	C08D-8	6131	720
Area 14	Crown	C08D-14	2514	217
Area 15	Crown	C08D-15	1158	166
Area 23	Crown	C08D-23	3892	682
Area 24	Crown	C08D-24	5067	453
Area 38	Crown	C08D-38	1622	473
Area 44	Crown	C08D-44	1964	617

This is within the acceptable variance for planned harvesting since the 2006 Wood Supply Analysis was designed to ensure that operable growing stock would be maintained at a minimum of two times the AAC throughout the 160 year planning horizon. That is to say, there will always be at least twice as much merchantable timber available on the landbase than will be cut in any one period. The actual total harvest volume for each class of AAC, however, for the next five years will not exceed the allowable cut. The proposed Crown commercial harvest allocation for the five year period is shown in table 9.

Table 9 Proposed Crown commercial harvest allocation by AAC source in Planning Zone 3 from 2007-2011

Class I Commercial Softwood Allocation				
FMD	**Tenure**	**Annual Allocation (m3)**	**5 Year Allocation (m3)**	**5 YEAR AAC**
4	ACI	40,500	202,500	202,500
5	CROWN	15,500	77,500	126,000
6	ACI	8,900	44,500	44,500
8	ACI	2,400	12,000	12,000
8	CBPP	16,900	84,500	84,500
8	CROWN	48,500	242,500	260,000

Class III Commercial Softwood Allocation				
FMD	**Tenure**	**Annual Allocation (m3)**	**5 Year Allocation (m3)**	**5 YEAR AAC**
4	ACI	11,000	55,000	56,000
5	CROWN	7,600	38,000	131,000

6	ACI	0	0	2,900
8	ACI	740	3,700	3,700
8	CBPP	1,200	6,000	11,000
8	CROWN	7,800	39,000	120,000

Class I Commercial Hardwood Allocation				
FMD	**Tenure**	**Annual Allocation (m3)**	**5 Year Allocation (m3)**	**5 YEAR AAC**
4	ACI	521	2,605	2,605
5	CROWN	2,000	10,000	14,700
6	ACI	230	1,150	1,150
8	ACI	0	0	0
8	CBPP	600	3,000	5,950
8	CROWN	3,650	18,250	33,450

Class I Salvage Commercial Hardwood Allocation				
FMD	**Tenure**	**Annual Allocation (m3)**	**5 Year Allocation (m3)**	**5 YEAR Salvage**
8	CROWN	13,250	66,250	86,900

Generally, in the allocation of the wood supply to the major commercial operators, the first priority is given to damaged and diseased stands where feasible. This precedent has limited potential because only a small portion of the production forest currently shows evidence of insect or disease damage and it is interspersed throughout the district. The second priority is to harvest merchantable, over mature stands. Most scheduled operating areas will consist of stands in this 81 + year old age class. The priority of harvest planning in this age timber will be placed on the overmature Class III softwood during this five year period. The third priority is to harvest merchantable mature stands.

Included in the list of commercial operating areas are 19 domestic areas in which it is proposed to harvest limited scale commercial allocations. These operating areas have been proposed specifically to target cleanup of small stands of scheduled AAC and are required to meet scheduled commercial allocations. The stands have mainly resulted from previous commercial harvesting and because of their small size (ie. ranging from 2 ha to 20 ha), proposed commercial operations will more closely approximate domestic harvesting. Due to the varied economic feasibility of harvesting individual stands, not all stands portrayed are able to be harvested However, all Age Class 4 and 5 stands within the domestic areas referred to have been included, as it is difficult at this point to determine the actual stands to be harvested.

Some of the proposed operating areas contain merchantable timber that is currently designated as Class III (ie. operationally constrained). Stands in this category are typically difficult to access

and/or harvest from both physical and economic aspects. As a result, they have been removed from the landbase used to calculate the sustainable Class I AAC. The designation of these stands has been set for the period 2007 to 2011, after which time the landbase will be reviewed in preparation for the next wood supply analysis. It is the intent of the department that this designation of timber will also be harvested in a sustainable manner. Class III allocations represent approximately 17 percent of the overall proposed Crown softwood commercial harvest in the planning zone for the next five years.

Several operating areas contain merchantable birch volumes made up from a combination of pure birch stands and mixed softwood/hardwood stands. The priority of harvest for commercial birch allocations will be met first with remnant birch in mixed softwood/hardwood stands as a part of integrated harvesting operations. Utilizing this strategy, it is anticipated that approximately 15 % of the proposed commercial birch harvest will result from mixed stands primarily targeted for softwood harvest. Currently many Crown commercial operators harvest only firewood (mainly birch), while several other operators have firewood allocations as integrated components of their operations. This species of timber is therefore essential in sustaining commercial operations within the district. White birch represents approximately 11 % of the overall Crown commercial harvest in the planning zone for the next five years. As with other designations of timber, it is the department's position that birch is to be harvested in a sustainable manner. However as noted in section 6.1.3, a salvage harvest will have to be implemented in FMD 8 for this species in order to capture forecasted mortality.

7.2.2 Domestic

There are 75 Crown domestic areas located in Planning Zone 3. The majority of these areas, located in FMD's 5 and 8, were historically created along the coastline encompassing the scattered communities. These areas were designed to provide a supply of fuelwood close to the communities. Additionally, in recent history a number of new areas throughout the planning zone have been added on transferred company limits. These areas were developed to provide additional opportunity for the public to access operationally constrained stands, remnant white birch and general cleanup commercially logged areas.

Currently, it is difficult to quantify the supply of domestic fuelwood available in each domestic area. Accurate inventory data are not available for domestic cutting blocks due to the small size of individual harvests. Most of these areas now contain remnants of commercially harvested forest, partially harvested stands, commercially uneconomical stands and scrub, as well as underutilized species (i.e. aspen, maple, and larch). Also, many domestic areas have either received very small patch cutting or high-grading of stands that have not been updated on the Department's inventory system. However, generalities can be made about the supply of domestic wood in different zones of the district, and some important implications are apparent. Table 10 details the domestic areas available in the planning zone. The distribution of all domestic areas in Planning Zone 3 is shown on a 1:250,000 scale map and on individual 1:50,000 scale maps in appendix 5.

Table 10 Summary of proposed Crown's domestic harvest areas in Planning Zone 3 from 2007-

District 4 Domestic Areas				
Domestic Area	**Total Area (ha)**	**Productive Area**	**Nonproductive Area**	**Total Forested Area**
CED-4-36	3729	1907	1337	**3244**

District 5 Domestic Areas				
Domestic Area	**Total Area (ha)**	**Nonproductive Area**	**Productive Area**	**Total Forested Area**
CD-5-1	13315	1330	3144	**4474**
CD-5-2	6766	1511	1476	**2987**
CD-5-3	6595	2121	613	**2734**
CD-5-4	10122	940	4065	**5005**
CD-5-5	6663	661	4544	**5205**
CD-5-6	8032	1486	4081	**5567**
CD-5-7	8459	3139	2847	**5986**
CD-5-8	3562	446	1313	**1759**
CD-5-9	8259	1865	1695	**3560**
CD-5-10	5744	1873	935	**2808**
CD-5-11	6088	1238	1903	**3141**
CD-5-12	5994	1353	534	**1887**
CD-5-13	2816	590	73	**663**
CD-5-14	9637	3596	743	**4339**
CD-5-15	45654	13479	7288	**20767**
CD-5-16	13401	4022	1793	**5815**
CD-5-17	10504	2750	1820	**4570**
CD-5-18	7104	2158	2688	**4846**
CD-5-19	4296	1676	16	**1692**
CD-5-20	1404	317	1210	**1527**
CD-5-21	3746	1361	1393	**2754**
CD-5-22	5474	1957	2526	**4483**
CD-5-23	2438	913	1485	**2398**
CD-5-24	5690	1793	2922	**4715**
CD-5-25	2377	832	1153	**1985**
CD-5-26	1473	860	1508	**2368**
CD-5-27	4988	1142	1480	**2622**
CD-5-28	7504	1780	2136	**3916**
CD-5-29	9130	1575	2738	**4313**
CD-5-31	1300	431	890	**1321**
CD-5-32	296	24	296	**320**
CED-5-33	**6450**	874	5136	**6010**
CD-5-33a	2142	448	1375	**1823**
CD-5-34	407	13	367	**380**
CD-5-35	2242	789	1559	**2348**
CD-5-37	6227	6906	2737	**9643**

District 8 Domestic Areas

Domestic Area	Total Area (ha)	Nonproductive Area	Productive Area	Total Forested Area
CD-8-1	4425	438	1020	**1458**
CD-8-3	32419	8304	5762	**14066**
CD-8-4	8840	1143	3855	**4998**
CD-8-5	4506	592	2027	**2619**
CD-8-6	4207	677	1653	**2330**
CD-8-7	5148	796	2593	**3389**
CD-8-8	6131	863	4243	**5106**
CD-8-9	4299	645	2690	**3335**
CD-8-11	5777	772	3649	**4421**
CD-8-12	781	98	525	**623**
CD-8-14	2514	453	1533	**1986**
CD-8-15	1158	123	679	**802**
CD-8-17	1625	139	1102	**1241**
CD-8-18	6752	312	1227	**1539**
CD-8-19	3008	292	1784	**2076**
CD-8-20	3041	339	1757	**2096**
CD-8-22	1676	162	1073	**1235**
CD-8-23	3892	434	2594	**3028**
CD-8-24	5067	775	3335	**4110**
CD-8-25	4299	351	1789	**2140**
CD-8-26	1624	261	877	**1138**
CD-8-27	5794	309	3596	**3905**
CD-8-28	2925	139	2261	**2400**
CD-8-29	528	50	296	**346**
CD-8-31	675	106	453	**559**
CD-8-34	716	159	357	**516**
CD-8-36	2516	239	1427	**1666**
CD-8-37	2344	250	1476	**1726**
CD-8-38	1622	168	1269	**1437**
CD-8-39	2466	423	1431	**1854**
CD-8-40	5217	150	2387	**2537**
CD-8-43	15253	2215	6749	**8964**
CD-8-44	1964	252	1251	**1503**
CD-8-45	2862	357	1205	**1562**
CD-8-47	2922	276	1943	**2219**
CD-8-48	9266	1294	5131	**6425**

With the exception of the areas on Fogo Island, Crown domestic permits are issued for 28 m^3/permit/yr. Residents are permitted to choose two areas per permit. Typically there are approximately 3,000 and 2,000 domestic permits issued annually in FMD's 5 and 8 respectively. The estimated drain on timber supplies determined from analysis of domestic cutting returns at Lewisporte and Gambo is between 15-16 m^3/permit/yr. The total drain varies by year as the permits purchased vary significantly based on the price of heating oil.

The majority of domestic areas throughout the planning zone contain some over mature and mature softwood stands which have sustained decades of domestic harvesting resulting in many patch cuts and highgraded stands. However, the domestic fuelwood supply is becoming a

concern in four areas near the communities of Stoneville, Baytona, Comfort Cove and Embree in FMD 8 and areas between Georges Point and Musgrave Harbour in FMD 5. Years of domestic harvesting have left stands depleted, forcing residents to move farther from their communities to obtain fuelwood, or purchase their fuelwood from commercial operators. These areas also contain many regenerating stands that have been silviculturally treated and there are some problems with illegal domestic harvesting of these immature stands.

Generally, the traditional domestic areas near communities have been expanded into harvested commercial areas to provide residents access to additional fuelwood supplies. Over time, these expansions into commercial areas will have to be closed to prevent the illegal harvest of immature stands. This has already taken place in the Birchy Bay area, were much of area 14 has been closed to domestic harvesting in the past two years. Similarly, a large part of the traditional domestic area around Embree and Little Burnt Bay has also been closed to most domestic harvesting to prevent harvesting of immature stands. Given the present fuelwood demand, and growth rates of regenerating forest, it is anticipated that these problems will persist and expand to other domestic areas in the medium term. However, it is also anticipated that continuing the expansion process of domestic areas into recent commercially harvested areas will alleviate much of the supply concern.

The domestic areas in FMD 5 that stretch from Harebay to Lumsden for the most part consist of regenerating spruce and mixed hardwood from the 1961 burn. Due to the expanse of bog and wet land throughout this area, the majority of timber is not considered to be economically viable for commercial operation and is not part of the Class 1 landbase. The majority of stands in these areas that have a potential to produce commercial volumes have been removed from the domestic areas. Some of these stands have been precomercially thinned while others are proposed for this treatment in this plan. As this is the only source of timber available in relatively close proximity to the affected communities and the timber is not being relied upon for commercial sustainability, DNR permits the residents to utilize this younger timber.

The most distinct areas geographically are the island communities of Change Islands in FMD 8 and the communities on Fogo and Cotrell's Islands in FMD 5. The residents of Change Islands have a small demand for fuelwood, only 30 - 40 permits issued per year. The situation is similar for Cotrell's Island. Both these Islands have a good supply of regenerating softwood forest to meet the fuelwood demand. This timber is alienated from the Class 1 landbase and is therefore not part of the sustainable supply for the district. Fogo Island on the other hand has a shortage of timber for fuelwood and domestic lumber. With a much higher population, the residents of Fogo Island place a much higher demand on the local timber supplies. As a result the domestic areas of Fogo Island have a reduced permit volume of 20 m^3/permit (i.e. 20% less than the other domestic areas in the planning zone). To compensate for the shortfall DNR permits the residents of Fogo Island to gain access to domestic timber in either one of the other domestic areas.

Domestic areas encompassing some of the islands in Notre Dame and Bonavista Bays provide a source of fuelwood for both cabin owners on the islands as well as some surrounding communities. In the past residents used long liners to transport fuelwood from the islands to their residence. Today some of the fuelwood harvested off the islands in Notre Dame Bay is transported over ice by snow machine.

Although the communities of Gander, Glenwood and Terra Nova are surrounded by company limits, there are ample supplies of fuelwood available. For Gander and Glenwood company limits belonging to CBPP and in FMD's 5 and 6 provide a hardwood (mainly birch) fuelwood supply in areas in close proximity to these communities. For Terra Nova, DNR has created two domestic areas on transferred limits in FMD 4 in close proximity to the town. In other communities including Norris Arm, Lewisporte, Benton, Gambo and communities in the Gander Bay, the residents also rely on company limits for hardwood fuelwood.

There are a number of important issues which need to be addressed with regard to the domestic cutting sector. The most prominent and timely of these is the concern with utilization of commercial sawlogs and pulpwood as firewood. A second issue which has also surfaced, and will continue to gain dominance during the next decade, is the harvesting of young sub-merchantable regenerative growth (mainly spruce) on past cutover areas. This leads to a third problem area of increased demand brought on by a reduction in supply. All of these problems point to the need for increased control over domestic cutting. The goal of protecting the provincial short-term commercial wood supply is of a primary concern with respect to maintaining the existing forest industry in Newfoundland during the next decade or two.

One of the measures that will be taken to maximize the portion of the allowable cut available to commercial operators will be to direct the domestic harvest away from commercial stands and into non-commercial, fuelwood type stands. Restricting domestics from cutting in both mature commercial quality softwood stands as well as young sub-merchantable stands will maintain the domestic impact to the Class 1 AAC's at or below its current levels. This will involve a complete review of all domestic blocks for their commercial value, and where appropriate the allocation of valuable, operable stands to commercial operators. Although there are good alternate domestic supplies in all of these areas, it is still anticipated that there will be public dissatisfaction if changes are made to existing domestic areas, as they are within close proximity to communities and were used as traditional domestic cutting areas.

To help offset any losses to the domestic land base that may occur as a result of allocation of stands to commercial status, extensions/additions to domestic areas will be investigated in current commercial areas, as timber management objectives are met, to provide alternative sources for domestic timber consumers. This will also facilitate silvicultural operations through the cleanup of commercially submarginal stands. Additionally, the concept of removing fuelwood and any merchantable pulpwood, produced as bi-products from proposed diameter limit thinning treatments, for both public and industrial use will be investigated during this five year period.

To sustain a middle and long term wood supply, growing stock that will be developed from older regenerative stands (i.e. age class 2) and precommercially thinned areas must be protected. Many domestic blocks contain areas that have been silviculturally treated in the past, and still contain potential areas for future treatment. These areas will be evaluated during this planning period and amendments will be made to the respective domestic cutting blocks to reserve appropriate areas for silvicultural treatment for enhancement of the future growing stock. The specific treatment areas will be identified on domestic cutting maps and marked in the field.

These areas will be closely monitored and strictly enforced for no-cutting or trespassing. Also commercial fuelwood operators will be encouraged to expand in other parts of the district, so that a greater supply will be available to the consumer.

The proposed Crown domestic harvest allocation for the five year period is shown in table 11. As noted in the commercial allocation discussion, when the actual total domestic harvest volume for each class of AAC is added with the commercial harvest for the next five years, the total will not exceed the allowable cut in each class of AAC.

Table 11 Proposed Crown domestic harvest allocation by AAC source in Planning Zone 3 from 2007-2011

Class I Domestic Softwood Allocation				
FMD	**Tenure**	**Annual Allocation (m3)**	**5 Year Allocation (m3)**	**5 YEAR AAC**
4	ACI	0	0	202,500
5	CROWN	9,700	48,500	126,000
6	ACI	0	0	44,500
8	ACI	0	0	12,000
8	CBPP	0	0	84,500
8	CROWN	3,500	17,500	260,000

Class III Domestic Softwood Allocation				
FMD	**Tenure**	**Annual Allocation (m3)**	**5 Year Allocation (m3)**	**5 YEAR AAC**
4	ACI	200	1,000	56,000
5	CROWN	18,600	93,000	131,000
6	ACI	580	2,900	2,900
8	ACI	0	0	3,700
8	CBPP	1,000	5,000	11,000
8	CROWN	16,200	81,000	120,000

Class I Domestic Hardwood Allocation				
FMD	**Tenure**	**Annual Allocation (m3)**	**5 Year Allocation (m3)**	**5 YEAR AAC**
4	ACI	521	2,605	2,605
5	CROWN	2,000	10,000	14,700
6	ACI	230	1,150	1,150
8	ACI	0	0	0
8	CBPP	590	2,950	5,950
8	CROWN	3,250	16,250	33,450

Class I Salvage Domestic Hardwood Allocation				
FMD	Tenure	Annual Allocation (m3)	5 Year Allocation (m3)	5 YEAR Salvage
8	CROWN	4,120	20,600	86,900

Class III Domestic Hardwood Allocation				
FMD	Tenure	Annual Allocation (m3)	5 Year Allocation (m3)	5 YEAR AAC
4	ACI	110	550	550
5	CROWN	1,050	5,250	5,250
6	ACI	20	100	100
8	ACI	0	0	0
8	CBPP	100	500	500
8	CROWN	250	1,250	1,250

7.3 Silviculture

There are 96 individual silviculture treatments areas proposed for the next five years by the Crown within the planning zone as outlined in table 12. Crown operators will be conducting the harvest on these tenures, therefore DNR will be implementing the silvicultural treatments over the five year planning period. In FMD 4, there are 5 planting, 4 precommercial thinning and 2 hardwood management with planting areas. In FMD 5, there are 13 planting, 15 precommercial thinning, 3 hardwood management with planting areas, and 1 herbicide and plant areas proposed. In FMD 6, there are 3 planting areas proposed. In FMD 8 there are 20 precommercial thinning, 14 planting, 5 plantation maintenance, 2 hardwood management, 2 hardwood management with planting, 2 planting with plantation maintenance, 2 red pine management, 2 white pine management, 1 gap planting, and 1 herbicide and plant areas proposed. The silviculture treatments proposed for the period 2007 -2011 in Planning Zone 3 by the Crown are outlined on a 1:250,000 scale overview map, and detailed and on individual 1:50,000 scale topographic maps in Appendix 4.

In order to minimize impacts on the long-term timber supplies and ecosystem processes, a steady reforestation program will be conducted with the objective to plant all medium, or higher classed sites that are not regenerating to a satisfactory stocking level. Areas that are scheduled for planting have been harvested in the past five years or will be during this five year period. These areas will undergo reconnaissance and or intensive regeneration surveys to determine the need for planting. Reforestation of current cutovers through scarification and planting will therefore be the first priority of slivicultural area treatment during this planning period. It is anticipated that approximately 90 percent of all scheduled planting will require site preparation in the form of row scarification. Additionally, there is a considerable area of NSR occupying productive sites in the district that resulted from past wildfire disturbance and in some cases past harvesting practices. These sites need to be converted to a more vigorous, useful state by re-establishing forest cover. Reclamation of backlog, non-sufficiently restocked sites (NSR) through planting

will: (1) result in an increase in the production forest land base, thereby assisting the goal of maintaining 15 % Old Growth on the future landscape; (2) account for future losses to the landbase from permanent disturbances; and (3) result in the production of successional habitat that will aid in the maintenance of landscape connectivity for wildlife.

From a silviculture perspective, the only potential treatment to lessen the projected medium term Class I timber supply shortage is precommercial thinning (PCT) in the 21/40 year age class, and a variation of PCT in larger diameter stands of the same age group, diameter limit thinning (DLT). Thinning, over a number of years, will advance the development of those treated stands, so as to essentially bump the age/development up a class, and can help to fill the shortfall in supply. However, due to the limited time frame available to the immanent shortfall in softwood supply in districts of this planning zone, this treatment effect will be minimal in alleviating the forecasted Class 1 softwood shortfall. It is therefore the second silviculture treatment priority for the Crown this period.

As stated in previous sections, there is a growing problem with balsam woolly aphid throughout the planning zone. This insect affects balsam fir trees by severely reducing growth rates and therefore reducing the productivity of some sites to a point where commercial viability is questionable. For PCT treatments, where the main regenerating species is balsam fir, the presence of adphid will be evaluated using reconnaissance surveys and a decision to thin will be based on the level of infestation. Thinning treatments (PCT) in natural fir/spruce stands and plantations (PM - plantation maintenance) in the district, however, have merit from the perspective of promoting the development of high quality fiber stands. For plantation maintenance areas and PCT areas where spruce conversion is possible, the treatments will allow natural and planted spruce to rebound, through the removal of competing, low quality, aphid-infected fir ingrowth (often an off site colonizer). These treatments will insure that such stands remain tracking along projected yield curves, resulting in protection of the future growing stock, and a cost benefit to future harvesting through gains in piece size compared to untreated areas.

Silviculture treatments designed to promote management of the District's hardwood component at both the landscape and stand levels will be conducted during this period to achieve the ecosystem management initiatives described earlier in section 4.2.2.1.Treatments will involve two stages of stand development; immature stand density management and stand regeneration management. In the former case a hardwood component will be left where possible in all PCT's, DLT's and PM's. Currently, no density management treatments are proposed for hardwood dominated immature stands, as survey work by district staff has indicated that suitable stands for the treatment are limited. In the latter case, stand regeneration initiatives will be implemented from both harvesting (seed tree retention) and site preparation (light broadcast) perspectives. This will involve the evaluation of scarification treatments for the production of adequate seedbeds, as well as evaluation of seeding treatments such as direct seeding and seed tree harvests.

Similarly to hardwood management, silviculture treatments designed to promote management of the District's red and white pine components at both the landscape and stand levels will be conducted during this period to achieve the ecosystem management initiatives described earlier in section 4.2.1.3.3. White pine pruning is proposed for two immature stands to

abate the advancement of white pine blister rust within the district. It is propose to incorporate a minimum 2 % pine seedlings in the overall planting program. District staff will evaluate the existing planted red pine stand at Northern Arm for its cone bearing capacity and carry out cone picking operations to increase the supply of native seed when crops are available. This may involve fertilization treatment of selected areas of the stands to maximize cone crops.

The treatment proposals for planting and precommercial thinning for the five year period noted in table 12 show a total area that is greater than the minimum requirements for the 2006 Wood Supply Analysis. Treatment levels beyond the minimums are considered additional and will only be completed on an incremental funding basis. Similarly, all other proposed treatments besides the minimum requirement for planting and thinning are also considered additional and will only be completed on an incremental funding basis

Table 12 Summary of the Crown's proposed silviculture treatments in Planning Zone 3 for 2007-2011

District 4 Silviculture Areas			
Silviculture Area	**Tenure**	**Treatment Code**	**Area (ha)**
Mint Brook		CE04-DLT-1	447
Fleigher's		CE04-DLT-2	263
Mint Pond		CE04-DLT-3	433
Fleigher's		CE04-P-1	4987
Camp 10		CE04-P-2	1601
Deadwolf		CE04-P-3	5639
Dennis Brook		CE04-P-4	2967
Mile 10		CE04-P-5	1673
Triton North		CE04-P/HM-1	612
Triton South		CE04-P/HM-2	6652

District 5 Silviculture Areas			
Silviculture Area	**Tenure**	**Treatment Code**	**Area (ha)**
Third Pond	Crown	C05-PCT-1	413
Barry's Brook	Crown	C05-PCT-2	195
Gull Pond	Crown	C05-PCT-3	198
Little Seldom Cove	Crown	C05-PCT-4	232
Deadman's Bay	Crown	C05-PCT-5	85
Ragged Harbour River	Crown	C05-DLT-1	73
Eastern Arm	Crown	C05-DLT-2	118
Shoal Pond	Crown	C05-DLT-3	86
Middle Arm	Crown	C05-DLT-4	181
Island Pond	Crown	C05-DLT-5	111
Moccasin Pond	Crown	C05-DLT-6	308
Back-Up Pond	Crown	C05-DLT-7	106
Little Bear Cove Pond	Crown	C05-DLT-8	142
North West Pond	Crown	C05-DLT-9	164

Mann Pond	Crown	C05-DLT-10	76
Content West	Crown	C05-P-1	1891
Content East	Crown	C05-P-2	1783
Goose Cove	Crown	C05-P-3	628
Gambo Hill	Crown	C05-P-4	291
Drover's Ridge	Crown	C05-P-5	905
Northwest Pond	Crown	C05-P-6	1177
Gull Pond	Crown	C05-P-7	829
Maccles Lake	Crown	C05-P-8	1064
Chain Pond	Crown	C05-P-9	1296
Miller's Angle	Crown	C05-P-10	886
Magic Arm	Crown	C05-P-11	383
Pussell's Pond	Crown	C05-P-12	973
Weir's Pond	Crown	C05-P-13	1229
Rocky Bay	Crown	C05-P/HM-1	469
Northwest Arm	Crown	C05-P/HM-2	511
Hay Cove	Crown	C05-P/HM-3	971
Gander Bay	Crown	C05-H/P-1	702

District 6 Silviculture Areas			
Silviculture Area	**Tenure**	**Treatment Code**	**Area (ha)**
Burnt Bay Lake		CE06-P-1	850
Junction		CE06-P-2	721
Shirley Lake		CE06-P-3	466

District 8 Silviculture Areas			
Silviculture Area	**Tenure**	**Treatment Code**	**Area (ha)**
Clarke's Pond	Crown	C08-DLT-1	251
Sailor Island	Crown	C08-DLT-2	735
Burnt Arm	Crown	C08-GP-1	2334
South Pond	Crown	C08-HM-1	333
Ten Mile Lake	Crown	C08-HM-2	216
Beaverton	Crown	C08-P-1	1051
Big Lake	Crown	C08-P-2	742
Bobby Joe Pond	Crown	C08-P-3	237
Brink's Pond Exchange	CBPP	CE08-P-4	4097
Duder Lake	Crown	C08-P-5	823
Hatchy Brook	Crown	C08-P-6	3201
Lawrence Harbour	Crown	C08-P-7	850
Little Indian Pond	Crown	C08-P-8	968
Long Pond	Crown	C08-P-9	2079
Millord's Arm	Crown	C08-P-10	1557
Spar Pond Exchange	CBPP	CE08-P-11	398
Southern Lake	Crown	C08-P-12	3944

Southwest Arm	Crown	C08-P-13	1174
Twin Ponds	Crown	C08-P-14	590
Ten Mile Lake	Crown	C08-P/PM-1	5786
Celies Cove	Crown	C08-P/PM-2	1190
Amy's Pond	Crown	C08-PCT-1	1448
Bellman's Pond	Crown	C08-PCT-2	633
Burnt Arm	Crown	C08-PCT-3	419
Chapel Island	Crown	C08-PCT-4	1560
Dildo Pond, Lond Pond	Crown	C08-PCT-5	472
Duder Lake	Crown	C08-PCT-6	440
Horsechops	Crown	C08-PCT-7	615
Island Pond	Crown	C08-PCT-8	440
Jumper's Pond	Crown	C08-PCT-9	759
Lawrence Harbour	Crown	C08-PCT-10	85
Long Pond, Steady	Crown	C08-PCT-11	163
Mill Pond, Tower Road	Crown	C08-PCT-12	2595
Osmonton Arm	Crown	C08-PCT-13	832
Rowsell's Lake	Crown	C08-PCT-14	743
Swan Pond	Crown	C08-PCT-15	257
Two Mile Branch	Crown	C08-PCT-16	978
West Arm	Crown	C08-PCT-17	608
White Rock Pond	Crown	C08-PCT-18	392
Otter Pond	Crown	C08-P/HM-1	1689
Pine Pond	Crown	C08-P/HM-2	526
Big Lake	Crown	C08-PM-1	228
Rushy Pond	Crown	C08-PM-2	1759
Ten Mile Lake	Crown	C08-PM-3	326
Tooth Pond	Crown	C08-PM-4	782
Island Pond	Crown	C08-PM-5	343
Charles Brook	Crown	C08-rPM-1	32
Rowsell's Lake	Crown	C08-rPM-2	42
Neyle's Brook Exchange		CE08-wPM-1	789
Rowman's Pond Exchange		CE08-wPM-2	166

7.4 Forest Access Roads and Water Crossings

Proposed access road construction by the Crown for the next five years in Planning Zone 3 is detailed in Table 13 and outlined on 1:250,000 scale overview map and on individual 1:50,000 scale topographic maps in Appendix 3. A total of 308.3 km of road is planned for construction during this period. On a district basis 87.6, 65.8, 11 and 143.9 km is proposed for construction in FMD's 4, 5, 6 and 8 respectively. It is proposed that all the primary roads in the zone (i.e.122 km > C2) will be constructed by the Department under tendered contract. These roads are the main trunks into operating areas. It is anticipated that all the secondary roads in the zone (i.e.185.7 km < Class C) will be built by Crown commercial operators. This breakdown, however, is dependant on funding and is therefore subject to change. The secondary roads proposed will be a combination of spur, temporary and winter roads. For example, the proposed roads in the First and Second Burnt Pond operating areas are to be constructed to a winter standard to protect

freshwater fish values adjacent to these areas.

Associated with the proposed road construction are 84 water crossings that will require the installation of appropriate sized culverts or bridges. The size and hence design features of each crossing will be determined through field work prior to construction of the associated road system, and is subject to all provincial and federal legislation and guidelines. The location of these water crossings is detailed on 1:50,000 scale topographic maps in Appendix 3.
The majority of the road construction will be into over mature and mature wood, for the primary purpose of accommodating commercial cutting operations. At this time, no road is planned solely for domestic use. A secondary forestry use will be to provide access for silviculture operations. Other uses of forest access roads include domestic cutting, and recreation (ie. hunting, fishing, cabin access and berry picking).

Consideration of the host of tourism/recreation values that exist within the boundary of Planning Zone 3 by the Planning Team has resulted in the consensus that road-specific decommissioning is to be considered on an area specific basis should a conflict of values exist. Decommissioning of specific roads to protect other ecosystem values can take the form of removing bridges and culverts, in addition to replacing excavated material from adjacent embankments back into the roadway to restore the areas as close as possible to their natural state. The degree of decommissioning will ultimately depend on the value being protected. The scheduling of road decommissioning must be done in concert with the completion of harvesting and silviculture activities in the areas of concern. While the Department of Forest Resources and Agrifoods can adopt this approach as a goal of the plan, the implementation of this strategy will be entirely dependant upon the ability to prevent the establishment of permanent structures such as cabins along the road routes proposed for decommissioning. While DNR can commit to refusing approval of cabin sites in areas to be decommissioned, the actual authority rests with the Crown Lands Division of the Department of Government Services and Lands. During this planning period district staff will continue to liaison with Crown Lands Division in identifying operational roads that will require decommissioning (see section 8 for roads to be decommissioned).

7.5 Activities in Protected Water Supply Areas

In total there are 28 protected public water supply areas in Planning Zone 3 in which some forestry activity is planned for the period 2001-2011. There are 9 PPWSA's in which commercial harvesting and/or road construction operations are proposed for implementation in this plan. These operations are indicated in table 14. Additionally, these operations are shown on a 1:250,000 scale map in appendices 6 and 8 and detailed on 1:50,000 scale maps in appendix 3. Similarly, there are 13 public protected water supply areas in which silviculture operations are proposed for implementation in this plan. These operations are also indicated in table 14. These

operations are shown on a 1:250,000 scale map in appendix 6, and detailed in a table and on 1:50,000 scale maps in appendix 4. Approval to operate in these areas over the next five years

Table 13 Summary of the Crown's proposed access road construction in Planning Zone 3 from 2007-2011

DISTRICT	ROAD NAME	HARVEST BLOCK NAME	PRIMARY ROAD (km)	SECONDARY ROAD (km)	TOTAL ROAD (km)	WATER CROSSINGS
8	SOUTHERN LAKE	SOUTHERN LAKE C08-SH-1	11.8	5.5	**17.3**	5
	BIG LAKE	BIG LAKE C08-SH-2	0	4.2	**4.2**	3
	BULLEY'S COVE	SOUTHWEST ARM C08-SH-3	1.5	3.6	**5.1**	1
	MILL POND	DIVER POND C08-SH-4	4.5	3.9	**8.4**	2
	BLACK PIT	MILL POND C08-SH-4	2.7	0	**2.7**	0
	CAMPBELLTON	LOON HARBOUR C08-S-5	0	1.5	**1.5**	0
	OTTER POND	LILLY POND C08-SH-6	0	4.2	**4.2**	0
	CHAPEL ISLAND	CHAPEL ISLAND C08-SH-7	0	2.3	**2.3**	0
	STONEVILLE	BEAVERTON C08-SH-8	6.3	1.5	**7.8**	1
	CELIES COVE	CELIES COVE C08-SH-9	3	1	**4**	0
	WINGS POINT	BURNT LAKE C08-S-11	0	1.2	**1.2**	0
	SALMON POND	ROCKEY POND C08-SH-12	0	8.5	**8.5**	0
DISTRICT	**ROAD NAME**	**HARVEST**	**PRIMARY**	**SECONDARY**	**TOTAL**	**WATER**

		BLOCK NAME	ROAD (km)	ROAD (km)	ROAD (km)	CROSSINGS
	SALMON POND	HATCHY BROOK	0	6.1	**6.1**	1
8		C08-SH-13				
	MILORD'S ARM	MILORD'S ARM	0	14.5	**14.5**	4
		C08-SH-15				
	SALMON POND	BELLMAN'S POND	0	2	**2**	0
		C08-SH-16				
	SALMON POND	SOUTH POND	0	3.2	**3.2**	0
		C08-SH-18				
	WEST ARM	WEST ARM PENINSULA	0	1	**1**	1
		C08-S-19				
	MICHAELS HR	BRINKS POND	0	22.3	**22.3**	5
		CEO8-SH-21				
	PINE POND	PINE POND	17	3	**20**	10
		C08-S-23				
	MICHAELS HR	CAMPBELLTON RIVER	0	5	**5**	1
		C08-S-24				
	OSMONTON ARM	OSMONTON ARM	20	5.2	**25.2**	10
		C08-SH-26				
	SHIPBUILDERS POND	SHIPBUILDERS POND	0	1.3	**1.3**	0
		C08-SH-27				
	BAYTONA	BAYTONA	3.5	0.5	**4**	0
		C08-SH-29				
	DAN'S POND	DAN'S POND	0	1	**1**	1
		CE08-S-30				
	subtot FMD 8		**70.3**	**73.6**	**143.9**	**45**
6	BURNT BAY LAKE	BURNT BAY LAKE	4	1.5	**5.5**	3
		CE06-SH-1				
	JUNCTION	JUNCTION	0	2	**2**	0
		CE06-SH-2				
DISTRICT	**ROAD NAME**	**HARVEST**	**PRIMARY**	**SECONDARY**	**TOTAL**	**WATER**

		BLOCK NAME	ROAD (km)	ROAD (km)	ROAD (km)	CROSSINGS
6	SHIRLEY LAKE	SHIRLEY LAKE CE06-S-3	3.5	0	**3.5**	1
	subtot FMD 6		**7.5**	**3.5**	**11**	**4**
5	DROVERS RIDGE	CONTENT WEST C05-S-1	4.3	0	**4.3**	0
	DROVERS RIDGE	CONTENT EAST C05-S-2	2.4	7.4	**9.8**	0
	DROVERS RIDGE	CAT BAY	0	2.2	**2.2**	0
		C05-S-3				
	DROVERS RIDGE	GOOSE COVE C05-S-5	0	1.4	**1.4**	0
	DROVERS RIDGE	NORTHWEST ARM C05-SH-6	0	2.3	**2.3**	0
	NORTHWEST POND	NORTHWEST POND C05-SH-9	3.8	0	**3.8**	0
	MACCLES LAKE	MACCLES LAKE C05-S-11	0	7.8	**7.8**	1
	MILLERS ANGLE	MILLERS ANGLE	0	0.7	**0.7**	0
		C05-SH-12				
	CHAIN POND	CHAIN POND C05-S-13	2.5	8.2	**10.7**	0
	CHAIN POND	ROCKY POND	4.7	0	**4.7**	1
		C05-S-14				
	MAGIC ARM	MAGIC ARM C05-SH-15	6.8	0	**6.8**	0
	CROWN RIDGE	PUSSELLS POND C05-S-16	4.5	0	**4.5**	2
	WEIRS POND	WEIR'S POND C05-S-17	3.8	0	**3.8**	0
DISTRICT	**ROAD NAME**	**HARVEST BLOCK NAME**	**PRIMARY ROAD (km)**	**SECONDARY ROAD (km)**	**TOTAL ROAD**	**WATER CROSSINGS**

					(km)	
5	FOURTH POND	FOURTH POND C05-S-18	1.2	0	**1.2**	1
	HAY COVE	HAY COVE C05-S-20	0	1.8	**1.8**	0
	subtot FMD 5		**34**	**31.8**	**65.8**	**5**
4	FLEIGHER'S	FLEIGHER'S CE04-S-1	4.3	0	**4.3**	2
	CAMP 10	CAMP 10 CE04-S-2	0	3.1	**3.1**	2
	DEADWOLF	DEADWOLF CEO4-S-3	0	11.7	**11.7**	3
	TRITON BROOK	TRITON BROOK SOUTH CE04-SH-5	0	5.6	**5.6**	0
	TRITON BROOK	ROCKY BROOK CE04-SH-6	1	4.1	**5.1**	1
	CROWN RIDGE	FIRST BURNT CE04-SH-7	0	2.4	**2.4**	0
	SOUTHWEST POND	SOUTHWEST POND CE04-S-8	0	31.5	**31.5**	11
	LARSON'S FALLS	DENIS BROOK CE-04-S-9	6.5	11.6	**18.1**	11
	MILE TEN	MILE TEN CE04-SH-12	0	4.8	**4.8**	0
	CROWN RIDGE	SECOND BURNT CE04-SH-13	0	**2**	**2**	0
	subtot FMD 4		**10.8**	**76.8**	**87.6**	**30**
	GRAND TOTAL		**122.6**	**185.7**	**308.3**	**84**

will be requested annually from the Water Resources Division of the Department of

Environment and Labour and the appropriate municipalities. The terms and conditions of approval will be applied to all Crown permits and contracts and strictly enforced by district staff. In wet areas with a greater potential for site degradation and erosion, commercial operators in the districts will be directed, where possible, to employ winter harvesting and road building. This will be less intrusive to the sites concerned and minimize impacts. DFRA staff will work with commercial operators who build roads, ensuring that only the minimum amount required to facilitate harvesting is built. This will reduce the future road density in the districts, and ultimately the impacts of road building. Appendix 12 shows the forest road network up to the end of 2005. These maps will be updated over the five year period to maintain a visual record of the forest road network.

In addition to commercial operations, certificates of approval are required for domestic cutters to harvest within protected public water supply areas. There are 25 PPWSA's in which domestic cutting areas are proposed for this planning period (see table 14). Appendix 6 outlines the domestic harvest area boundaries with respect to the protected public water supply boundaries on 1:250,000 scale maps, while appendix 5 shows detailed 1:50,000 up to 1: 100,000 scale topographic map locations of domestic cutting areas which include a protected public water supply area (s). Approval to operate in these areas will be requested every five years from the Water Resources Division of the Department of Environment and Labour and the appropriate municipalities. The corresponding conditions for cutting within each respective protected public water supply area are printed on the back of the map attached to each domestic permit.

7.6 Environmental Protection

7.6.1 Fire

Wildfire has not been prevalent in the district in the past number of years and as a result there have been few timber losses. Despite this fact the district must remain vigilant in its fire suppression program to ensure any future losses are minimized. There are 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 3 Cl-215 air tanker and a helicopter with a crew of fire fighters for initial attack.

7.6.2 Insect and Disease

Monitoring and protection for insects and disease is done out of the forest protection division in Corner Brook. District staff are always available however to provide assistance in detection, monitoring, and protection against insects and disease.

As stated, district staff will be conducting reconnaissance surveys to monitor the extent and rate of spread of the balsam woolly aphid.

7.6.3 General Environment

The environmental protection guidelines form the basis for protecting the environment from the effects of forest activities. Forest activities have the potential to impair water quality, cause soil erosion and compaction, destroy fish and wildlife habitat, impact viewscape, and disturb sensitive and rare sites etc. The guidelines are designed to provide site specific measures to ensure that these impacts are avoided. Highlights of measures to avoid these impacts include no activity buffer zones, modification of harvesting design and equipment, avoidance of sensitive sites during critical periods, consultation with other regulatory agencies and of course, monitoring. Specific measures that govern each forestry activity are detailed in appendix 2.

Table 14 Summary of Crown's proposed forestry activity in the public protected water supply areas of Planning Zone 3 from 2007 to 2011

Protected Water Supply Area	**FMD**	**Proposed Commercial Harvest Area**	**Proposed Road Construction Name**	**Proposed Silviculture Area**	**Proposed Domestic Harvest Area**
Barry's Brook	5	C05-S-18	Fourth Pond	C05-PCT-1 C05-PCT-2	33 33A 5
Beaver Pond	8	n/a	n/a	n/a	3
Beaverton Pond	8	n/a	n/a	n/a	5
Bridger's Cove Pond	8	n/a	n/a	n/a	3
Bullock Cove Pond	8	n/a	n/a	n/a	2
Carter's Pond	8	n/a	n/a	n/a	13
Cottrell's Pond	8	n/a	n/a	n/a	43
Dark Cove Pd	5	n/a	n/a	n/a	20

Protected Water Supply Area	FMD	Proposed Commercial Harvest Area	Proposed Road Construction Name	Proposed Silviculture Area	Proposed Domestic Harvest Area
Deadman's Pond	5	n/a	n/a	C05-DLT-6	10 11 15
Dog Bay Pond	8	C08-SH-9 C08-S-11 C08-SH-12 C08-SH-14 C08-SH-16 C08-S-17 C08-SH-18 C08-SH-31	Celies Cove Burnt Lake Rocky Pond Bellman's Pond South Pond	C08-P-3 C08-P-5 C08-P-11 C08-P-16 C08-PCT-1 C08-PCT-6 C08-PCT-7 C08-PCT-9 C08-PCT-15 C08-PCT-16 C08-DLT-6 C08-PM-2 C08-PM-3 C08-PM-4 C08-HM-1 C08-HM-2	5 7 8 9 11 14 23 24 28
Gander Lake	4	CE04-S-2 CE04-S-3	n/a	CE04-P-1 CE04-P-2 CE04-P-3 CE04-P-4	n/a
Gander Lake	5	C05-S-19	n/a	C05-P-12	31 34
Gander Lake	6	CE06-S-4	Crown Ridge	n/a	n/a
Goose Neck Pond	8	n/a	n/a	n/a	28
Grandfathers Pond	5	n/a	n/a	n/a	6

Protected Water Supply Area	FMD	Proposed Commercial Harvest Area	Proposed Road Construction Name	Proposed Silviculture Area	Proposed Domestic Harvest Area
Gull Pond		n/a	n/a	n/a	12
Hare Bay Pond	5	n/a	n/a	n/a	18
Indian Arm Brook	6	CE06-S-2 CE06-SH-3	Junction	CE06-P-2	n/a
Indian Arm Brook	8	CE08-SH-21 C08-S-24 C08-SH-27 C08-S-30	Michaels Hr Dan's Pond	CE08-P-4 C08-PCT-8 CE08-WPM-1 CE08-WPM-2	17 19 20 22
Indian Bay Brook	5	C05-S-17	Weir's Pond	C05-P-13 C05-PCT-12 C05-DLT-6 C05-DLT-7 C05-DLT-8 C05-DLT-9	15
Indian Cove Pond	8	n/a	n/a	C08-PCT-12	38 39
Jimmy's Pond	8	n/a	n/a	n/a	3
Jumper's Pond	8	n/a	n/a	C08-PCT-5 C08-PCT-9	11 14
Little Arm Pond	8	C08-SH-3	Southwest Arm	C08-P-15	N/A
Little Northwest Pond	8	n/a	n/a	n/a	13 14 15
Little Pond	8	C08-SH-2	Big Lake	C08-P-2 C08-PCT-17 C08-PM-1	3 12 47
Long Pond	8	n/a	n/a	n/a	3 12
Muddy Hole Pond	8	n/a	n/a	C08-PCT-14	n/a
Northwest Pond	8	n/a	n/a	n/a	7

Protected Water Supply Area	FMD	Proposed Commercial Harvest Area	Proposed Road Construction Name	Proposed Silviculture Area	Proposed Domestic Harvest Area
Northwest Pond	5	n/a	n/a	n/a	22
Peter's River	8	n/a	n/a	n/a	36 37
Rocky Pond	8	n/a	n/a	n/a	3 5 9
Rusty Cove Pond	8	n/a	n/a	n/a	3
Saltine's Pond	8	n/a	n/a	n/a	3
Saltwater Pond Brook	5	n/a	n/a	C05-PCT-1 C05-DLT-5	4 5 6
Sandy Cove Pond	?	n/a	n/a	n/a	3
Southeast Pond	8	CE08-SH-21 CE08-S-30	Brink's Pond Dan's Pond	C08-P-3 C08-PCT-5 C08-PCT-11	14 15
Southwest Feeder Pond	8	n/a	n/a	n/a	17
Stanhope Pond	8	C08-SH-15	Milord's Arm	C08-P-12 C08-P/HM-1	n/a
Trokes Cove Pond	8	n/a	n/a	n/a	25

7.6.4 Surveys

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

As previously mentioned, reconnaissance and intensive regeneration surveys will be conducted on commercial cutovers created during the next five years as well as those created in the past five years to determine the need for planting. As well, reconnaissance surveys for balsam woolly adelgid will be done to determine suitable areas to conduct silvicultural treatments.

7.6.5 Information and Education

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

Section 8 Mitigations

Several operating are concerns arising from the planning team members and from regulatory agencies have been identified during the development of this plan and previous five year plans for FMD's 4,5,6 and 8. As well, guiding principles which outline procedures to follow should an unforeseen conflict arise have been identified for each value in Section 4. However, site specific mitigations that will be implemented by DNR have also been developed. These mitigations are:

1) DNR has agreed with the IFWD to not harvest within the calving areas of the Middle Ridge Caribou Heard and to maintain 30 % forested habitat within a 10 km radius around the calving areas. Additionally, DNR has agreed to maintain an unharvested corridor to link the calving areas below Little Gander Pond to those north west of Eastern Pond (see Appendix 7). These mitigations produced the resultant FMD 4 harvest areas of Denis Brook, Southwest Pond, Little Gander and Owl Pond. These mitigations designed by the IFWD were developed as precautionary steps to protect habitat for the Middle Ridge Heard which is currently in decline. Existing guidelines for caribou will be followed by DNR for all other affected areas (eg Fourth Pond, FMD 5) and any new guidelines developed as a result of ongoing processes will be adhered to

2) Similarly, existing guidelines for pine marten will be followed by DNR for all affected areas and any new guidelines developed as a result of ongoing processes will be adhered to. With regard to the Miller's Angle proposed harvest area, DNR will not clearcut harvest in the section of this block that intersects critical pine marten habitat until such a time that the marten habitat plan is completed.

3) DNR has agreed to the development of a viewsacpe management plan in consultation with the communities of the Eastport Peninsula to protect the vistas associated with the Magic Arm proposed harvesting block. Similarily DNR will develop a viewscape management plan for harvesting associated with the Terra Nova River in FMD 5 in conjunction with Tourism Division. No harvesting will occur in these areas until a viewscape plan has been developed.

4) A 100m buffer will be maintained along the coastline headlands to protect potential archaeological artifacts and important seascape vistas on Crown Land in FMD's 5 and 8

5) A 50 meter buffer will be maintained at Gull, Fourth and First Burnt Ponds in FMD 5 to protect sensitive waterfowl habitat. A 50 meter buffers will also be maintained around waterbodies associated with the North Pond sensitive waterfowl area in FMD 4. Similarly in FMD8, DNR will continue to maintain 50 meter buffers around Lily Pond and waterbodies in the

Campbellton River Block to protect sensitive waterfowl areas.

6) As in the previous five year plans for District 4 and 5, DNR will maintain a 100 meter buffer along Triton Brook (south side) and Maccles Brooks as well as on Riverhead brook below the falls. A 30 meter buffer will be maintained above the falls on Riverhead Brook. In FMD 8 a 100 meter buffer will be maintained on the Cambellton River in the vicinity of Second Pond, and on Salmon Brook in the vicinity of Twin Ponds. These mitigations were designed to protect fresh water fishery resources.

7) Similarly, DNR will continue with road decommissioning plans at Triton Brook, Georges Pond, Second Burnt Pond and Cambellton River. These mitigations were also developed to protect fresh water fishery resources. During this period DNR has also agreed to road decommissioning in the section of the Milord's Arm operating area that intersects the Lewisporte Public Protected Water Supply Area. The schedule and extent of decommissioning work will be developed with the agencies concerned.

8) DNR has agreed to water quality monitoring within the Lewisporte PPSWA to monitor the potential effects that forest harvesting in adjacent areas may have on Lewisporte's potable water supply. The schedule and details of this monitoring will be developed with the Town of Lewisporte.

9) DNR has facilitated negotiations between the paper companies and the freshwater fishery management groups IBEC, FABEC and GMA at proposed harvesting areas on the Gander River, Indian Bay system and Middle Brook system to protect fish habitat. DNR is also continuing research in the Triton Brook area aimed at determining the effects of forest harvesting on water quality in the Triton Brook area.

10) DNR has facilitated negotiations between CBPP and the Kittiwake Development Association to protect three white birch areas for sap production research and continues to support efforts in the development of this non timber forest product.

11) DNR will continue to implement the enhanced guidelines for operations within PPWSA as per the EPP guidelines (appendix 2)

12) DNR will support the Development of blueberry management areas on sites that are not silviculturally treated and are approved by the Agrifoods Division of DNR.

Section 9 Plan Administration

9.1 Monitoring

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

9.1.1 Operational Level

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

9.1.2 Planning Level

The planning team has established a monitoring committee (which is the planning team) whose primary role is to monitor implementation of this Five Year Operating Plan as well as those of Corner Brook Pulp and Paper and Abitibi Consolidated for the zone. This is a crucial role, as many implementation commitments are stated in the plan. The primary function of the monitoring committee is to:

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

The monitoring committee should meet at least once a year to review the annual operating plan. Additional meetings may be required to review amendments or provide recommendations should changes be required as a result of a catastrophic event such as fire which may precipitate changes to the plan. Field trips to view on the ground activities has proven effective by monitoring teams in the past and will be encouraged during the implementation of this plan.

9.2 Amendments

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

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

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

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

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

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

Amendments requiring submission through EA will be reviewed by the planning team. Other amendments may also be reviewed by the monitoring committee if the District Manager deems that they represent a significant change to the plan.

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Appendices