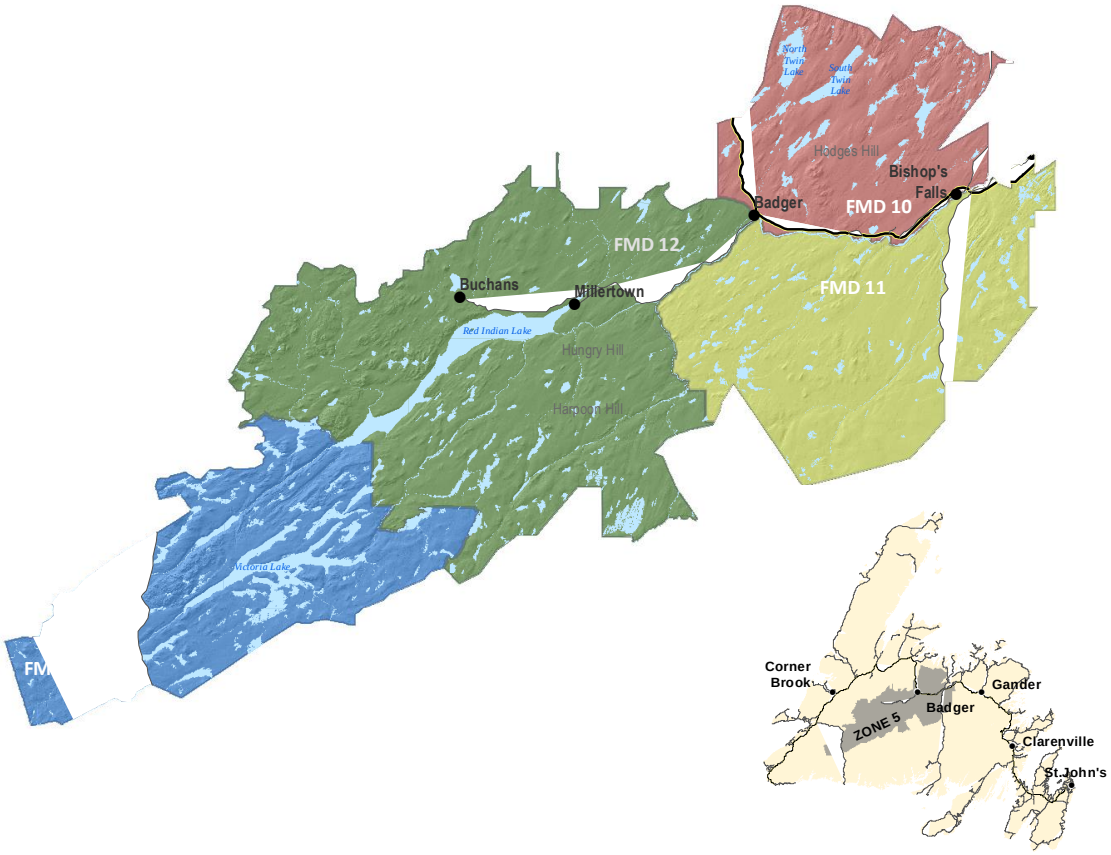
ZONE 5

FOREST MANAGEMENT PLAN

2021 – 2025



Department of Fisheries, Forestry, and Agriculture
Forestry & Wildlife Branch
Regional Services

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INTRODUCTION

This new five-year plan is scheduled for the period January 1, 2021 to December 31, 2025 and represents proposed forestry activity upon crown timber lands within Forest Management Districts 10, 11, 12 and 13. The management of this land is consistent with strategies and philosophies implemented by Fisheries and Land Resources on all other crown land managed districts within the Province. This five-year operating plan incorporates established provincial planning requirements, environmental protection guidelines, and standard operating procedures developed under a stringent Environmental Management System (EMS) which is registered under the ISO 14001 standard. Topics that are provincial in scope such as carbon and global warming are included in the provincial sustainable forest management strategy, while sections that are more descriptive or depict local conditions such as values, forest characterization and ecosystem description are included into this five year operating plan. Forest Management Districts 10, 11, 12 and 13 are adjacent and share common ecoregion characteristics and collectively form Planning Zone Five. Within a planning zone, there is a requirement for each tenure to develop a five year operating plan. These plans have to be submitted to Forestry and Wildlife Branch and Department of Environment (for an environmental assessment review). Forest Management Districts 11, 12 and 13 are comprised entirely of crown land, while FMD 10 has both Crown and Corner Brook Pulp and Paper (CBPPL) tenure. As a result, there will be two (2) five-year plan submissions for this zone. Throughout this five-year plan, references will be made to Districts 10, 11, 12 and 13 individually but when combined they will collectively be referred to as Planning Zone Five or the zone.

This document will attempt to fully integrate the presentation of information and discussions for crown land in the zone. Discussion and information will be presented separately for each district where warranted based on unique and distinct differences in scope and content. The more descriptive sections of this plan will be generic in nature and give information for the entire zone as well as some broad comparative statistics. Finally, this document will attempt to build on the positive results of previous five-year plan documents. Information will be updated as required or new sections will be added as any new information is available.

SECTION 1 DESCRIPTION OF THE LAND BASE

1.1 General

1.1.1 Location

Planning Zone Five encompasses Forest Management Districts 10, 11, 12 and 13 (Figure 1). It is located in central Newfoundland and extends from Victoria Lake in the west to the Bay D'Espoir highway in the east and from Island Pond in the south to North and South Twin Lakes in the north. Major towns located within the zone are Bishop's Falls, Grand Falls-Windsor, Badger, Millertown and Buchans. Districts 10 and 11 are administered from Bishop's Falls, District 12 from Springdale, and District 13 from St. Georges.

1.1.2 History

The natural resources of the zone have played a major role in the well-being of the residents. Since the earliest settlement, the forest and fish resources were the mainstay of the economy. Initially, the forest was used as a source of fuelwood as well as construction materials for houses and fishery related items (stages, lobster pots, boats etc.). Small sawmills developed to supply the local demand for lumber and construction timber.

One of the earliest commercial uses of the forest in Central Newfoundland was to supply materials for the construction of the railway in the late 1800's. This combined with the granting of the Reid Lots opened up a large portion of previously inaccessible area to commercial activity. It resulted in an increase in the number and size of sawmills. Paper production started in 1909 with the opening of a mill at Grand Falls by the Anglo-Newfoundland Development (AND) Company. In the first half of the 1900's exports of material for pulpwood and mine pit-props were also common. Once the paper mill was firmly established, domestic cutting in the zone was limited to cutovers, birch and burnt timber. Commercial sawmill activity was also limited. In the early 1960's, the AND Company merged with the Price Brothers and Company Limited to form a new company called Price Pulp and Paper Limited. This company operated under various names until the closure of Abitibi-Bowater Inc. in 2009. At that time, the land area was expropriated and has been subsequently managed under Crown responsibility.

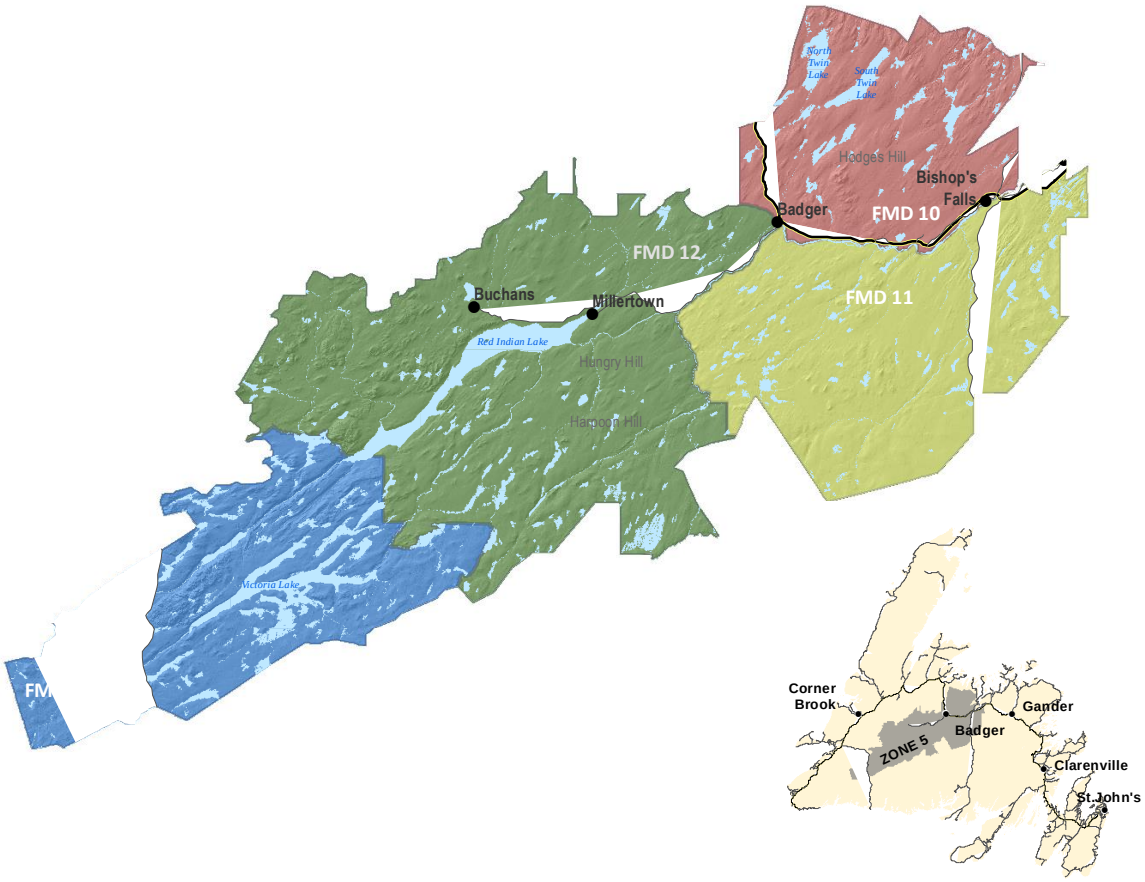

Figure 1: Location of Planning Zone 5

1.1.3 Ownership

Forest Management Districts 11, 12 and 13 are comprised entirely of crown land and managed under Crown authority. In January 2020, an agreement was signed between FLR and Corner Brook Pulp and Paper (CBPPL), which has resulted in both Crown and CBPPL tenure within Forest Management District 10.

1.2 Physical

1.2.1 Topography and Hydrology

The central portion of the zone comprises the majority of area and is gently undulating with slopes seldom exceeding 10 percent. In contrast, the terrain is very rough and hilly in the northern portion of District 10. The Gaff Topsails and Buchans Plateau occur north of Red Indian Lake in District 12 and consists mainly of highland areas and windswept barrens. The southern and south western portion of the zone consists of rolling hills that grow steeper as one moves farther south. Elevation ranges from 0 at the coast to 610 m on the Buchans Plateau. Most of the zone is forested and interspersed with scrub, barren, and treed, wet, basin and domed bogs. Generally the most productive forest occurs on the more undulating terrain. The areas with the highest productivity occur in the river valleys. Forest productivity decreases beyond 400 metres culminating in rock and soil barrens at the highest elevations.

The more prominent highland areas in the zone include Hodges Hills in the northeast, Buchans Plateau and Gaff Topsails in north central and the eastern extent of the Annieopsquotch range in the south west. The zone is dominated by three major river basins; the Exploits, Victoria and Lloyds River systems. These rivers originate in the interior areas and drain large watersheds. Red Indian Lake is of extreme importance as a reservoir to allow flow control on the Exploits River for the generation of hydroelectricity.

1.2.2 Geology

In the majority of the zone, the underlying bedrock is composed of sedimentary and metamorphic rocks consisting of shale, schist and sandstone dating from the Paleozoic era, with later intrusions of granite and diorite. The area has been heavily glaciated and stony till with a sandy loam-to-loam texture covers the bedrock in most locations. In the northern section near Mark's Lake, Frozen Ocean Lake and Lewis Lake treeless granite outcrops occur on the steep terrain. There are a number of steep isolated rock hills or monadnocks located at Hodges Hills, Hungry Hill and Harpoon Hill which rise sharply above the surrounding terrain.

Glacial activity has played a prominent role in shaping landscape features. Most of the central area is covered with bedrock derived glacial till with lesser areas of outwash terraces and moraine deposits. There is a local network of outwash terraces composed of well-sorted sands and gravels, along a narrow band of an earlier drainage channel of Stoney Brook. Eskers and kame terraces, composed of coarse-grained materials that have a limited moisture holding capacity are common. There are also some local moraine deposits below 150 meters.

In the Buchans Plateau area north of Red Indian Lake there are three major types of bedrock: (1) medium to coarse grained granite to the north, (2) volcanic rock immediately north of Red Indian Lake from Buchans Junction to the Shanadithit lowlands, and (3) red sandstone, conglomerate and shale in the Shanadithit lowlands. The Buchans area is covered with a thick deposit of glacial till which are generally drumlin shaped in the direction of ice movement. Most of the area is covered by upland barrens which consist of extensive areas of bog-soil-rock complexes above 244 meters elevation. These uplands can be divided based mainly on elevation; the upper consisting of bog and exposed rock with thin deposits of glacial till and the lower composed of a bog-barren complex with a minor component of exposed rock.

In the southwest portion of the zone, the northerly extension of the Annieopsquotch range consists mainly of treeless granite outcrops. There is an area between this mountainous region and Red Indian Lake, which is underlain by softer, less erosion-resistant sandstone, shale and conglomerate. Surface deposits in this location consist of medium textured glacial till, lacustrine and glacial-fluvial materials. Some material for the description of geologic features was taken from Batterson, M. J, 1991, 1999a and 1999b.

1.2.3 Soils

For most of the zone soil profiles developed in the till are chiefly orthic and humo-feric podzols on the well-drained upland sites, and gleysols and peats on the low-lying sites. The bogs are dominated by organic soils. The better-drained, more permeable soils, which offer better machine mobility and make better road construction material, are usually associated with poorer tree growth. The heavier, finer textured soils, which have greater water retention capabilities and poor vehicle mobility and

make poor road building material, are usually associated with the best tree growth. These heavier soils form an almost continuous east-west strip along the river basins. There are some minor areas of more permeable soils within this area; however, they do not make up a significant portion.

There is little soil profile development in the Buchans Plateau which limits forest productivity. An escarpment along the northern shore of Red Indian Lake has surface deposits of glacial till with glacial-fluvial materials at the mouth of major brooks and streams. Forest growth is good along these sheltered slopes, although some areas are limited due to wet conditions. Soils are ferro-humic podzols which are dark soils with high organic content that usually occur on humid sites.

1.2.4 Climate

The eastern portion of the zone experiences warm summer temperatures and its location east of the Long Range Mountains makes it one of the driest on the island. This area experiences the least wind and fog due to the effects of the cold northeast winds off the Labrador Current. The area has high summer temperatures, low summer precipitation and prolonged dry periods which makes it very susceptible to fire.

The climate for the central and western portion of the zone is more moderate with lower summer temperatures and higher precipitation than in the east. It still has dry, warm summers relative to the rest of the island making fire occurrence more common.

The climate for the Buchans Plateau area is notable for its short growing season and permanent snow cover throughout the winter. Heavy drifting in exposed areas is common. With the exception of a more moderate summer, climate is similar to the extreme southern boundaries of the zone.

1.3 Ecosystems

1.3.1 Forest Ecosystems

An ecosystem is a community of interacting and interdependent plants, animals and microorganisms, together with the physical environment within which they exist (adapted from Perry, 1994). It is important to remember that within an ecosystem the interactions between the biotic and abiotic components are at least as important as the component themselves. Another critical characteristic

of ecosystems is their overlapping boundaries. While each is definable in time and space, and distinguishable from adjacent ecosystems, each is intimately integrated with other local ecosystems. Additionally, each local ecosystem is nested within increasingly larger ecosystems. The scale at which an ecosystem is viewed is contingent on the species or abiotic characteristic under consideration. While planet earth represents the ultimate global ecosystem, complex ecosystems also exist under fallen logs and rocks.

A forest ecosystem, as the term implies, is an ecosystem dominated by tree cover. At the coarsest level, the forests of Planning Zone Five, 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 and Northern 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.

1.3.2 Ecoregions and Subregions

Damman 1979, defined ecoregions as areas where comparable vegetation and soil can be found on sites occupying similar topographic positions on the same parent material, provided that these sites have experienced a similar history of disturbance. Thus, an ecoregion cannot be defined in isolation

from the physical landscape, but vegetation toposequence, vegetation structure, floristic composition, and floristic distributions can provide the primary criteria. According to Damman, nine ecoregions are represented in Newfoundland. Each of these is further divided into subregions (also known as ecodistricts) All of the Newfoundland ecoregions and subregions contain many of the same ecosystem variables. It is the dominance and variance of these variables (e.g., vegetation and climate) that determine their classification.

Figure 2 depicts Planning Zone Five relative to Damman's ecoregion classification system. The Central Newfoundland Forest Ecoregion encompasses the majority of the area in the zone and occupies the more productive sites. The Maritime Barrens and Long Range Barrens Ecoregions occur on the north-central, south western peripheries and are less important in terms of forest productivity.

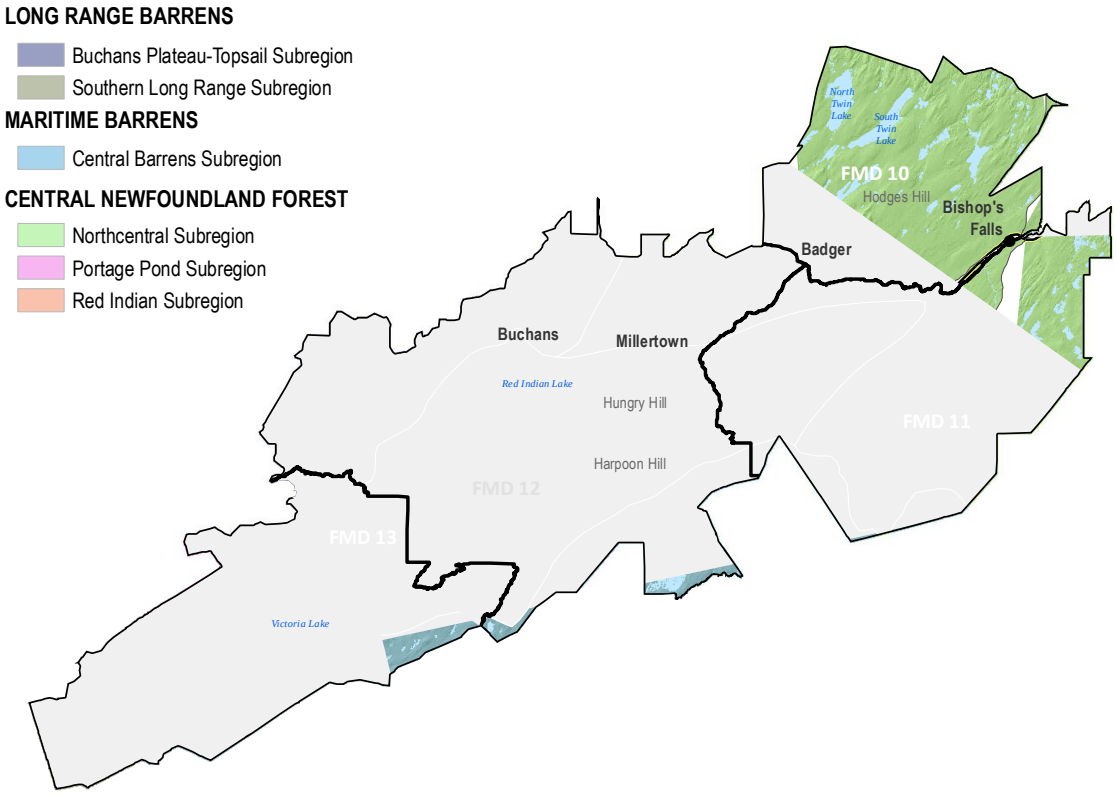

Figure 2: Ecoregions and subregions of Planning Zone 5

Table 1 below depicts the percentage of the ecoregions and subregions that are represented in the zone. It describes each ecoregion and subregion as a percentage of the total in the province as well as the relative importance within each district and in the zone. For example, District 12 contains 59 percent of the Red Indian Lake Subregion of the Central Newfoundland Forest Ecoregion in the province while the whole zone encompasses all of this subregion. As well, 47 percent of district 12 and 31 percent of the zone is located within this subregion. The following is a detailed description (from Meades, 1990) of each ecoregion and subregion in the zone.

		Total Area within Province (ha)	Percentage of Total Area within Zone 5 Forest Management Districts					Relatinve Percentage of of Ecoregion and Subregion within Zone 5 Forest Management Districts				
			10	11	12	13	total	10	11	12	13	total
Long Range Barrens												
	Buchans Plateau Topsail Subregion	369,811	0	0	36	7	40	0	0	27	5	12
	Souther Long Range Subregion	599,815	0	0	0	6	6	0	0	0	13	3
Central Newfoundland Forest												
	Portage Pond Subregion	149,319	0	0	0	44	44	0	0	0	24	5
	Northcentral Subregion	2,310,742	9	9	3	0	21	100	70	17	0	38
	Red Indian Subregion	393,911	0	18	59	23	100	0	24	47	33	31
Maritime Barrens												
	Central Barrens **Subregion**	1,514,392	0	1	4	5	10	0	7	12	25	11

Table 1: Percentage of ecoregions and subregions in Planning Zone 5.

1.3.2.1 Central Newfoundland Forest Ecoregion

This ecoregion is located in the north-central part of the island with a small outlet near Bay d'Espoir. The topography is gently rolling to hilly with most elevations between 150 and 450 meters. It has the most continental climate in insular Newfoundland with the warmest summers and coldest winters. It has the least wind and fog of any ecoregion and a growing season of 140-160 days and average precipitation of 900-1300mm.

This ecoregion is heavily forested and is the most distinctly boreal part of the island. Balsam fir, black spruce, and to a lesser extent white birch are the dominant tree species. There is an extensive fire history thus fire origin stands of black spruce and white birch cover extensive areas in the northern and eastern portions. Trembling aspen forms local stands after fire but is restricted to the central and northern portion.

Hylocomium-balsam fir is the zonal forest type and is dominant in areas not disturbed by fire. *Kalmia*-black spruce and *Pleurosium*-balsam fir forests are also common. The *Kalmia*-black spruce-lichen forests, which occur on outwash sands and gravels, are unique to this ecoregion. Red pine also occurs but is restricted to extremely dry sites. This ecoregion comprises 74 percent of the zone in the Portage Pond, North Central and Red Indian Lake subregions.

1.3.2.1.1 North Central Subregion

The North Central Subregion has the highest maximum temperatures, lowest rainfall, and highest forest fire frequency on the island. The subregion extends from Clarenville to Deer Lake with a mostly rolling topography of less than 200 meters. The history of fire is evident by the pure black spruce forest with white birch and aspen stands that dominate the subregion.

1.3.2.1.2 Red Indian Lake Subregion

The entire Red Indian Lake Subregion is located in Planning Zone Five. The landscape is characterized by dense forest, bogs, and rolling hills. It is distinguished from the rest of the Central Newfoundland Ecoregion by having the coolest summers, highest precipitation and shortest growing season. Despite this fact, there is still a high incidence of wildfire relative to other subregions of the province.

1.3.2.1.3 Portage Pond Subregion

This subregion includes the Annieopsquotch Mountains with elevations up to 677 metres. It has rugged topography and is heavily forested, primarily with balsam fir.

1.3.2.2 Long Range Barrens Ecoregion

This ecoregion comprises the highlands extending from the southwest coast to the northern part of the Northern Peninsula. It consists of three distinct units, the Southern Long Range, the Buchan's Plateau-Topsails, and the Northern Long Range subregions. The subregions are separated by areas of more or less continuous forest with the former two occurring in the zone. Fire is of little importance and has played no role in the formation of these barrens. There are large areas of exposed bedrock in this ecoregion which are acidic in nature.

Cool summers and cold winters are typical of this ecoregion. The mean daily temperatures are relative low therefore the vegetative season is short. Snowfall can exceed 5 m and drifting is extreme throughout the winter. Snow cover is permanent throughout the winter and persists through to late

spring. Western and southwestern facing slopes are severely exposed due to the prevailing winds from this direction.

This ecoregion contains mainly barren vegetation with shallow ribbed fens and tuckamore dominating the landscape. Sheep laurel heath is the predominant dwarf shrub vegetation with pink crowberry dominated Empetrum heath covering exposed areas that are subject to active erosion. Arctic alpine vegetation ie (*Diapensia* and *Loiseleuria*) is common on all highlands and exposed sites. In areas with persistent snow cover, snow bank species such as moss heather, mountain sorrel and dwarf bilberry are common.

Extensive areas of tuckamore, mostly of black spruce less than one metre high, occur on slopes and in valleys, but are absent from hill summits. Speckled alder is completely absent being replaced by sweet gale along brooks. Mountain alder is common on wet and dry sites but does not form alder swamps. Shallow peatlands, patterned fens and slope bogs cover extensive areas.

1.3.2.2.1 Buchans Plateau - Topsail Subregion

The Buchan's Plateau-Topsails Subregion lies between Grand Lake and Red Indian Lake and its southern edge extends into Districts 12 and 13. Most of the subregion is barren. Dwarf shrub heaths, shallow patterned peatlands, and areas with low krummholtz dominate the landscape.

1.3.2.2.2 Southern Long Range Subregion

The Southern Long Range Subregion is located on the western portion of District 13 and covers the upper reaches of the river valleys and the higher terrain. In these river valleys, more of the southern plant species are present particularly yellow birch. Speckled alder thickets occur on alluvial soils.

1.3.2.3 Maritime Barrens Ecoregion

This ecoregion extends from the east coast of Newfoundland to the west coast through to 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.

1.3.2.3.1 Central Barrens Subregion

This subregion includes the barrens between the forests of Central Newfoundland and the foggy zone along the south coast. Summers are warmer, fog is less frequent, and snow cover is more persistent than in other subregions. Forest patches are common throughout the barren but Arctic-alpine species are poorly represented. Speckled alder is present but does not form alder swamps and bogs are slightly raised or domed. This subregion occurs on the southern extremes of Districts 11, 12, and 13.

1.4 Ecosystem Dynamics

1.4.1 Ecosystem Condition and Productivity

Landscape patterns determine the variety, integrity, and interconnectedness of habitats within a region. These landscape patterns are a direct result of the relationship amongst 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 Five. For the most part this section will be descriptive and explanatory in nature.

1.4.1.1 Productivity

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

The level of primary production is dependent 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 and a good site would have a higher potential than a poor site.

Overall, the landscape in Planning Zone Five has approximately 44 percent productive forest. As well, the relative proportion of site types is 17 percent good, 65 percent medium and 18 percent poor with a mean annual increment (MAI) of 2.6, 1.7, and, 0.8 m3/ha/yr respectively. The 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 occur in the lowlands and gently rolling uplands of the zone with the most productive being in 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 the Buchans Plateau section of District 12 and the south central and south west portion of District 12 and 13 the soils are shallower with bedrock at or near the surface. The terrain is much rougher and the growing season is shorter.

In practice, it is nearly impossible to measure the amount of biomass produced in an ecosystem, or the energy consumed in the process. One method is tracking mean annual increment in m3/ha/yr by tree species by ecoregion. This can be readily measured over time and manipulated through silvicultural treatments or affected by poor harvesting practices that 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 following a disturbance. To a large degree, a forest ecosystem's resilience is controlled by properties such as climate, parent soil, topography 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. Indicators 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.

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 (eg. 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 in distribution and abundance of various fauna. These indicators can be measured and monitored to ensure stability is maintained and to evaluate the impact, if any, of forest activities on ecosystem stability.

1.4.1.4 Disturbance Regimes and Successional Patterns

There are four main driving forces that cause disturbance in the boreal forest. Forest Harvesting can be considered a major disturbance in the zone, occurring 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 windstorm, wind throw usually occurs after a stand is weakened by some other agent like insects. For this reason successional patterns after insect damage and wind throw will be discussed together. The following is a brief synopsis of successional patterns after each major disturbance type by forest type and site type.

1.4.1.4.1 Harvesting

Regeneration patterns in the black spruce forest type after harvesting is mainly back to black spruce, the component of which increases as site productivity increases. Regeneration failure in this forest type has the potential to be high, where NSR rates increase from a low of near 10 percent on good sites to a high of approximately 50 percent on poor sites. These sites would be candidates for planting with White, Black or Norway spruce.

In the balsam fir types, regeneration success back to balsam fir is much higher averaging 65 percent. Regeneration rates to balsam fir are consistent on all site types. Regeneration failure is low at 10 percent.

Regeneration pattern in the mixed forest types is generally to balsam fir or to mixed species dominated by balsam fir. There is also a component of white spruce regeneration after harvest on these mixed forest types. There is a higher component of white birch regeneration after harvesting in types that had a higher percentage of hardwood before harvest. As well, the better the site class the more hardwood regeneration. Regeneration failure on the mixed forest types is variable across site types and ecoregions depending on local conditions but averages 15 percent and is higher as the site gets poorer

Regeneration after harvest on the hardwood types is variable. Sites regenerate back to hardwood or to balsam fir in varying proportions. Mixed wood regeneration is also common. Usually the better the site the more likely the site will regenerate to hardwood.

1.4.1.4.2 Fire

On the black spruce types regeneration is usually back to black spruce with a minor component of balsam fir. More fir regenerates after fire on the better sites. Regeneration failure on the black spruce types is low on the better sites averaging 10 percent but increases to 45 percent as the sites get poorer. Regeneration patterns after fire on the balsam fir types occurs in the same pattern as in black spruce. On the mixed wood types regeneration is variable. The softwood hardwood sites regenerate to fir and mixed wood while the hardwood softwood sites tend to have a higher component of black spruce and trembling aspen. The component of hardwood in the regeneration increases as the sites get better. Regeneration failure on the mixed wood forest types averages 10 percent and decreases as the component of hardwood in the original stand increases. Regeneration on the hardwood types is generally mixed with equal components of black spruce, balsam fir, white birch and trembling aspen. The hardwood component can be dominated by aspen if it was present in the original stand.

1.4.1.4.3 Insect

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

Mature balsam fir types usually regenerate to balsam fir with a component of black spruce and mixed wood on the poorer sites. Disturbance by insects in young balsam fir stands can cause succession to white spruce. In black spruce stands regeneration is usually consistently back to black spruce across site types with a lesser component of balsam fir that increases as the sites improve. 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. Black spruce is also a component in stands with higher hardwood content. Regeneration patterns in the hardwood types are variable and can regenerate with equal components of black spruce, balsam fir, white birch and trembling aspen. Regeneration failure occurs approximately 10 percent of the time but can be significantly higher if pure stands of immature balsam fir are killed.

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.

While the boreal forest may 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. 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 potentially up to 500 times as many mycorrhizal fungi. Despite the large number of organisms contained within the boreal forest, only a small amount are actually plants and vertebrates. The larger portion remains largely unrecorded and unstudied. As a result, we need to manage with caution so that species are not inadvertently extirpated.

Biodiversity provides such essential services for humans as: climate control, oxygen production, purification of freshwater supplies, carbon dioxide removal from the atmosphere, soil generation, and nutrient cycling.

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. 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 Ecosystem Diversity

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

A forest interspersed with barrens, marshes, lakes and ponds provides for diversity across the landscape. Each ecoregion in the province should have representative areas protected which displays the diversity where such exists. These areas can serve as a benchmark from which to measure and guide management decisions. These representative areas protect the integrity 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.

1.5 Forest Characterization

1.5.1 Land Classification

Table 2 displays the Crown land classification broken down by forest management district for Planning Zone 5. The total mapped land area in the zone is approximately 1.3 million hectares. There are four basic categories that currently represent how the land is classified; productive, non-productive, non-forest and fresh water.

Table 2: Land classification by district and area for Planning Zone 5.

Land Class	Total				**Total**
	10	11	12	13	
disturbed	4,456	7,888	12,443	1,580	26,367
age class 1	4,975	12,821	17,454	12,209	47,459
age class 2	14,922	35,141	20,042	16,442	86,547
age class 3	6,306	33,648	19,185	11,051	70,190
age class 4	1,652	19,499	18,791	2,195	42,137
age class 5	5,190	10,764	28,861	4,112	48,927
age class 6	4,673	11,073	22,356	8,192	46,294
age class 7	2,081	5,896	10,864	13,674	32,515
Total Productive	44,265	136,741	150,008	69,468	400,482
softwood scrub	13,652	62,475	91,272	59,826	227,225
hardwood scrub	2,336	3,945	5,531	576	12,388
Total Non-Productive	15,988	66,420	96,803	60,402	239,613
rock barren	115	1,507	9,554	9,641	20,817
soil barren	1,797	3,865	34,403	32,798	72,863
bog	17,596	51,613	111,504	51,310	232,023
cleared land	414	194	380	152	1,140
agriculture land	822	34	6	0	862
residential	2,194	203	253	42	2,692
right of ways	578	913	688	217	2,396
miscellaneous	189	841	692	239	1,961
Total Non Forested	23,705	59,170	157,480	94,399	334,754
Fresh Water	23,534	58,334	156,798	94,189	332,855
Total All Classes	107,492	320,665	561,089	318,458	1,307,704

Figures 3, 4, 5, and 6 display the relative percentages of each major land class category found within in each district.

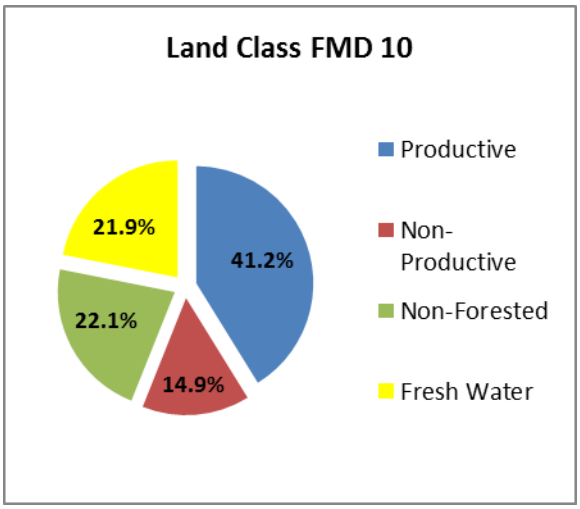

Figure 3: Land class breakdown for District 10.

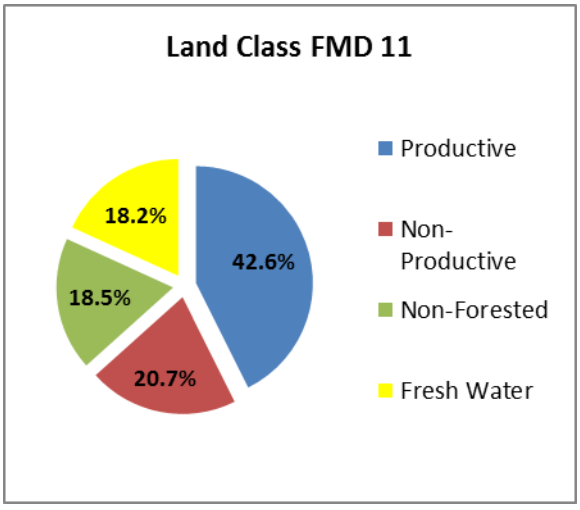

Figure 4: Land class breakdown for District 11.

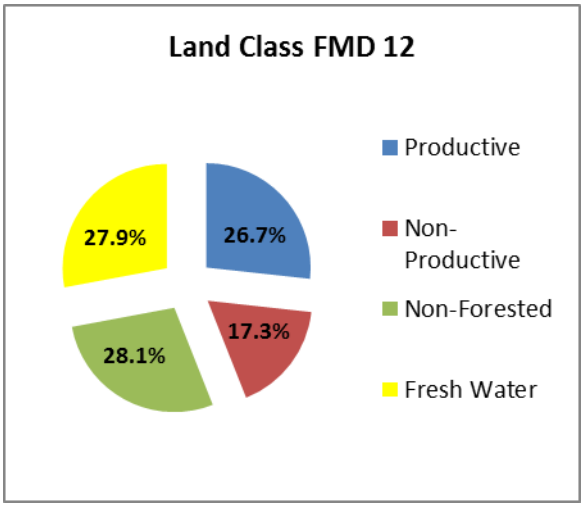

Figure 5: Land class breakdown for District 12.

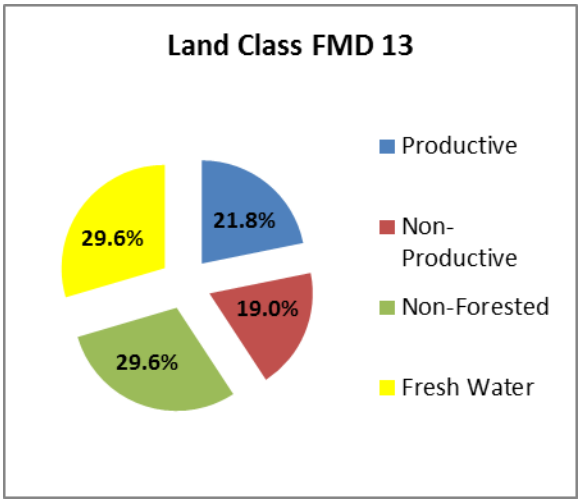

Figure 6: Land class breakdown for district 13.

1.5.2 Age Class

Individual tree ages within any given stand have the potential to be the same after fire or planting. However; in most cases the ages vary. Foresters describe forest stand age in terms of age classes which generally encompass 20 years. The age classes present in the zone are described as regenerating (age class 1, 0-20 years), immature (age class 2, 21-40 years), semi-mature (age class 3, 41-60 years), mature (age class 4, 61-80 years), and over mature (age class 5, 81-100 years), (age class 6, 100-120 years), (age class 7, 120+ years). The age class distribution in each district for the entire productive forest is shown in Figures 7, 8, 9, and 10. In general terms, a continuous timber supply is limited by the lower age class. This means a more balanced age class distribution within a district would yield a greater opportunity for an even flow sustained yield of timber. The age class structure for Districts 10 is typical of the rest of the island with an abundance of area in the young and old age classes and a dip in the intermediate age classes. District 11 is skewed toward the younger age classes while in District 12 and a lesser extent Districts 13, the age class structure is more balanced. Strategies to rectify any age class imbalances or impacts on wood supply are employed during the timber supply analysis.

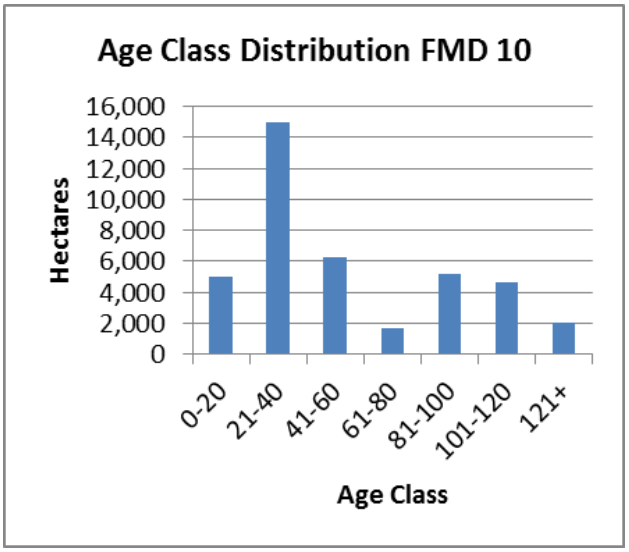

Figure 7: Age class distribution for District 10.

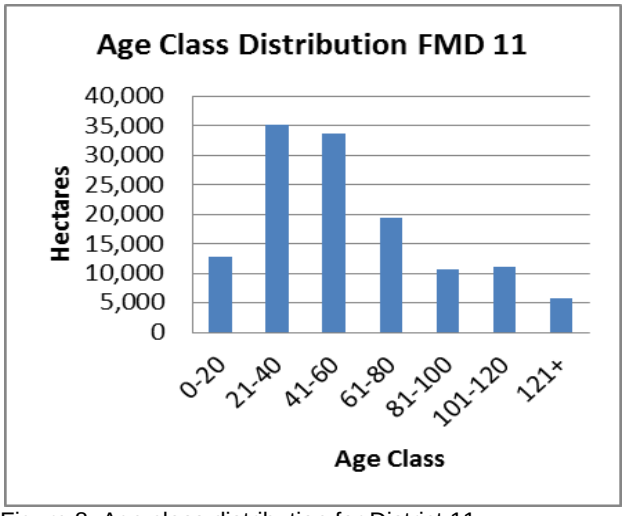

Figure 8: Age class distribution for District 11.

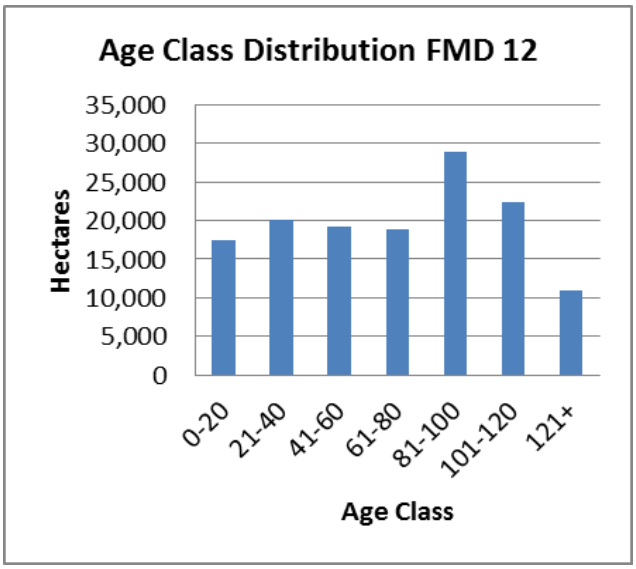

Figure 9: Age class distribution for District 12.

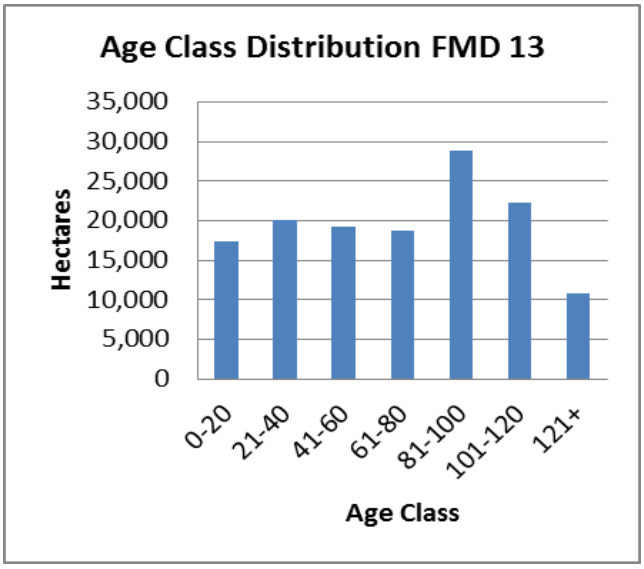

Figure 10: Age class distribution for District 13.

1.5.3 Site Class

The productive forest in the zone is further sub-divided along a gradient of productivity ranging from poor to good site class. The site class is determined through air photo interpretation supplemented with field checks, and is based primarily on the sites ability to produce timber. Site capability is determined on a number of factors including: soil fertility, moisture regime and geographic (slope) position. In the zone, medium site types are most abundant accounting for approximately two-thirds of the productive area. The distribution of area by site class for each district is shown in Figures 11, 12, 13 and 14. 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.

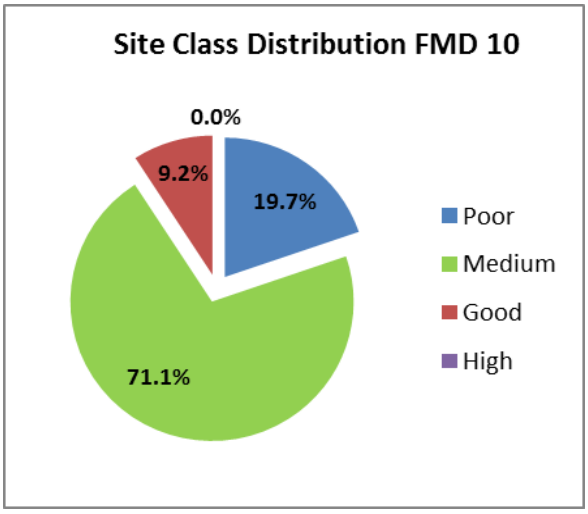

Figure 11: Site class breakdown for District 10.

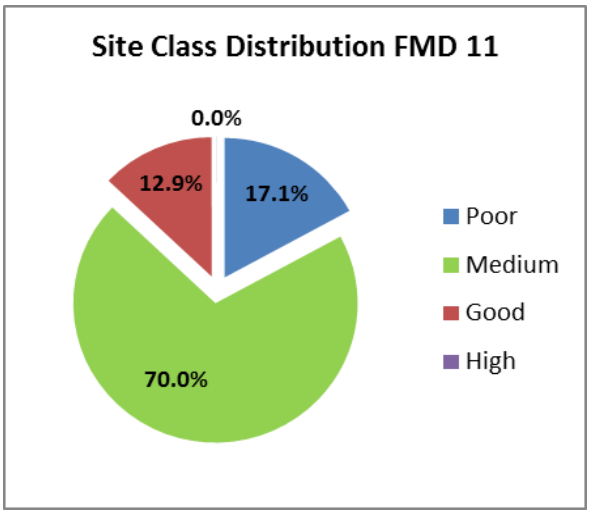

Figure 12: Site class breakdown for District 11.

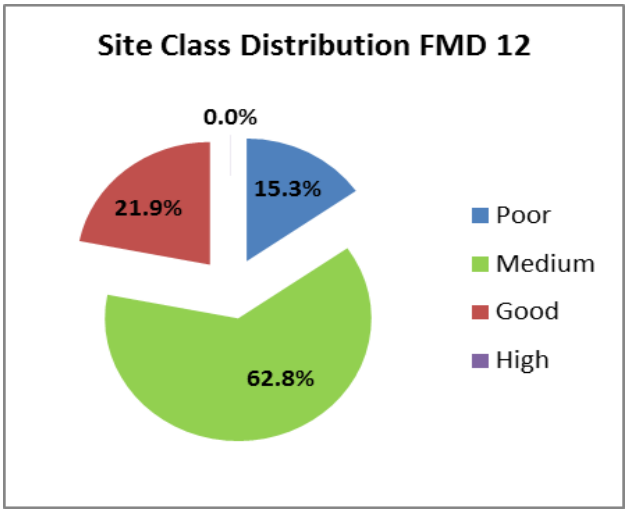

Figure 13: Site class breakdown for District 12

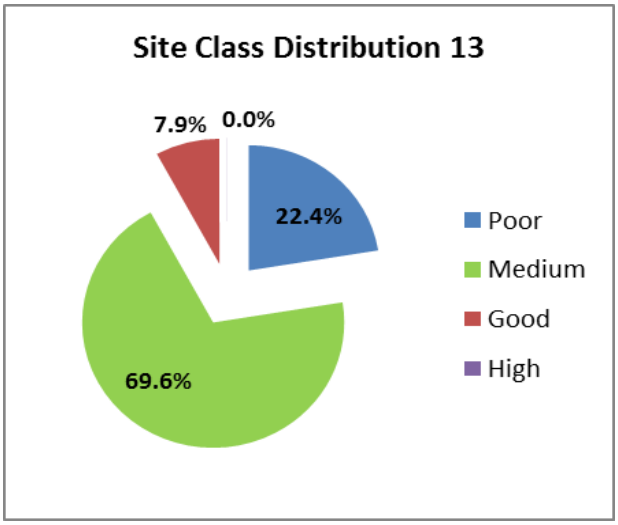

Figure 14: Site class breakdown for District 13.

1.5.4 Species and Working Group

A Working group is a term used to describe 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 as opposed to species composition which specifically describes the relative proportion of each individual tree species that make up a stand.

In the zone, the softwood working groups dominate accounting for over 75 percent of the productive forest. With the exception of District 13, black spruce is the most prolific working group in the zone followed by balsam fir (Figures 15, 16, 17, and 18). The black spruce working group can occur as pure stands or in association with balsam fir, white spruce, white birch, trembling aspen or larch in varying species compositions. Balsam fir can occur in pure stands or in association with one or more of the species listed above.

The softwood hardwood working group occurs as varying mixtures of fir, spruce, and birch. Within the hardwood softwood working group, white birch and white spruce working groups occupy a small portion of the productive forest in each district.

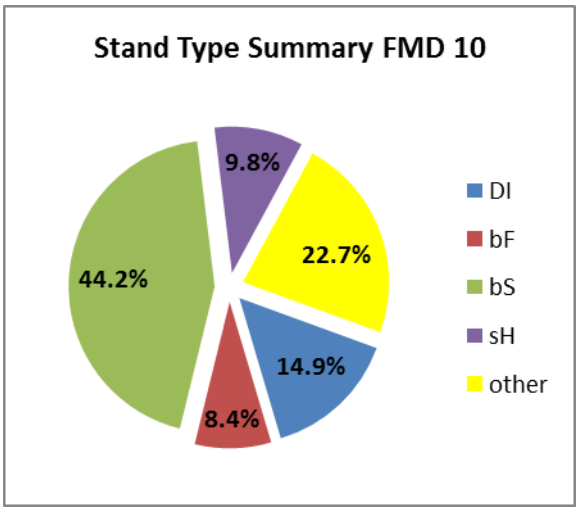

Figure 15: Working group breakdown for District 10.

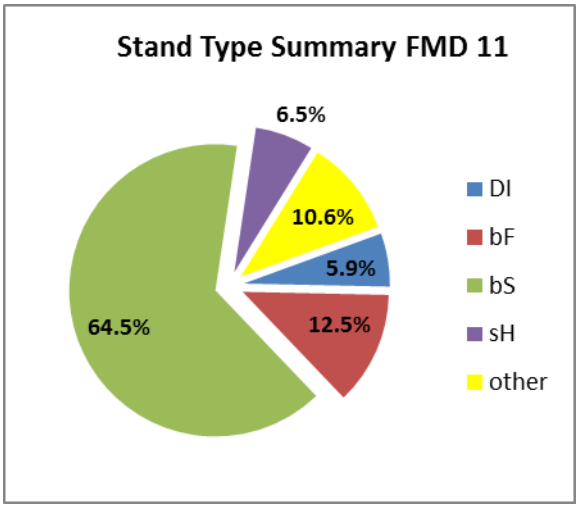

Figure 16: Working group breakdown for District 11.

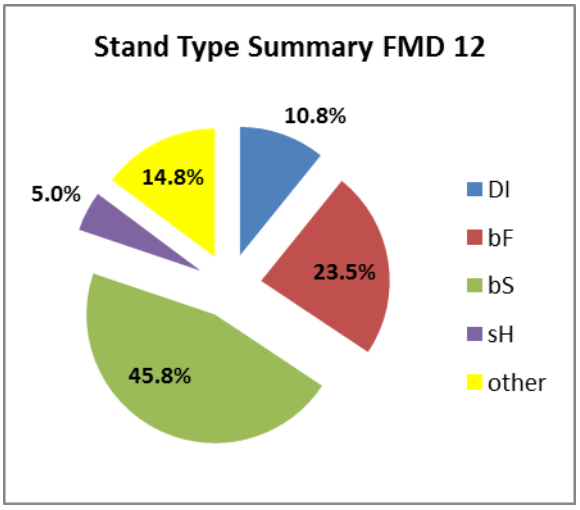

Figure 17: Working group breakdown for District 12.

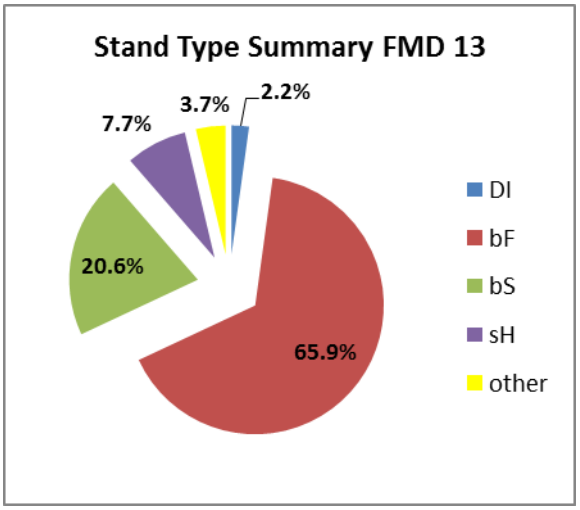

Figure 18: Working group breakdown for District 13.

1.5.5 Forest Disturbances

Forest harvesting , fire, insects and windthrow (blowdown) are considered forest disturbance types within the zone.

High summer temperatures combined with low summer precipitation and prolonged dry spells make the zone susceptible to fire. There has been a cyclical fire history in Districts 10, 11, and the central portion of 12. There was major fire activity in 1986 which resulted in a significant loss of timber in these areas. In recent years, loss has been minimal due to weather conditions, fire prevention activities and enhanced fire suppression capability. However, a major fire can occur in any year depending on weather conditions.

Hemlock Looper and Spruce Budworm are the main forest insects which have affected forests in western portion of the zone, mainly in Forest Management District 13. There was a major infestation in the mid-late 1980's that resulted in significant mortality and subsequent blowdown. Fortunately, at that time, the opportunity for harvesting insect damaged timber was available and a large portion of insect damaged timber was salvaged. In addition, the Balsam Woolly Adelgid also impacts growth of balsam fir forests in Forest Management Districts 10 and 11.

To aid in the control of the Hemlock Looper infestation, a chemical spray program was implemented in 1969. Aerial application of insecticides has been regularly used as a management tool to control insect pests of balsam fir. However; in recent years, the use chemical insecticide has been eliminated in favour of a biologically insecticide called Bacillus Thurengiensis (bT) which is a naturally occurring, biological control agent. Despite control tactics, hemlock looper and the spruce budworm continue to pose a significant threat to the balsam fir forests in the western portion of the zone and new infestations are likely to develop over the next 20 years.

SECTION 2 PAST ACTIVITIES

2.1 District 10

2.1.1 Harvesting

2.1.1.1 Commercial

Table 3 summarizes the commercial harvest in District 10 for 2016-2020. Commercial and domestic harvest was below the AAC for the period.

Table 3: 2016- 2020 Commercial Harvest District 10.

District 10		Core				Operational (available)				Non-AAC Wood	
Crown		AAC	Harvest	Deviation	Total	AAC	Commercial	Deviation	Total	Operational	Regulatory
SWD	2016	74885	27016	47869		11982	330	11652		0	0
	2017	74885	65497	9388		11982	467	11515			
	2018	74885	12658	62227		11982	823	11159			
	2019	74885	11903	62982		11982	507	11475			
	2020	74885	52000	22885		11982	500	11482			
	Sub-Total	374425	169074	205351			59910	2627		0	0
		Core				Operational (Available)				Non-AAC Wood	
HWD	Crown	AAC	Harvest	Deviation	Total	AAC	Commercial	Deviation	Total	Operational	Regulatory
	2016	4505	2430	2075				0			
	2017	4505	566	3939							
	2018	4505	1013	3492							
	2019	4505	344	4161							
	2020	4505	1000	3505							
	Sub-Total	22525	5353	17172		0	0	0			
District Total											

* *note: Domestic drain is included in the FMD 10 harvest numbers*

2.1.1.2 Domestic

Domestic harvest in FMD District 10 by Crown for 2016 to 2020 is included in the total harvest numbers in the commercial table.

2.1.2 Silviculture

Table 4 summarizes the completed silviculture treatments for the past planning period (2016-2020).

Table 4: 2016-2020 Silviculture treatments District 10.

Treatment Type	Area (ha)	
	Proposed	Treated
Pre Commercial Thinning		0
Site Preparation (raking)		93
Planting		480
Commercial Thinning		0
Prescribed Burning		0

2.1.3 Road Construction

Table 5 summarizes forest access road construction in District 10 for the period 2016-2020.

Table 5: 2016-2020 Road Construction District 10.

Construction Type	Proposed (km)	Constructed (km)
New Construction		13,950
Re-Construction		11,400
Total		25,350
Bridges		3

2.1.4 Natural Disturbance

2.1.4.1 Fire

District 10 has had a very infrequent fire history due to its relatively long winters and abundant precipitation. There were no significant fires during the last planning period.

2.1.4.2 Insect

There was no defoliation and treatment for either the hemlock looper or balsam woolly adelgid in the last 5 years.

2.2 District 11

2.2.1 Harvesting

2.2.1.1 Commercial

Table 6 summarizes the commercial harvest in District 11 for 2016-2020. Commercial and domestic harvest was below the AAC for the period.

Table 6: 2016-2020 Commercial Harvest District 11.

District 11		Core				Operational (available)				Non-AAC Wood	
Crown		AAC	Commercial	Deviation	Total	AAC	Commercial	Deviation	Total	Operational	Regulatory
SWD	2016	169745	38337	131408		4930	215	4715		0	0
	2017	169745	38590	131155		4930	421	4509			
	2018	169745	37967	131778		4930	142	4788			
	2019	169745	38780	130965		4930	176	4754			
	2020	169745	39000	130745		4930	200	4730			
	Sub-Total	848725	192674	656051		24650	1154	23496		0	0
		Core				Operational (Available)				Non-AAC Wood	
HWD	Crown	AAC	Commercial	Deviation	Total	AAC	Commercial	Deviation	Total	Operational	Regulatory
	2016	4930	770	4160							
	2017	4930	379	4551							
	2018	4930	1529	3401							
	2019	4930	841	4089							
	2020	4930	800	4130							
	Sub-Total	24650	4319	20331							
District Total											

* *note: Domestic drain is included in the FMD 11 harvest numbers*

2.1.2.2 Domestic

Domestic harvest in FMD District 11 by Crown for 2016 to 2020 is included in the total harvest numbers in the commercial table

2.2.2 Silviculture

Table 7 summarizes the completed silviculture treatments for the past planning period 2016 - 2020.

Table 7: 2016-2020 Silviculture Treatments District 11.

Treatment Type	Area (ha)	
	Proposed	Treated
Pre Commercial Thinning		0
Site Preparation (raking)		915
Planting		641
Commercial Thinning		0
Prescribed Burning		0

2.2.3 Road Construction

Table 8 summarizes forest access road construction in District 11for the period 2016-2020.

Table 8: 2016-2020 Road Construction District 11.

Construction Type	Proposed (km)	Constructed (km)
New Construction		33,100
Re-Construction		6,370
Total		39,470
Bridges		5

2.2.4 Natural Disturbance

2.2.4.1 Fire

District 11 has had a very infrequent fire history due to its relatively long winters and abundant precipitation. There were no significant fires during the last planning period.

2.2.4.2. Insect

There was no defoliation and treatment for either the hemlock looper or balsam woolly adelgid in the last 5 years.

2.3 District 12

2.3.1 Harvesting

2.3.1.1 Commercial

Table 9 summarizes the commercial harvest in District 12 for 2016-2020. Commercial and domestic harvest was below the AAC for the period.

Table 9: 2016-2020 Commercial Harvest District 12.

District 12		Core				Operational (available)				Non-AAC Wood	
Crown		AAC	Commercial	Deviation	Total	AAC	Commercial	Deviation	Total	Operational	Regulatory
SWD	2016	180072	194950	-14878		6478	0	6478		0	0
	2017	180072	196741	-16669		6478	0	6478			
	2018	180072	196594	-16522		6478	84	6394			
	2019	180072	194167	-14095		6478	75	6403			
	2020	180072	195000	-14928		6478	75	6403			
	Sub-Total	900360	977452	-77092		32390	234	32156		0	0
		Core				Operational (Available)				Non-AAC Wood	
HWD	Crown	AAC	Commercial	Deviation	Total	AAC	Commercial	Deviation	Total	Operational	Regulatory
	2016	7257	2557	4700							
	2017	7257	4611	2646							
	2018	7257	3689	3568							
	2019	7257	5398	1859							
	2020	7257	5000	2257							
	Sub-Total	36285	21255	15030							
District Total											

* *note: a) Domestic drain is included in the FMD 12 harvest numbers*

b) An interim woodsupply consolidation analysis was conducted FMD's 11 & 12 to ensure calculated Maximum Sustainable Harvest (MSH) is not exceeded.

2.3.2.2 Domestic

Domestic harvest in FMD District 12 by Crown for 2016 to 2020 is included in the total harvest numbers in the commercial table

2.3.2 Silviculture

Table 10 summarizes the completed silviculture treatments for the past planning period 2016-2020.

Table 10: 2016-2020 Silviculture Treatments District 12.

Treatment Type	Area (ha)	
	Proposed	Treated
Pre Commercial Thinning		0
Site Preparation (raking)		414
Planting		1742
Commercial Thinning		0
Prescribed Burning		0

2.3.3 Road Construction

Table 11 summarizes forest access road construction in District 12 for the period 2016-2020.

Table 11: 2016-2020 Road Construction District 12.

Construction Type	Proposed (km)	Constructed (km)
New Construction		33,100
Re-Construction		6,370
Total		39,470
Bridges		5

2.3.4 Natural Disturbance

2.3.4.1 Fire

District 12 has had a very infrequent fire history due to its relatively long winters and abundant precipitation. Over the past planning period there were no significant fires.

2.3.4.2. Insect

There was no defoliation and treatment for either the hemlock looper or balsam woolly adelgid in the last 5 years.

2.4 District 13

2.4.1 Harvesting

2.4.1.1 Commercial

Table12 summarizes the commercial harvest in District 13 for 2016-2020. Commercial and domestic harvest was below the AAC for the period.

Table 12: Summary of Commercial harvest FMD 13

District		Core				Operational (available)				Non-AAC Wood	
Crown		AAC	Commercial	Deviation	Total	AAC	Commercial	Deviation	Total	Operational	Regulatory
SWD	2016	18,942	0	0	18,942	287	0		287	0	0
	2017	18,942	0	0	18,942	287	0		287		
	2018	18,942	686	3.62	18,256	287	0		287		
	2019	18,942	5,240	27.66	13,702	287	0		287		
	2020	18,942	2,000	10.55	16,942	287	0		287		
	Sub-Total	94,710	7,926		86,784	1,435	0		1,435	0	0
		Core				Operational (Available)				Non-AAC Wood	
	Crown	AAC	Commercial	Deviation	Total	AAC	Commercial	Deviation	Total	Operational	Regulatory
HWD	2016	882	0	0	882	0	0		0	0	0
	2017	882	0	0	882	0	0		0		
	2018	882	0	0	882	0	0		0		
	2019	882	0	0	882	0	0		0		
	2020	882	0	0	882	0	0		0		
	Sub-Total	4,410	0	0	4,410	0	0		0	0	0
District Total		99,120			91,194						

2.4.2.2 Domestic

Table 13 summarizes the domestic harvest in District 13 by Crown for 2016 to 2020

FMD 13 Summary of Crown AAC Domestic Harvest in FMD 10 in Planning Zone 5 from 2016 to 2020.

Note:

i. DOMESTIC AREAS WERE NOT RUN AS A SEPARATE WOODSUPPLY CLASS FOR FMD 13. It draws on CORE CROWN AAC above.

ii. 2020 is an estimated volume forecasting the same as the year previous.

Table 13: Summary of Crown Domestic Harvest FMD 13 from 2016-2020

District 14		Core				Operational (Available)				Non-AAC Wood	
Crown		AAC	Domestic	Deviation	Total	AAC	Domestic	Deviation	Total	Operational	Regulatory
SWD	2016	0	110			0	0				
	2017	0	386			0	0				
	2018	0	462			0	0				
	2019	0	1,129			0	0				
	2020	0	1,129			0	0				
	Sub-Total	0	3,216			0	0				
		Core				Operational (Available)				Non-AAC Wood	
H V	Crown	AAC	Domestic	Deviation	Total	AAC	Domestic	Deviation	Total	Operational	Regulatory

	2016	0	0			0	0				
	2017	0	0			0	0				
	2018	0	0			0	0				
	2019	0	0			0	0				
	2020	0	0			0	0				
	Sub-Total	0	0			0	0				
District Total											

2.4.2 Silviculture

There was no completed silviculture treatments in District 13 from 2016 to 2020

2.4.3 Road Construction

Table 14 is a Summary of Crown access roads built (primary and secondary) in Forest Management District 13 from 2016 to 2020.

Table 14: Road Construction in FMD 13 from 2016-2020

Roads		
	Proposed (km)	Constructed (km)
New Construction	0	0
Re-Construction	0	0
Total	0	0
Bridges	3	3

2.4.4 Natural Disturbance

2.4.4.1 Fire

District 13 has had a very infrequent fire history due to its relatively long winters and abundant precipitation. There were no significant fires during the last planning period.

2.4.4.2. Insect

There was no defoliation and treatment for either the hemlock looper or balsam woolly adelgid in the last 5 years.

SECTION 3 TIMBER SUPPLY ANALYSIS

3.1 Introduction

The province conducts a review of timber supply every five years to reflect any changes in forest land base, growth rates, and management strategies. This schedule is consistent with the Forestry Act, with oversight by forest management districts, and mandates a wood supply analysis to be completed every five years. The result of this analysis is the establishment 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 into the future (applicable for a period of 160 years). Annual allowable cuts must be calculated on a district basis, and the cumulative sum would provide the total island annual allowable harvest level. The current Wood Supply is for the period January 1, 2016 to December 31, 2020. A new woodsupply analysis is currently being conducted for the period January 1, 2021 to December 31, 2025.

More information on the Timber Supply Analysis Program can be found on Governments Forestry website using the following address:

https://www.faa.gov.nl.ca/forestry/timber/index.html

3.2 Guiding Principles and Policy Direction

The key underlying principles guiding the provincial woodsupply 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 addition to the establishment of sustainable timber harvest levels, the legislation also requires that forest harvesting not exceed the established AAC's. Likewise, government's policy is to optimize forest industry opportunities from the sustainable fiber supply. Government also requires consultation be conducted during the timber analysis. In the current analysis, the forest industry was consulted directly. 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 aged forests. This imbalance is not unusual in a boreal forest where cyclic catastrophic disturbances are common.

This imbalanced age class structure of intermediate age forest within insular Newfoundland is one of the most important factors influencing AAC's and is therefore the basis for many of the department's forest management strategies. Essentially, the department utilizes a matrix of management techniques designed to marginalize the imbalance in age structure. These techniques range from an aggressive forest protection program (insect control and fire suppression), forest harvesting programs that attempt to exclusively target harvesting the oldest stands first, and pre-commercial thinning of the regenerating forest so that it becomes merchantable and ready for harvest 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. These adverse conditions is very challenging when determining the economic availability of timber supply.

Arguably, the most important factor affecting present and future AAC's is the land base. The land base available for forest activity is constantly being reduced as a result of other users' requirements. 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. Therefore, it is very important that we continue to determine methods to minimize the loss of productive landbase and expand on efforts to grow more volume on the existing land base.

3.4 Timber Supply Analysis

The timber supply analysis is structured to determine sustainable timber availability, while respecting 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) involves the use of computer models to forecast the sustainability of possible AAC levels. These models require three basic inputs as described below:

(1) a description of the current state of the forest (forest characterization and availability),
(2) growth rates associated with the current forest, and
(3) management strategies applied to the forest.

These basic inputs requires careful and detailed consideration of a broad range of both timber and non-timber values. The following topics in this chapter are considered when determining the sustainable timber supply.

3.4.1 Forest Characterization

To realize the current description of the forest resource (referred to as forest stock), the province has invested significant resources into creating and maintaining a Provincial Forest Inventory. This program is designed to ensure the estimate of forest stock is current and accurate, while other regular programs employed by the department also evaluates:

1. Natural and man-made disturbances (fire, insects and harvesting)
2. Enhancement activities (tree planting and pre-commercial thinning)
3. In addition, the actual stands within the forest inventory is updated to reflect any yield changes

3.4.2 Land Availability

Through a regular timber supply analysis, the Forest Inventory is updated and classified at the stand level on the basis of harvest potential. This classification system consists of three broad classes;

i. Class 1 - available for harvest under normal operating conditions
ii. Class 3 – adverse conditions for forest harvesting, making that landbase more expensive and less available under current economic conditions. However, an AAC is still calculated in the event of improved economic conditions making the area more feasible for commercial operations.
iii. Class 5 – unavailable for forest harvesting. No AAC is calculated on this landbase, which incorporates a broad range of timber and non-timber values as indicated in the following sections.

3.4.2.1 Non-Timber Related

Implementation of non-timber values has a direct impact on provincial AAC's. As the amount of productive forested landbase available for timber management declines, so will the AAC. With the current non-timber related considerations, the net landbase (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. Typically, in any given year, less than 1% of the productive forest land base is influenced by harvesting operations.

3.4.2.1.1 No-Cut Buffer Zones

The Department has implemented guidelines requiring all water bodies (visible on a 1:50,000 map sheet) be given a minimum 20 meter (from the edge of water) unharvested buffer. In addition to these legislated water buffers, District Ecosystem Managers, in consultation with interested stakeholders may have increased buffer zone widths 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

Wildlife Habitat specialists are working in consultation with industry to ensure future adequate habitat remains available for wildlife species such as pine marten and caribou. Analysis of the landbase continues with examining the quantity and quality of habitat, as well as, the required connectivity. Wildlife specialists also examine how this arrangement of habitat would change over time. Forest management strategies take into consideration the results and recommendations of the Wildlife Habitat Specialists.

3.4.2.1.3 Protected Areas

All established and proposed protected areas approved within the Natural Areas Systems Plan (NASP) are removed from potential harvest considerations and the AAC calculations.

3.4.2.2 Timber Related

The potential AAC within a Forest Management District is also further impacted by taking into account other potential losses of landbase or timber as indicated below:

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 of loss from these surveys are used to reduce the 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 class 1 AAC calculation. 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.

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, negative pressure on future AAC's will continue to increase.

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. In Newfoundland, there are dozens of distinct forest strattum 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., the Northern Peninsula, Western 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 one hundred percent certainty how stands will actually grow in the future, care must be taken to ensure that the yield projections are realistic and reasonable. Respecting the sensitivity and importance of these forecasts, the department 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 departments forest inventory program were used to make stand growth predictions. These projections were then evaluated 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. As well, special yield curve sets were developed for defined geographic areas with demonstrated uniqueness. These included areas where chronic insect activity is ongoing and areas that have unique growth characteristics.

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 minimize fiber losses, and enhance forest sustainability.

3.4.4.1 Harvest Flow Constraints

An even-flow harvest constraint strategy is utilized in the wood supply analysis. This strategy produces the maximum even flow harvest but results in less than optimum economic use of the forest resource. Conversely, if this strategy was not applied, then harvest levels are permitted to fluctuate which may result in increased commercial potential of the forest at specific intervals. However; applying the even-flow constraint provides more stability within the forest industry.

3.4.4.2 Spatial Analysis

The provincial wood supply analysis implements a technique of manual harvest scheduling. In 2001, the harvest scheduling was an automated process where the software allocated the stands to be harvested over the upcoming 25 years, based on user supplied criteria. The 2001 approach of scheduling harvest stands was an improvement over previous wood supply analysis. However, the software used cannot realistically know all the operational restrictions within a forest management district. By utilizing the manual process, District Staff are able to identify specific ground conditions that restrict commercial harvesting, which are then incorporated into a spatial harvest schedule. The proposed harvest schedule is then vetted back through the modeling software to ensure sustainable and non-timber objectives are met. In most case, this process has to go through several cycles before an acceptable harvest schedule can be implemented. The spatial arrangement of areas for timber harvesting is especially challenging in this province because of the natural fragmentation of our forests. This model provided forest planners with the ability to mimic realistic timber harvest schedules based on current practices and to identify other forest stands that are not as accessible for harvesting.

Manual harvest scheduling has several major benefits. First, it fosters the long term sustainability of our AAC's by mimicking current harvest practices and accounting for actual on the ground conditions 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 harvest schedules build credibility into the forest management process. A common misconception is that the province is running out of wood and soon will not be able to support existing forest industries. Every stand that will be harvested over the spatial plan must already be in the second (20-40 years old) or third (41-60) age class and can be easily identified and highlighted.

Having the ability to visualize the timber that will be harvested in the future helps reassure the resource is being used in a responsible manner. Next, harvest scheduling helps integrate the management of other forest resource values into timber management planning. Specific forest values can be directly related to forest areas, which can be mapped and potential issues can be

addressed. Finally, the harvest schedule maps developed for the wood supply analysis can be a starting point for a 5 year operational planning process. Worthy to note is that harvest scheduling is completed for class 1 landbase only. The class 3 AAC, for the most part, is considered opportunistic if economic conditions become favorable.

3.4.4.3 Planning Horizons

Given the province's commitment to long term sustainability of our forest resource, timber supplies are 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.

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. This 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 including:

1. Some of the non-timber objectives are not explicitly accounted for in the planning process and therefore will require a growing stock buffer to achieve them.

2. The ability to completely incorporate the optimum harvest schedule due to operational restrictions on commercial harvesting.

3. Lowers the overall risk associated with the sustainability of the timber supply.

For these reasons a growing stock constraint of two times is utilized. This constraint is used in concert with harvest scheduling to help map out a reasonable harvest for the upcoming 20 years.

3.4.4.5 Old Forest Targets

Within the woodsupply analysis, the department considers a target for Old Growth forest, where at least 15 percent of forests at any given time must be be older than 80 years. While this is a minimum target, actual results are usually higher. This initiative was designed to provide a coarse filter approach to maintaining representative forest structure. It ensures the presence of certain amounts of old forest across the landscape into the future and can be tracked across a district.

3.4.4.6 Operability Limits

Operability limits are considered the timeframe in which forest harvesting activity can be undertaken within specific forest stands. Stand growth development (merchantable timber volume) and individual piece size of trees are factors which determine a stands readiness for commercial harvest activity. Some younger stands may have acceptable harvest volumes, but still contain trees that are too small (diameter and height) to commercially 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, 30 percent, and 60 percent assigned to each availability class listed above respectively. The ending operability limits or the last age in which a stand can be harvested before it becomes too old to harvest is solely determined on a minimum stand volume of 60 m3/ha, after which that stand is not considered to have enough volume to make it economical feasible to commercial harvest operations. 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 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 analyzing the many different future forests that are generated using the wood supply modelling software.

The silvicultural actions used in the current woodsupply analysis include:

1. Pre-commercial thinning of balsam fir, black spruce, and softwood hardwood stands,
2. Full planting of any areas that do not regenerate naturally with either white spruce, black spruce, or Norway spruce, and
3. Gap planting of stands with either black spruce or balsam fir seedlings. Gap plant is the filling in of "holes" within stands that have inadequate natural regeneration of either balsam fir or black spruce.

The thinning levels (ha) for districts 10, 11, 12, and 13 used in the analysis were 25, 25, 50 and 25 ha respectively. The planting levels (ha) for districts 10, 11, 12, and 13 used in the analysis were 300, 500, 600 and 25 ha respectively.

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: fire, insects/disease, timber utilization practices and the presence of stand remnants. It was recognized that a need existed to study each component more intensely and the staff from the Forest Engineering and Industry Services Division, over a seven year period, completed an analysis of the individual components. The results of these (and other) analysis are incorporated into the current woodsupply analysis.

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 FLR

3.5.2 Insects

An aerial mortality survey was completed on areas with historically high insect infestations. This information along with a GIS analysis of areas salvaged enabled FLR to determine the amount of productive area lost to insect mortality each year.

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 where the information is analyzed by harvesting system and season.

3.5.4 Stand Remnants

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

The total inventory adjustment for Forest Management Districts 10, 11, 12 and 13 were: 15, 15, 9, and 18 percent, respectively.

3.6 Results

The results of the timber supply analysis for forest management districts 10-13 for the period 2016-2020 is shown in Table 15. A new woodsupply is being developed for the same districts for the period 2021-2025.

Table 15: Annual Allowable Cut Zone 5 2016-2020 by district.

	Annual Allowable Cut Volume (m^3)		
	Class 1 Softwood	Class 3 Softwood	Hardwood
DISTRICT 10	74,885	3,060	4,505
DISTRICT 11	169,745	4,930	4,335
DISTRICT 12	180,072	6,478	7,257
DISTRICT 13	18,942	287	882

SECTION 4 VALUES

4.0 Guiding Principles of Sustainability

Environmental, Economic, Political, Social, and Cultural are considered the five guiding principles of sustainability.

Environmental sustainability evaluates current and future ecosystem health. It ensures the needs of the present are obtained without compromising the ability of future generation's needs. Ecosystem health is determined by such factors as ecosystem integrity, biodiversity, productive capacity, and resiliency. The five year operating plan strives to ensure these factors are maintained.

Economic sustainability requires forest resources to be managed efficiently and equitably among stakeholders. Economic development remains high priority for many of the residents within the Province. However; economic development should only proceed with the incorporation of the other principles of sustainability.

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

Social sustainability means fairness and equity to all interested stakeholders. The forest management strategy should not jeopardize the basic requirements of the public. As a result, public involvement/awareness, participation, and decision-making are considered necessary to development of proper forest management plans.

Cultural sustainability is attained by applying Newfoundland and Labrador'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 and Labrador'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 properly achieved.

4.1 Value Structure

The forest ecosystems of the zone provide a wide range of values to different individuals and groups, which include:

(a) Consumptive values such as: timber products, hunting, trapping, sport fishing, and berry picking.

(b) Non-Consumptive values such as: skiing, snowmobiling, hiking, and bird watching.

(c) 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, spiritual values are considered to be a product or an accumulation of all values.

Other values such as water quality, parks and protected areas provide the protection of forest ecosystems, which can enhance the above identified values. Many of the values in the zone are identified by many years of forest management planning and engagement with interested stakeholders.

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 can be 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 interested stakeholders in resolving potential conflicts;
3. Special management provisions/strategies such as: riparian buffer zone consideration, temporal operating periods, modified harvesting, or best management practices, and/or
4. Models and/or forecasting strategies to determine economic contribution, biodiversity impact, or community sustainability

Individual values are 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 help to provide a mechanism for resolving potential 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) is identified to aid in the discussion of each value.

In many instances, the Environmental Protection Guidelines (EPG's) developed by the department help 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.

4.1.1 Biotic Values

4.1.1.1 Big Game

4.1.1.1.1 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 (Northcott, 1980). Today, moose are distributed throughout the island and the population is estimated to be about 125,000 - 140,000.

Currently, moose are managed on an area/quota system in the province. The island is divided into management areas and license quotas are set annually for each area. Moose quotas are established as a result of a management objective for each area. Generally, if an area has too high of a moose population, managers will increase quotas to bring down the population in order to prevent damage to the habitat. However, if the habitat is in good condition, and the area could support more animals, future quotas may be increased. All or portions of moose management areas 11-13 and 15-22 are located within the zone.

Critical Elements:

Forest harvesting is not expected to have a negative impact on moose populations in this zone because moose prefer the early seral stages of a forest and generally do well in areas after harvesting.

4.1.1.1.2 Caribou

Characterization:

Caribou is the only native ungulate species on the island (Northcott, 1980). Prior to the railway being built in 1898 there was a healthy population on the island. However; by 1930 the population had declined to about 2,000 animals (Murphy and Minty 1993). 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, populations have declined with this Forest Management Planning Zone having no exception. All or portions of caribou management areas 61, 62, 63, 66, 67 and 68 are located in the zone.

Critical Elements:

Caribou populations have been and continue to be studied. Information has been developed to restrict forest harvesting around calving zones during the calving season. It has also been thought that forest road construction may have negative impact resulting from improved access into remote areas, which increase the probability of road-kill and poaching.

4.1.1.1.3 Black Bear

Characterization:

The black bear is native to the island and is found in forested areas (Northcott, 1980). Currently, the number of black bears occurring on the island is not known but is crudely estimated about 6 - 10,000 animals. All or portions of black bear management areas 11-13 and 15-22 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 within the province is the responsibility of the Wildlife Division and is accomplished through a Big Game Management Plan, which is annually prepared.

Wildlife Division staff considers all relevant data such as: recent census work, information provided on license returns, and jawbone or skull data to make a decision on types and numbers of licenses of each species in each management area.

Moose

Mature stands of timber serve as moose shelter or moose yards. Proposed forestry activity will be reviewed by the staff at the Wildlife Division and recommendations are incorporated into this five-year plan.

Caribou

In areas where caribou utilize lichens, a minimum amount of forest which supports these lichens will be maintained. Proposed forestry activity will be reviewed by the staff at the Wildlife Division and recommendations are incorporated into this five-year plan.

Bear

A 50-metre treed buffer must be maintained around known bear den sites (winter) or those encountered during harvesting. Proposed forestry activity will be reviewed by the staff at the Wildlife Division and recommendations are incorporated into this five-year plan.

4.1.1.2 Furbearers

Characterization:

Management of small game species within the province is the responsibility of the Wildlife Division. There are a variety of furbearers occurring within this Forest Management Zone. However, the more prominent ones include: lynx, red fox, beaver, otter, muskrat, short-tailed weasel, red squirrel, mink, coyote, and pine marten. Of these, red squirrel, mink and coyote are not native.

Critical Elements:

water quality maintenance;
riparian buffer zones along aquatic areas;
maintaining a mosaic of forest age and development classes
snags and coarse woody debris (denning, nesting sites, etc.)

Guiding Principles:

Fur Bearer Management Strategy:

It is the responsibility of the Wildlife Division to develop and implement a furbearer management strategy. Similar to the big game management plan, a fur bearer management plan reviews the status of each fur bearer species and addresses the season dates and lengths, and if necessary closure of areas (or no open season). Proposed forestry activity will be reviewed by the staff at the Wildlife Division and recommendations are incorporated into this five-year plan

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.

4.1.1.3 Species of Interest

4.1.1.3.1 American Marten

Characterization:

Before 1900, American marten ranged over most of the forested areas of the island. However; in 1934 numbers, had declined significantly and marten were only found in limited regions. (Bergerud, 1969). In 1986, the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) assessed the Newfoundland population of the american marten and the species was listed as threatened. Revisions in 1996 and 2000 resulted in an uplisting to endangered due to further declines. Habitat loss, trapping and incidental snaring are possible reasons for the marten population decline. Through the work of the Marten Recovery Team, the status of marten has been upgraded from endangered to threatened in 2007 because new population estimates were stable and distribution of marten was increasing. The American marten (island population) is currently (2010) listed as threatened under both the federal *Species at Risk Act* and provincial *Endangered Species Act*.

Since the initiation of the live-trapping program, it has been revealed that Main River, Little Grand Lake and Red-Indian Lake are high-density marten areas on the island. Based on this information, it is important that marten habitat be protected in these areas. Furthermore, it is important that some remnant stands of old growth (80+) forests remain on harvested areas 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 Department in 1999.

This involved consultations with stakeholders to identify critical or potential marten habitat and possible corridors. In addition, identifying areas which would not be harvested in the near future. To identify factors affecting marten survival, stakeholders from the Canadian Forest Service, Wildlife Division, Corner Brook Pulp and Paper and the Forestry Branch became members of the Newfoundland Marten Recovery Team. The primary function of the Recovery Team was to prepare and periodically revise the recovery plan for American marten in Newfoundland and to

provide advice on species recovery. The recovery plan may include short and long-term population goals and outlines actions required to reach recovery goals.

Critical Elements:

sufficient habitat to support a viable population of marten;
areas of known marten populations remain closed to trapping
only allow use of legal snare wire types

Guiding Principles:

As a result of the Recovery Team, a suitability model for identification of marten habitat has been developed. The marten habitat suitability model has been a useful tool in identifying potential marten habitat and evaluating potential impacts of forest harvesting. Critical marten habitat has been identified and continued development and refinement of this model will provide a more reliable means of evaluating impacts of harvesting on future marten habitat requirements.

Under Brian Hearn's work with the Canadian Forest Service, previous proposed harvest schedules within various forest management districts have been analyzed and indicate suitable habitat remained after harvest. Anecdotal evidence also suggest that snaring and trapping maybe impediments to marten recovery. Maintenance of appropriate forest habitat is integral to the long-term recovery of this species.

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 potential impacts of harvesting on this habitat and resultant changes to population levels. Continued development and refinement of this model will provide a more reliable means of evaluating impacts of harvesting on marten habitat in the future. Proposed forestry activity will be reviewed by the staff at the Wildlife Division and recommendations are incorporated into this five-year plan

4.1.1.3.2 Rare Plants

Characterization:

Approximately 300 plant species, or about a quarter of all plant species on the island of Newfoundland, are considered to be rare and are found in 20 or fewer locations. Rare plants are often found in habitat types that are themselves rare or at least fairly restricted. While the limestone barrens of the Great Northern Peninsula are the best-known rare plant habitat, other habitats with high rare plant diversity exist in central Newfoundland and other areas of the island.

Most of the rare plant species throughout Newfoundland are inhabitants of fairly open habitats, such as river gravels, salt marshes, wetlands, aquatic habitats and barrens. These are all areas where commercial forestry operations are not implemented. In Forest Management Districts 10, 11, 12 and 13 the greatest concentration of rare plants can be found in the flood plain of the Exploits River between Badger and Bishops Falls. The rare species occupy a variety of mostly open habitats, including gravelly and rocky shorelines and aquatic habitats in backwaters and ponds adjacent to the river. There are only two other areas where two or more rare plant species occur in close proximity, at Lloyds River, approximately 7 km upstream of its mouth (District 13), and at “the Quarry” on the former rail bed (border of Districts 12 and 16). Many areas of central Newfoundland appear to be devoid of rare plants, but it is likely that they have never been visited by botanists.

There are several rare plants that prefer or tolerate the partial shading found in forests. In Districts 10-13, some of these plants occur scattered throughout the forested area and they often occur alone, rather than in groups of several rare species. Unlike in Western Newfoundland, where rare forest species are more likely to be found in moist sites with nutrient rich or calcium influenced soils, most of the rare forest plants of Districts 10-13 are found in mesic or dry forests, often on sandy or rocky terrain. Some of these species are commonly associated with open forests, burned over areas or forest gaps and clearings, but can also occur in more closed forests under consideration for harvesting. Rare forest plant species in Districts 10-13 include:

- Teaberry, checkerberry - *Gaultheria procumbens* (dry, coniferous forest)

- Prince's pine, pipsissewa - *Chimaphila umbellata* (woods, dry or mesic, often with feathermoss understory)
- Red pine - *Pinus resinosa* (sandy soil)
- Carex foenea (dry to mesic forest, often in clearings)
- Carex adusta (sandy burned over and open areas)
- Dryopteris fragrans (cliffs, talus slopes, rocky woods)

Critical Elements:

- quarrying and road construction
- logging and extraction using heavy equipment
- mechanical site preparation
- all terrain vehicle traffic

Guiding Principles:

- To ensure that rare and endangered plant species present in the zone do not become extinct resulting from forest management operations.
- To identify and protect rare plant habitat
- To educate department personnel and the public on the locations and importance of rare plants
- Encourage domestic harvesting in the winter
- Identify and update all rare plant sites on GIS forestry data base
- Ensure that areas containing rare plants are marked and posted
- Work with the Wildlife Division to develop mitigative measures in areas where rare plants occur.

4.1.1.3.3 Waterfowl

Characterization:

In District 10, two wetland sites located at Little Rushy Pond and Corduroy Brook within the Town of Grand-Falls Windsor Municipal Planning Area have been identified as significant wetland sites. In 1998, the Town signed a Stewardship Agreement with the provincial government to protect and conserve these areas. A third wetland site located in the Red Cliff area is also considered important for waterfowl but is not officially designated. Within Districts 12, the Wildlife Division has also designated another sensitive area at Victoria Steadies on the Victoria River.

Critical Elements:

- maintenance of habitat
- disturbance of waterfowl during the brood rearing, breeding, and staging period

Guiding Principles:

- 50-metre treed buffer will be established around designated sensitive waterfowl areas. As well, no forestry activities are recommended during the brood rearing, breeding, and staging period
- A minimum 30-metre, treed buffer must be maintained from the high water mark in other waterfowl breeding, molting, and staging areas.

4.1.1.3.4 Other Species

Other species, particularly the red crossbill, are currently listed as endangered. The Forestry and Wildlife Division has a representatives 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 implemented accordingly.

4.1.1.4 Water Resources

Characterization:

The protection of water resources is an important topic both nationally and provincially. Events such as the E.coli outbreak in Walkerton Ontario, Newfoundland's Triahlomethane (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 towards 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 Five, most communities have water supplies, where ten of these supplies are protected under the province's Protected Water Supply Program. Recreational uses of water within this zone are used for activities such as: fishing, boating and as a water supply source for numerous cabin owners. Human activity on the land has the potential to alter water quality and water quantity. Commercial forest harvesting is one of the predominant activities occurring throughout the zone. Hydroelectric development has also occurred in the zone which has resulted in several river diversions. Mining operations within the zone in the form of mineral exploration, mining operations and small quarrying operations associated with road construction. Some exploration activity for hydrocarbons, dimension stone and base metals has occurred sporadically throughout the region.

Critical Elements:

Forest management activities such as road construction and maintenance, timber harvesting, and silviculture have the potential to alter the quality of water draining from watersheds. Impacts could include: stream hydrology, sediment loadings, stream characteristics. 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.

4.1.2 Human Values

4.1.2.1 Timber Resource

Characterization:

One of the major resource values of the forest ecosystem is the harvesting of timber to provide forest products. Historical market value of forest products harvested and employment levels in this Zone is unknown at this time due to the closure of AbitibiBowater Mill in GFW in 2009. Re-development of the forest industry in this zone since that time has resulted in the 2 larger integrated sawmills having a more pronounced presence. As a result, there is potential to provide continued significant contribution to the local and provincial economy. 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. Commercial logging contractors are allocated the majority of the annual allowable cut level in the zone. Commercial harvesting and sawmilling activity provides many jobs in harvesting, sawmilling, trucking, pulp and paper manufacturing and related spin off industries for local residents.

Domestic harvesting provides fuelwood to heat many homes and sawlog material for residential house construction in the zone. Domestic harvesting is conducted in specific domestic cutting areas via a crown domestic cutting permit that is required and issued within each forest management district. Unless otherwise specified; domestic cutting is limited to these designated cutting areas. A Domestic Permit specifies the volume and species that can be harvested, utilization standards, and other relevant conditions. While some domestic cutting areas are designated for hardwood only, the majority of areas will allow the harvest of all hardwood and softwood species.

Silviculture treatments are important to the forest resource of the zone as it ensures that a vigorous and healthy forest is maintained. Forest renewal activities facilitate renewal of productive landbase by manual 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 will be a significant investment on silviculture in the zone each year creating seasonal employment.

Timely access to timber is critical to planning any forestry operations. Primary, secondary and tertiary roads form an integral part of operating areas for commercial harvesting activity. Upon completion, these roads are often used for silviculture and recreational purposes. A significant amount of money will be spent to construct forest access roads each year in the zone.

Protection of the forest from various disturbances is a major characteristic of resource management, which includes: integrated pest management and forest fire prevention/suppression techniques. Other resource values are protected through modification of activities and enforcement.

Critical Elements:

The overall objective is to ensure the AAC is calculated using the latest information 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
- 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

Guiding Principles:

- enforcement of forestry act, regulations, guidelines and policies
- minimize loss of productive land base through spatial and temporal compromises and continuous dialogue with other resource users
- education (staff, public, operators)
- aggressively conduct silviculture, access road, and protection activities
- implement best management practices. The *EPG's* outline courses of action and mitigative measures for forest activities. These EPG's are outlined in their entirety in Appendix, with some highlighted subject areas listed below.
    - garbage disposal
    - fuel storage
    - mineral soil exposure
    - buffer requirements
    - road and bridge construction
    - silviculture and harvesting activities

4.1.2.2 Agriculture

Characterization:

The vast majority of commercial agricultural activity is located in the Agriculture Development Area at Wooddale in forest management district 10. Additionally, hundreds of subsistence farming plots are scattered throughout the zone. The vegetables grown on these plots are used to supplement food requirements during the winter months. There are also several pastures and areas designated for hay production. The wild berry industry (bakeapple, partridgeberry, strawberry, blueberry, and raspberry) plays a significant role in the economic picture for the zone. While there is no actual record of domestic production, thousands of kilograms of berries are harvested annually. These berries are sold locally and to travelling tourists.

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 landbase is the first critical element necessary for a successful agriculture operation, markets and the interest of individuals are also prime factors in the development and location of future farms. In the spirit of managing the ecosystem for multiple benefits, provisions have been given for the agriculture industry to expand. Both the Forestry and Agrifoods departments have identified Agricultural Areas of Interest (AOI's) across the province, representing approximately 155,600 hectares. The area in AOI's have been removed from woodsupply calculations and is available for agricultural development. In addition, Agricultural Development is still considered for areas falling outside established AOI's.

Guiding Principles:

Landbase falling inside AOI's are available for agricultural production. However, the Landbase falling outside AOI's and designated for forest management that is determined high potential for agriculture will also be considered. Consequently, the Forestry Branch will collaborate with the Agrifoods Branch when such opportunities exist.

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

- Home gardening leases should be confined to areas already developed for this activity.
- New agriculture leases approved by the Agrifoods Branch of the Department of Fisheries and Land Resources.
- Forestry Act has been amended to allow clearing of land to occur without a commercial cutting permit if applicant is utilizing the fibre for their own private use.
- Where possible, existing commercial forest operators should be encouraged to work with farmers to clear new land for development.

4.1.2.3 Mining

Characterization:

There is a significant mining presence throughout the zone, where major base metal mines and deposits are located at Buchans Mine, Duck Pond, Buchans Lundberg, Point Leamington Boomerang, Bobby's Pond, Denny's Pond and Tulks Hill. Gold is also found at Valentine Lake. In addition, throughout the zone, there are also a number of active aggregate and quarry leases, which due to their small size are considered to have minimal negative impact upon the forest ecosystem. Exploration activities continue to form a large portion of the activities in the zone.

Critical Elements:

To minimize the impact of mining and mineral exploration upon the forest ecosystem while providing a source of energy and aggregate material.

Guiding Principles:

- Mines Division to work with Forestry Branch to ensure that quarries and open-pit mines are rehabilitated. The organic overburden should be stockpiled and stored in a manner so that it can be used to rehabilitate the site.
- Maps of mineral potential, mineral claims and aggregate and quarry areas must be kept up-to-date.
- Forestry Branch will minimize or avoid silviculture activity in proposed mines or quarries. Mineral exploration that proposes to explore or develop within a silviculturally treated area must be undertaken with minimal disturbance and provide compensation as required.
- Make every attempt to extract timber harvested as part of exploration and development. If timber can not be feasibly extracted using conventional means then timber shall be piled so that it may be extracted during winter months by snowmobiles.
- Mineral exploration and/or development on mineral licenses within the zone will not be impeded and will follow government policy. Specific proposed forest management activities are identified in annual operating plans for each upcoming calendar year.
- For the purpose of road construction, quarry permits are required only for aggregate material taken outside of the road right-of-way.
- Non-compliance with exploration permits identified by Forestry Branch will be passed to Mines Division.

4.1.2.4 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 as 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. Most often, archaeological sites are small in size, so it is important to protect these sites and professionally record as much information possible to fully understand its history. To do this properly, the site must not be disturbed. Over the years, Archaeological surveys have been undertaken in several areas within the zone. However; there is potential that many areas still remain to be surveyed. To date, there are many archaeological sites recorded within the zone and are protected under the Historic Resources Act. Most notably is the evidence of the Beothic along the Exploits River. There is potential for other historic resources to be found in the zone.

Critical elements:

Activities which disturb soil layers and/or provide unintended public access to an archaeological site can have a negative impact on that historic resource. Without applying best management practices, forestry activities such as: construction of access roads and bridges, harvesting, mechanical site preparation and regeneration have the potential to destroy historic resources.

While forestry activities can have adverse impacts on historic resources, beneficial effects can be realized. Where 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 the provincial archaeology office is involved at the planning stage to ensure effective mitigative measures are developed early in the process to protect historic resources. Buffer Zones will be implemented to protect known archaeological sites and potential unknown sites. If deemed necessary, archaeological assessments may be required to fully assess the site. In addition, buffer zones are required along all rivers and ponds, as well as along the coastline, where there is potential for archaeological resources to be found. 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.

4.1.2.5 Newfoundland T'Railway

Characterization:

The T'Railway is a linear park approximately 850 km in length, where a large section is located within the zone. It is comprised of the former CNR right of way, which varies from 25 to 100 feet each side of the center line. It provides for an all season, multi-use recreation corridor and is developed and managed with Parks and Natural Areas Division in conjunction with the T'Railway Council. The *Provincial Parks Ac*t provides the legislative framework for the administration and management of the T'Railway and is protected for present and future enjoyment of the public. The T'Railway constitutes the province's contribution to the Trans Canada Trail System and is used primarily by snowmobile and all-terrain vehicles. Industrial or traditional uses such as: commercial and domestic harvesting, quarry and mining access and cabin access are also granted with a special permit.

Critical Element

- protection of the historical landscape integrity of the T'Railway corridor
- preservation of the scenic quality along the corridor
- control of land usage adjacent to the T'Railway

Guiding Principles:

- co-ordination 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
- build partnerships with other stakeholders and user groups such as communities, industry and recreational organizations for the long term maintenance and development of the T'Railway
- Establishment of a 100 meter buffer along the right-of-way corridor to preserve the natural value of the T'Railway. Also, consider viewscapes in forestry management plans.
- where access is required, any landings or turnaround areas shall be 100 meters or more along the resource roads from the T'Railway.
- where feasible and possible, Forestry Activity utilizing the T'Railway will avoid peak snowmobile and ATV seasons.

4.1.2.6 Parks and Protected Areas

Characterization:

The mission statement of the provincial Natural Areas Program is to protect, in an unimpaired condition, large wilderness areas, representative examples of all of the province's ecoregions including their natural processes and features, and rare natural phenomena, so as to preserve the diversity and distinctiveness of the province's rich natural heritage and to support an ecologically sustainable future for the benefit of present and future generations.

There are several different types of conservation areas in the province contributing to the provincial system of protected areas, as recognized by the International Union for the Conservation of Nature. Wilderness Reserves and Ecological Reserves are established via the *Wilderness and Ecological Reserves Act*. Wilderness Reserves are generally large (>1000 km2) and are designed to protect complete ecological systems. Ecological Reserves may be established to protect representative samples of each of the province's natural regions (ecoregions) with a mid-sized reserve (50-1000 km2), or to protect exceptional natural features, occurring in an area <10 km2, such as rare species or areas of unusual biological richness.

Provincial Parks established under the *Provincial Parks Act*, do play a conservation role, but are primarily established as sites for outdoor recreation and nature-based education. Wildlife Reserves may be established under the *Wildlife Act* for the protection of specific species or habitats. Public or Crown Reserves may be established for conservation reasons under the *Lands Act*. National Parks such as Terra Nova, Gros Morne and Torngat Mountains are established under the federal *National Parks Act*. The benefits of protected areas are to preserve biodiversity, provide areas for scientific research, opportunities for environmental education, provide standards against which the effects of development can be measured, and provide natural venues for enjoyment of nature.

Critical Elements:

- preservation of biodiversity
- maintenance of protected area integrity
- maintain natural processes and features
- can be utilized as "control blocks" measured against similar areas were forest management activities has occurred.

Guiding Principles:

- the type of activities encouraged or permitted within various protected areas in the province depends entirely on the type of protected area and the rational for its establishment
- generally all non-consumptive activities are permitted; educational activities and scientific research within protected areas generally require a permit and are encouraged
- in most protected areas, new development is prohibited such as mining activity, hydroelectric projects, forestry activity, agriculture activity, roads/trails, cabins and new structures;
- a 500 m no roads buffer is to be maintained around all existing and proposed protected areas to reduce access and minimize damage from motorized vehicles
- where forestry operations are scheduled within one kilometre of provisional and ecological reserves, wilderness reserves or provincial parks, modified operations may be necessary and any amendments to the forest plan may be required.

4.1.2.7 Outfitting

Characterization:

Since the early 1900's, the outfitting industry has been an integral component of the tourism industry in Central Newfoundland. This region has been a popular hunting and fishing destination because of the pristine environment and abundance of fish and wildlife species. There are many outfitters operating within the boundaries of this forest management zone, which provide seasonal employment for many local individuals.

Over the past decade or so, a significant number of traditional hunting and fishing facilities have diversified into the non-consumptive areas of the tourism industry. Such activities include: snowmobiling, dog sledding, kayaking, canoeing, nature viewing, hiking, and wildlife photography. The ability to diversify has positively impacted the viability of outfitting operations and as a result, increasing numbers of operators are considering this opportunities. Pristine wilderness settings are necessary for many of these types of diversification.

Critical Elements:

Some outfitting camps are considered remote and construction of forest access roads too closely to a camp could have negative impacts to this remote appeal. Increasing accessibility through increased access roads has the potential for increased hunting and fishing pressures within in a given area. Increased pressure on the wildlife resource within a given area could potentially lead to decreased success rates of outfitter guests. With improved road access, there is also a potential for increased cottage development, which can also impact both remoteness and wildlife availability.

Without proper application of best management practices, forest harvesting has the ability to negatively impact wildlife travel corridors, bear denning areas, and caribou feeding and calving areas. Removal of large areas of forest can simulate the same effect of reducing wildlife habitat, particularly winter staging areas.

While clients of hunting and fishing outfitters are primarily interested in the actual 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 viewscape experience may also have a direct impact on repeat client bookings and recommending the destination to others. Viewscapes become even more important as outfitters begin diversification into non-consumptive tourism activities. Prior to implementation of an Environmental Management System (EMS) on forestry operations, some poor past practices have resulted in increased levels of garbage (skidder tires, abandoned buses, used oil containers, etc.). This can be frustrating for outfitters who concentrate on not leaving permanent marks on the landscape. In addition, possible erosion caused by hillside logging and heavy equipment use is also a concern - particularly due to its potential effects on water quality for fish habitat.

Guiding Principles:

Through consultations with outfitters located within the zone, it maybe deemed necessary to develop a managed forest area around the established main outfitting lodge.

- Where possible, construct new access roads away from the existing main outfitting camp.
- 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 could be restricted or limited.
- Where possible, conduct harvest activity in the winter and construct winter roads that are less passable in summer/fall and will help to reduce vehicular traffic.
- In consultation with the outfitter, forest harvesting can be restricted around hunting and fishing camps during their season of operation.
- forest operations shall be undertaken in compliance with existing regulations
- In consultation with the outfitter, efforts should be made to ensure that the integrity of the view from the outfitter main lodge is maintained when conducting forest operations.
- forest operations shall ensure all garbage is removed from the harvest area.

4.1.2.8 Recreation

Characterization:

Non-timber recreational values such as: hiking, skiing, canoeing/kayaking, ATV/UTV and snowmobiling constitute an important role within this Zone. Central Newfoundland has outstanding scenery, varying topography and opportunities for viewing wildlife and flora in a natural setting. Regardless if you are canoeing/kayaking on the many rivers, walking the various hiking trails, utilizing forest access roads, or using groomed snowmobile trails, this zone provides excellent opportunities for sport hunting/fishing and adventure tourism activity.

Critical Elements:

Wilderness

Some adventure tourism activities are captivated by the existence of wilderness areas. If best management techniques are not applied, forest harvesting may result in the alteration of this feeling of pristine wilderness, which could have some short term adverse effects.

Accessibility

Construction and maintenance of Forest Access roads has both a positive and negative effect. On a positive side, it provides the ability to increase vehicular and ATV/UTV traffic allowing more opportunity for this activity. However, on a negative side, it also has the potential to decrease the value of the experience for those individuals seeking a “remote” type setting.

Viewscapes

Either walking a trail, snowmobiling on a groomed trail or canoeing down a river, the visual experience of the surrounding landbase plays an important role in the overall pleasure of the activity. Over the past number of years, viewscapes have become an integral portion of forest management planning.

Guiding Principles:

Wilderness

Forest operations will avoid established ecological reserve areas and will make every attempt to consult with local stakeholders in areas of high concentrations of recreational activities. In such areas, stakeholder meetings could prevent conflicts through temporal scheduling.

Limiting Accessibility

Where possible on sensitive areas, forest harvesting will be scheduled during winter months and take advantage of winter road construction techniques. Winter roads usually restrict vehicular traffic and decommission naturally. In addition, decommissioning of regular forest access roads near sensitive areas is a possible option when forest operations are completed.

Viewscape

Where possible within areas where high concentrations of recreational activities occur, negative impacts to viewscapes could be managed using landscape design techniques. This could mean that forest harvesting operations employ: treed buffers, tree retention methods or implement reforestation activity immediately to return the site to a forested condition. Viewscape analysis using computer modelling has been completed in areas along the Exploits River and the Trans Canada Highway to minimize the initial visual effects of Forest Harvesting.

4.1.2.9 Tourism

Characterization:

The tourism industry in Newfoundland and Labrador has experienced significant growth over the years, which is largely based on our natural and cultural resources. Newfoundland and Labrador has the resources to compete nationally and internationally with tourist destinations. As such, protection of these resources is vital for continued growth and prosperity. Tourism is becoming a great economic driver for provincial revenues. Some of the many excellent tourist destinations in the zone include: Salmonid Interpretation Centre, Cordury Brook walking trail, Recreational Parks (Catamaran, Mary March and Beothuck).

Critical Elements:

- viewscape
- accessibility
- wilderness ambiance
- remoteness

Guiding Principles:

As indicated in the Recreation Values section, Forestry Branch will collaborate with other stakeholders in this five year planning period, to implement strategies for minimizing the visual impact of harvesting operations near sensitive areas. This could mean that forest harvesting operations employ: treed buffers, tree retention methods or implement reforestation activity immediately to return the site to a forested condition. As well, temporal changes in harvest scheduling could minimize noise levels during busy seasons near adventure tourism locations.

SECTION 5 MITIGATIONS

5.1 General

Best Management Practices adopted from previous planning processes to be incorporated into this plan

- A 20 m buffer will be maintained on both sides of any other rivers, brook, ponds or other water bodies that are shown on 1:50,000 topographic maps.
- There will be no cutting buffer within 100 meters of the Newfoundland T'Railway.
- There will be no cutting buffer within 100 meters of a cabin development area and 30 meters of an approved cabin.
- Scheduled salmon rivers will be evaluated on a site-by-site basis and buffers will vary in width from 30 -100 meters.
- No forestry activity is to occur within 800 meters of a bald eagle or osprey nest during the nesting season (Mar 15 to July 31) and 200 meters during the remainder of the year.
- Within protected water supplies, there will be no cutting within 150 meters of the intake pond or stream and no cutting within 75 meters of the main river channel. There will be no cutting within 50 meters of all ponds and streams flowing into the intake pond or stream.
- 100 meter no cutting buffer on Victoria River
- 100 meter no cutting buffer on Buchans Highway
- 100 meter no cutting buffer on Burgeo Highway

SECTION 6 PUBLIC CONSULTATION

6.1 Planning Framework

Forest Resource managers in Canada are striving for a society that successfully integrates economic, environmental and social considerations into all resource-related decision making. Since the early 1990's, there has been a country-wide shift from single resource management to a more comprehensive approach of forest ecosystem management. 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" or in this case "sustainable forests", which not only takes into account the social, cultural, economic, and environmental benefits of the present, but those of future generations as well. Involvement of Interested Stakeholders into the five-year planning process is recognized by the Forestry Services Branch as a key component to achieving sustainable development.

As a result of the 1995 Environmental Preview Report, the Forestry Services Branch adopted an adaptive management planning process, which has three objectives:

- Establish a productive planning framework to include all interested stakeholders. An effective planning framework must have information and defined spatial issues.
- Learn more about forest ecosystems while they are being actively managed (i.e. adaptive management). Adaptive management incorporates strategies which help us learn about the forest ecosystem and to deal with uncertainties.
- 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 interested stakeholders and 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.
More information on the Forest Management Planning Process can be found on Governments Forestry website using the following addresses (https://www.faa.gov.nl.ca/forestry/managing/district.html) and (https://www.faa.gov.nl.ca/forestry/managing/public_consultation.html), as well as Governments Engage NL website.

6.2 Stakeholder Involvement

Since the mid 1990's, for each five-year plan, the Forestry Services Branch embarked upon a rigorous public consultation process involving a series of meetings spanning a number of months at an established venue, where interested stakeholders could discuss a range of forest management issues at an operational level.

With respect to the strategic level, in 2014, the Forestry Services Branch released a 10- year Provincial Sustainable Forest Management Strategy (PSFMS) Document (2014-2024), which emerged through wide consultation with citizens of the Province. The 2014-2024 PSFMS builds on the strengths of the previous strategy plans and uses a landscape-scale planning approach to implement the progressive and innovative ecological policies required for Sustainable Forest Management (SFM). The strategy builds on the strengths of the many modern and high-quality forest management programs that are currently being implemented in this province to ensure a vibrant and competitive forest industry.

Taking into account the many five-year plans successfully implemented within the province since the mid 1990's through public consultation processes and the recent PSFMS developed through public consultations, The Forestry Services Branch strives to improve its methods to garner advice from the public while also mitigating land-use conflicts. To this effect, as new five-year

plans are being developed and implemented provincially, relevant issues raised from previous planning processes are considered the foundation the new plans.

A new stakeholder involvement process was initiated in 2020 utilizing the department of Engage Nl. Through this process, interested individuals could either contact forestry directly or complete an online form that specifically indicates a particular issue or concern. The Engage Nl process opened on July 21, 2020 and closed on September 18, 2020. There were no formal response forms completed and registered through this public consultation process. However, forestry officials were directly contacted regarding the following:

1) July 30, an outfitter in FMD 13 called to get some more detailed maps and overview of planned harvest operations. District Manager / Staff in St. Georges followed up with this request.
2) Aug 22, an email was received from an individual regarding management plans and Wildfires. A response provided. No further correspondence received.
3) Aug 30, an email was received requesting the draft forest management plan text that was not put on the engage nl website. This draft document was sent out. No further correspondence received.
4) Sept 18, an email from the same outfitter in #1 above, outlining overall concerns with proposed harvest activity in a portion of FMD 12 and portion of FMD 13. Departmental Response developed.

In addition to the Engage Nl public engagement process mentioned above, known stakeholders from previous planning processes were contacted directly through email. Information regarding the proposed forest management plan, google earth files, the upcoming engage Nl public consultation process, and associated timeframes were provided on July 7, 2020. A subsequent email was sent out to the same groups informing the Engage Nl site is active on July 21, 2020.

1) Town Councils
2) Local MHA's
3) Outfitters
4) Indigenous Leaders

The only correspondence received regarding the proposed forestry activity from the directed emails was from an outfitter in FMD 13 as previously mentioned above.

SECTION 7 MANAGEMENT OBJECTIVES AND STRATEGIES

7.1 Harvesting

The boreal forest is characterized by natural stand replacement following a natural disturbance, which results in the formation of relatively even aged stands. A forest management technique called the Clearcut Silvicultural system is utilized as it closely emulates this natural disturbance pattern. The size, shape, arrangement and juxtaposition of harvest areas vary across the landscape depending on localized topography and terrain conditions.

7.1.1 Commercial

The older unalienated timber considered in the worst condition is targeted as a high harvest priority, followed by stands that have been damaged by insects and disease. In managed stands, this priority changes to allow for a faster rotation on sites that have been silviculturally treated.

Specific commercial strategies include:

- design irregular cut blocks that follow contours and natural boundaries
- vary buffer widths to protect other values (ie. larger buffers on salmon rivers)
- utilize winter harvest on wet and sensitive sites
- maintain current size and distribution of clear cuts
- where possible, maintain unharvested strips between harvest blocks as wildlife utilization corridors
- use landscape design techniques to mitigate viewscapes
- minimize timber utilization loss (< 6 m3/ha)

7.1.2 Domestic

The harvest of domestic fuelwood and sawlogs occurs from designated areas, recent commercial harvest areas and sporadically throughout the zone with the removal of blowdown trees. Utilization of cutover residue, dead timber and scrub areas do not form part of the woodsupply analysis. Generally, domestic cutting areas are generally established near communities. However, within areas of the zone not covered by any operating areas, domestic permits may be

issued to remote cabin owners for firewood as requested. The number of permits and volume associated with these permits will be extremely low and insignificant.

Specific domestic strategies include:

- target low volume stands having poor commercial opportunity
- encourage use of poor quality hardwood (birch, larch and aspen). In areas where there are future softwood commercial operations, domestic harvesting is limited to non-commercial hardwoods
- target dead, burnt and insect damaged stands that are beyond commercial salvage
- target alienation class 3 lands that have low commercial opportunity
- in areas of high domestic demand, limit volume allocation in designated cutting areas and encourage alternate sources (cutovers, landings, scrub etc)

7.2 Silviculture

As a general rule, approximately 80% of the Boreal Forest regenerates naturally following a disturbance. Forest renewal management programs are applied by forest managers within the 20% that do not successfully natural regenerate. Forest renewal silvicultural treatments are designed to help facilitate a new forest after disturbances caused by harvesting, insect, wind or fire. These prescriptions can involve either Site Preparation (scarification), Planting or Pre-Commercial Thinning.

Site Preparation

When a site does not regenerate at all, a full planting program is required. In some cases, the site may need to be manually prepared to aid in the establishment and growth of the planted seedlings (generally black or white spruce and to a lesser extent, norway spruce). Site preparation techniques can include:

- Mechanical site preparation (scarification) involves using heavy equipment (skidder) equipped with special attachments to reduce the thickness of the duff layer, and remove or disturb any kalmia that is present, which would restrict seedling growth.
- Prescribed burning is used to sanitize some sites where adelgid is present. This treatment reduces the slash loading and duff thickness to prepare the site for planting and kills any balsam fir which could potentially perpetuate the adelgid problem.
- Treatment to prepare sites that have been overgrown with hardwoods and other herbaceous species has been done with herbicides to reduce this competition, making the site more accessible and suitable for planting. Release herbicide treatment reduces the competition for a few years to allow planted seedlings to get established. In other instances, herbicides are used to control Kalmia either before or after planting. Herbicides, while used sparingly, are sometimes a necessary tool to help establishment of a new forest, particularly on the better sites.

Planting

A full planting technique is required when no regeneration occurs to ensure regeneration of selected tree species is at acceptable levels. Gap planting is normally achieved with spruce seedlings, coupled with the natural regeneration already present on site to increase seedling density to acceptable levels.

On adelgid sites partially regenerated to balsam fir, planting is done through the existing regeneration to obtain a sufficient stocking level of an adelgid resistance species. However, where adelgid has been a problem, balsam fir regeneration is sometimes ignored and the site is planted with spruce seedlings.

Where possible, seedlings used in the silviculture program are grown with seed from local sources. Seed orchards have been established at Pynns Brook and Wooddale to produce seed from plus trees collected throughout the province. Plus trees are normally selected because they have superior growth and physiological characteristics. It is hoped that once the orchard is in full

production, the majority of the planting stock will be grown from this source. The ultimate goal is to plant seedlings that have superior growth characteristics and thus increase yield and maintain genetic diversity.

Exotic species have been planted in trials at some locations in the zone. However; it is not anticipated to form any substantive proportion of the planting program in the foreseeable future.

Thinning

In an attempt to enhance development, silviculture thinning programs are designed to treat established forest stands.

Pre-Commercial Thinning (PCT) usually involves partial removal of overstocked balsam fir stands at a young age 10 -15 years. In areas which have high moose browsing potential, the age is increased to 20 – 25 years, so that crop trees are tall enough to be out of reach of moose. PCT reduces density levels which facilitates maximizing volume increment and operability (piece size). Trees removed are not of merchantable size and remain on site, returning the nutrients back into the soil. In the zone, balsam fir is usually thinned to favour any spruce present within the stand. This prescription results in a mixed softwood stand (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 and Diameter Limit thinning would occur in the intermediate age 25 - 35 years and is undertaken in older balsam fir stands (either natural or previously thinned). It is designed to capture any mortality that would normally occur in the stand through self thinning. The trees removed from commercial thinning operations are extracted and utilized. The remaining trees are left to grow, free from competition and are harvested when mature. As with PCT, spruce and hardwoods are left where possible to increase the stand diversity.

Thinning programs aim to shorten the rotation period of a stand and produce large diameter stems. This program should increase the percentage of merchantable volume considered suitable for sawlogs. Commercial thinning has not been completed in the zone and diameter limit thinning has been done sparingly. In recent years the precommercial thinning program has dropped significantly. This trend is expected to continue.

More information on the Silviculture Program can be found on Governments Forestry website using the following address

(https://www.faa.gov.nl.ca/forestry/managing/silviculture/index.html)

Specific silviculture strategies include:

- ensure regeneration of areas disturbed by harvest, insect, wind and fire to prevent loss of productive land base
- use thinning techniques in young stands to promote enhanced stand development, reduce rotation age, and increase the percentage of sawlogs
- leave hardwoods, where possible, in pre-commercially thinned areas to increase stand diversity
- where possible, promote species mixes particularly with spruce and hardwoods to reduce susceptibility to insect attack and increase biological diversity
- where possible, use seedlings grown from local seed sources to protect genetic diversity
- ensure levels of planting and thinning used in the wood supply analysis are achieved
- work towards pre harvest planning to identify areas with potential silviculture problems so that optimal prescriptions can be promptly employed

7.3 Access Roads

Forestry roads are required to gain access to scheduled commercial harvest areas. Access roads also provide opportunities for other recreational and commercial values such as: hunting, fishing, skiing, berrypicking, hiking, outfitting, cabin development and mineral exploration.

As a general rule of thumb, only the minimal amount of access roads are constructed to effectively and efficiently conduct commercial harvest operations. Access roads are constructed to specifications minimizing right-of-way and running surface width. Forwarding distances will be maximized to curtail the overall amount of road constructed. In sensitive and wet areas, winter harvesting and road construction are encouraged. Following these principles helps to ensure the minimum amount of road will be constructed, reducing the loss of productive forest landbase and minimizing environmental disturbance. Road and bridge maintenance and/or decommissioning are considered depending on cost, and mitigation of conflicting uses for a particular road.

More information on the Roads Program can be found on Governments Forestry website using the following address (https://www.faa.gov.nl.ca/forestry/roads/index.html)

Specific roads strategies include:

- construct winter roads in 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
- consider road decommissioning on roads near remote outfitting lodges and other areas of concern where requested and where feasibly possible
- determine impacts and explore alternatives (cost sharing) in areas where road and bridge decommissioning impacts other stakeholders
- explore all avenues to secure funding for road construction and encourage operators to build their own roads in exchange for royalty reductions

7.4 Forest Protection

7.4.1 Insects and Disease

As indicated in section 1.5.5, insects have been considered a major natural disturbance within the zone. Balsam fir is susceptible to most of the major insects including spruce budworm,

hemlock looper, and balsam woolly adelgid. In the past, severe mortality has occurred in District 13 resulting in massive salvage efforts. In recent years, hemlock looper and spruce budworm counts have been low. However, populations of these insects are closely monitored and treatment is employed where warranted. The adelgid problem is worsening in District 10 and 11. Alternative silviculture prescriptions (centered on minimizing fir regeneration in susceptible areas) are being employed to minimize the impact of this insect. In the event of a major insect infestation, salvage efforts may change harvest priorities. However, deviations from harvest schedules will be closely monitored to ensure that the validity of the AAC is not compromised.

Monitoring and protection programs for insects and disease are coordinated by the forest protection division in Corner Brook. Local district staff provide assistance in detection, monitoring, and protection surveys against insects and disease. More information on the Forest Insect Control Program can be found on Governments Forestry website using the following address (https://www.faa.gov.nl.ca/forestry/idc/index.html)

Specific insect and disease strategies include:

- use silvicultural techniques at the stand level to alter species mix and increase stand vigor to make stands less susceptible to insect attack
- where possible, use harvest scheduling techniques to alter species mix across the landscape to minimize potential for severe insect infestation
- in conjunction with provincial and federal initiatives, use pertinent and approved insecticides

7.4.2 Fire

There has been a cyclic fire history in the zone. A fire in an unusually dry year can have devastating effects on the forest and can exacerbate an established wood supply. The risk of a serious forest fire can minimized by maintaining a highly trained, efficient and effective fire control program and by minimizing the risk in forest stands through maintenance of forest health and

vigour. Within the zone, there have been major forest fires in the past. However, in recent years, wildfire has not been a major issue. There have been some minor wildfire's but all have been quickly contained and not much timber has been lost. The Department of Fisheries and Land Resources is committed to protection of the resource and continues to invest in a fire suppression program to ensure any future losses are minimized. There are fire crews and equipment stationed at local forestry depots within the zone during the forest fire season, whose direct responsibility is forest fire protection. In addition, support, equipment and manpower at both the regional and provincial level is available should the need arise. There are air tankers stationed at Deer Lake and Gander and helicopters in Gander that are available for initial attack. More information on the Forest Fire Program can be found on Governments Forestry website using the following address (https://www.faa.gov.nl.ca/forestry/forest_fires/index.html)

Specific fire strategies include:

- use silvicultural treatments and protection from insects to increase health and vigour of stands
- maintain fire control capabilities
- promote species mixes in stands to minimize risk

7.4.3 Windthrow

Wind throw usually occurs in older stands that have been predisposed by some other disturbance such as insects and disease. To minimize the effects of Windthrow (blowdown), stands will be managed to promote forest health and vigour mainly through silvicultural treatments and protection from insects.

Specific windthrow strategies include:

- avoid thinning in areas with high wind damage potential (hilltops on high elevations etc.)
- maintain forest in healthy vigorous condition through silvicultural treatments and protection from insects
- design cut blocks to follow contours and natural boundaries to minimize risk of windthrow to residual forest

7.5 Environmental Protection & Climate Change

7.5.1 General Environment

The Department of Fisheries and Land Resources have developed has developed an Environmental Management System (EMS) that is registered with the International Standards Organization (ISO). As part of this process, an EMS Policy was developed and proper operating procedures developed for various forest management activity. Initial registration was on December 17, 2015 and through regular monitoring and audits (internal and external), the EMS remains registered. Under the EMS, the department has developed stringent operating procedures for fuel handling, working around waterbodies, and overall pollution prevention. In addition, inspection programs are implemented are implemented to evaluate forest operations and rectify any deviations from established protocols. More information on the EMS can be found on Governments Forestry website using the following address (https://www.faa.gov.nl.ca/forestry/ems/index.html)

To ensure forestry activity is conducted to minimize any potential negative impacts to the environment, operating procedures and best management practices called Environmental Protection Guidelines (EPG's) have been developed and implemented across the province. Highlights of measures to avoid these impacts include no activity buffer zones, modification of harvesting design and equipment, avoidance of sensitive site during critical periods, consultation with other regulatory agencies, and monitoring. More information on EPG's can be found on Governments Forestry website using the following address (https://www.faa.gov.nl.ca/forestry/managing/pdf/Environmental-Protection-Guidelines.pdf)

Through implementation of the EMS and the EPG's, the department strives to be responsible stewards of the landbase. As well, the programs illustrated in this document relating to forest protection from Insects and Fires, help to maintain a forested landbase. As indicated in previous sections, harvested sites are evaluated for regeneration potential and proper reforestation techniques are implemented to facilitate tree growth. Maintaining and achieving a stocked forest at the earliest timeframe help provide for carbon storage.

7.5.2 Surveys

Utilization surveys will be conducted on both commercial and domestic cutovers to ensure loss of merchantable timber is minimized. Results of these surveys will be used to evaluate the expected volume in an operating areas to those actually attained. The results of this survey will help refine inventory deductions in future woodsupply analysis.

Reconnaissance and intensive regeneration surveys will be conducted on commercial cutovers in this upcoming five year period, and as well as those created in the past five years to determine the requirement for silvicultural activity. Reconnaissance surveys will be completed on regenerating stands to determine the suitability for pre-commercial thinning.

7.6 Information and Education

Information and education is one of the key elements to providing 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 ones values and positions is gained. The more we know about other values and their location, the better the ability to mitigate any potential negative impacts. 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. Districts within the zone will continue to educate the general public and engage in meaningful consultations with interested stakeholders where applicable. Annual National Forest Week activities provides a great opportunity for interested individuals to gain a greater understanding of the Provinces' Forest.

Sources of information can include:

- government website
- field trips
- school visits
- information meetings
- general day to day contact

SECTION 8 PROPOSED ACTIVITIES

8.1 overview

This section will outline all forest activities that will occur on crown land in the zone from 2021-2025, including: proposed commercial and domestic harvesting, silviculture, access road construction, and activities proposed within protected water supply areas.

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

Digital copies of the Zone 5 plan can be found on the governments forestry website at the following address

(https://www.faa.gov.nl.ca/forestry/managing/public_consultation.html)

8.1.1 Allocation of Timber Supply

Table 16 below indicates the scheduled proposed forest harvest for the upcoming five year period 2021-2025. Note: the total volume identified maybe over the final AAC for each forest management district, but when scheduling activity, the maximum sustainable harvest over the five year period will not be exceeded.

Table 16: Proposed forest harvest in Zone 5 from 2021-2025

	PROPOSED HARVEST TOTAL VOLUME m^3			
HARVEST TYPE	**Class 1 softwood**	**Class 3 Softwood**	**Hardwood**	**TOTAL**
COMMERCIAL	2,305,323	50,529	104,003	2,459,855
DOMESTIC	84,428		42,548	126,976
TOTAL	2,389,751	50,529	146,551	2,586,831

**note: when final AAC's are developed for this zone, if the above schedule represents more than the established AAC, the harvest will be monitored to ensure established AAC's are not exceeded.*

8.1.1.1 Commercial

The timber scheduled for commercial harvest in the district is overmature with some small pockets of mature dispersed throughout. This proposed harvest approximates the harvest schedule that was used to determine the AAC. The allocated operating area and associated harvest volumes represent as much as two times the actual proposed harvest. The purpose of including more volume than is actually proposed is to allow for operational flexibility and inventory deviations within operating areas without having to constantly amend the plan. These operations occur manually or mechanically using conventional harvesting equipment such as chainsaws, shortwood harvesters, skidders and forwarders and are conducted year round. The more sensitive sites are usually harvested in winter and most operations are integrated utilizing sawlogs, pulpwood and fuelwood.

Table 17: FMD 10 Proposed Commercial Harvesting from 2021 to 2025.

OPERATING AREA FMD 10				Proposed Commercial Harvest Volume (m3)								
				SOFTWOOD					HARDWOOD			
Name	OA	Tenure	Area (ha)	Number of Permits	Core	Operationally Constrained	Total	Non AAC	Core HW	residual HW	Total	Non AAC
Seal Bay River West	CC10001	Crown	300		24,000	1,005	25,005		0	100	100	
Seal Bay River East	CC10002	Crown	58		4,200	0	4,200		0	100	100	
Long Pond West	CC10003	Crown	102		6,100	0	6,100		0	0	0	
Trout Lake	CC10004	Crown	138		3,800	0	3,800		23	0	23	
Mud Lake	CC10005	Crown	78		1,000	459	1,459		539	0	539	
New Bay River	CC10006	Crown	207		11,400	229	11,629		0	0	0	
Northern Arm Brook	CC10007	Crown	64		6,500	0	6,500		0	50	50	
Northern Arm Brook 2	CC10008	Crown	89		6,400	1,888	8,288		0	350	350	
Musquash Road	CC10009	Crown	105		14,200	0	14,200		525	0	525	
Cassandra	CC10010	Crown	551		40,600	0	40,600		671	0	671	
Badger Chute East	CC10011	Crown	38		2,800	0	2,800		0	50	50	
Badger Chute	CC10012	Crown	62		4,800	0	4,800		0	100	100	
Catamaran Brook	CC10013	Crown	131		9,000	587	9,587		641	0	641	
Rocky Brook	CC10014	Crown	73		3,900	0	3,900		1,166	0	1,166	
Rocky Pond South	CC10015	Crown	72		2,500	0	2,500		2,006	0	2,006	
		TOTAL	**2,068**		**141,200**	**4,168**	**145,368**		**5,571**	**750**	**6,321**	

Table 18: FMD 11 Proposed Commercial Harvesting from 2021 to 2025.

OPERATING AREA FMD 11				Proposed Commercial Harvest Volume (m3)								
				SOFTWOOD					HARDWOOD			
Name	OA	Tenure	Area (ha)	Number of Permits	Core	Operationally Constrained	Total	Non AAC	Core HW	residual HW	Total	Non AAC
Tote Lake	CC11001	Crown	173		16,200	0	16,200		0	0	0	
Tote Lake South	CC11002	Crown	215		22,100	47	22,147		276	0	276	
Canning's Lake	CC11003	Crown	32		2,600	0	2,600		0	0	0	
Lower Chain Lake	CC11004	Crown	77		3,400	2,233	5,633		125	0	125	
Haynes Lake 1	CC11005	Crown	364		37,800	841	38,641		11,324	113	11,437	
Haynes Lake 2	CC11006	Crown	155		16,400	0	16,400		2,510	0	2510	
Rushy Pond	CC11007	Crown	94		10,500	0	10,500		0	0	0	
Miguels Lake	CC11008	Crown	244		20,000	250	20,250		0	0	0	
Miguel Lake South	CC11009	Crown	499		54,300	1,259	55,559		0	0	0	
Great Rattling	CC11010	Crown	171		19,400	0	19,400		0	0	0	
Paradise Lake South	CC11011	Crown	36		4,000	0	4,000		0	0	0	
Stoney Lake East	CC11012	Crown	355		39,700	0	39,700		0	0	0	
Stoney Lake	CC11013	Crown	307		34,500	74	34,574		0	0	0	
Sepepet Lake	CC11014	Crown	291		34,500	0	34,500		0	0	0	
Frenchmans Brook	CC11015	Crown	16		4,500	0	4,500		564	0	564	
Tom Joes Brook	CC11016	Crown	45		19,800	76	19,876		1,510	0	1510	
West Lake	CC11017	Crown	281		31,300	0	31,300		6,896	144	7,040	
West Lake South	CC11018	Crown	288		29,800	0	29,800		5,181	0	5181	
Leonards Lake	CC11019	Crown	697		77,200	446	77,646		20,997	199	21,196	
Cornation Lake	CC11020	Crown	377		48,900	0	48,900		361	0	361	
Sandy Brook	CC11021	Crown	506		57,300	180	57,480		0	0	0	
Patchy Valley	CC11022	Crown	313		34,100	1,755	35,855		0	0	0	
Cripple Back	CC11023	Crown	821		94,600	2,344	96,944		0	0	0	
Mill Pond	CC11024	Crown	38		39,600	1,940	41,540		0	0	0	
Noel Paul East	CC11025	Crown	323		33,900	2,287	36,187		1,598	0	1,598	
Little Rattling	CC11026	Crown	122		12,400	0	12,400		0	0	0	
Lemottes Lake	CC11027	Crown	23		4,300	0	4,300		65	2	67	
Norris Arm	CC11028	Crown	132		11,800	967	12,767		0	0	0	
		TOTAL	**6,995**		**814,900**	**14,699**	**829,599**		**51,407**	**458**	**51,865**	

Table 19: FMD 12 Proposed Commercial Harvesting from 2021 to 2025.

OPERATING AREA FMD 12				Proposed Commercial Harvest Volume (m3)								
				SOFTWOOD					HARDWOOD			
Name	OA	Tenure	Area (ha)	Number of Permits	Core	Operationally Constrained	Total	Non AAC	Core HW	residual HW	Total	Non AAC
Millertown Junction	CC12001	Crown	256		3,400	666	4,066		0	0	0	
Moosehead	CC12002	Crown	21		18,000	0	18,000		0	13	13	
Red Indian Lake	CC12003	Crown	96		10,300	0	10,300		1,734	93	1,827	
Victoria River West	CC12004	Crown	366		37,500	1,144	38,644		1,572	134	1706	
Sutherland Pond	CC12005	Crown	557		72,500	2,159	74,659		401	38	439	
Bobby's Pond	CC12006	Crown	256		38,700	0	38,700		0	7	7	
Dennys Pond North	CC12007	Crown	246		29,700	0	29,700		12,624	289	12,913	
Denny's Pond	CC12008	Crown	136		16,900	29	16,929		2,224	145	2369	
Victoria River South	CC12009	Crown	965		190,000	62	190,062		3,390	469	3,859	
Lost Pond	CC12010	Crown	842		111,400	1,502	112,902		0	0	0	
Red Cross	CC12011	Crown	434		149,900	1,962	151,862		0	0	0	
Exploits	CC12012	Crown	258		36,000	0	36,000		0	26	26	
Harpoon North	CC12013	Crown	26		3,300	0	3,300		11,110	264	11,374	
Harpoon South	CC12014	Crown	162		57,000	0	57,000		1,139	57	1196	
Selbys Pond	CC12015	Crown	210		48,600	0	48,600		468	55	523	
Duck Pond Road East	CC12016	Crown	50		30,500	0	30,500		78	1	79	
Duck Pond Road West	CC12017	Crown	104		12,800	0	12,800		0	0	0	
Gills Valley East	CC12018	Crown	830		100,200	0	100,200		0	3	3	
Lake Ambrose	CC12019	Crown	1,065		131,000	812	131,812		0	0	0	
Haven Steady	CC12020	Crown	350		43,700	0	43,700		0	0	0	
Noel Paul	CC12021	Crown	473		41,100	14,928	56,028		122	18	140	
Island Pond	CC12022	Crown	82		9,800	189	9,989		2,319	41	2360	
Little Red Indian	CC12023	Crown	136		13,400	0	13,400		0	4	4	
Carter Lake	CC12024	Crown	504		42,400	6,354	48,754		1,399	41	1440	
		TOTAL	**8,425**		**1,248,100**	**29,807**	**1,277,907**		**38,580**	**1,698**	**40,278**	

Table 20: FMD 13 Proposed Commercial Harvesting From 2021 to 2025.

OPERATING AREA FMD 13				Proposed Commercial Harvest Volume (m3)								
				SOFTWOOD					HARDWOOD			
Name	OA	Tenure	Area (ha)	Number of Permits	Core	Operationally Constrained	Total	Non AAC	Core HW	residual HW	Total	Non AAC
Hospital Pond	CC13001	Crown	685		71,235	1,394	72,629		0	0	0	
Red Indian Lake	CC13002	Crown	92		8,091	461	8,552		5539	0	5539	
Red Cross East	CC13003	Crown	236		21,797	0	81,181		0	0	0	
		TOTAL	**1,013**		**101,123**	**1,855**			**5,539**	**0**	**5,539**	

8.1.2.2 Domestic

Harvesting will occur in designated domestic cutting areas and is generally conducted on a small patch cut system. However, within areas of the zone not covered by any operating areas, domestic permits may be issued to remote cabin owners for firewood as requested. The number of permits and volume associated with these permits will be extremely low and insignificant. All domestic cutting is done under permit which has conditions attached that outline the species,

volume, location and utilization standards to be employed. Most cutting occurs in fall and winter with extraction by snowmobile or ATV. Domestic permit allocation is 23 m3.

Table 21: FMD 10 Proposed Domestic Harvesting From 2021 to 2025.

FMD 10				Estimated 5 year volume (m3)	
OA Name	OA No	area (ha)	Number of Permits	Softwood	Hardwood
Peter's Pond - Peterview Ridge	CC10501	2,761	185	0	2,775
Northern Arm Lake - Wooddale	CC10502	7,673	390	5,265	585
Powderhorn Lake	CC10504	9,099	555	7,493	833
Frozen Ocean	CC10505	5,633	70	0	1,050
New Bay Lake East - Rowsell's Lake	CC10506	5,884	85	0	1,275
Bishop's Falls	CC10507	6,742	1,330	17,955	1,995
Nanny Bag Lake - Four Mile Lake	CC10509	7,522	65	0	975
Grand Falls-Windsor - Leech Brook	CC10510	10,075	1,295	17,483	1,943
	TOTAL	55,391	3,975	48,195	11,430

Table 22: FMD 11 Proposed Domestic Harvesting From 2021 to 2025.

FMD 11				Estimated 5 year volume (m3)	
OA Name	OA No	area (ha)	Number of Permits	Softwood	Hardwood
West Lake – Sandy Brook	CC11501	5,000	310	0	4,650
Lemotte's Lake – Stoney Brook	CC11502	5,377	680	9,180	1,020
Jumper's Brook East - Rattling Brook	CC11503	7,552	175	0	2,625
Miguel Lake South	CC11504	6,270	50	675	75
Beaton's Lake	CC11505	7,985	25	0	375
Amy's Lake	CC11506	5,332	35	473	53
Pamehac Lake	CC11507	5,431	50	0	750
Middle Brook – Exploits River	CC11508	6,091	45	0	675
Five Mile Lake	CC11509	4,002	35	0	525
Cripple Back Lake	CC11510	4,549	55	0	825
Crystal Lake – Chipper Road	CC11511	5,339	80	0	1,200
Paradise Lake	CC11512	5,621	85	0	1,275
Martin Lake – Hayne's Lake	CC11513	7,670	190	0	2,850
South Side Road	CC11514	7,815	600	8,100	900
Jumper's Brook West – Camp 6	CC11515	7,486	200	0	3,000
Tote Brook – Burnt Lake	CC11516	4,257	120	0	1,800
Sepepet - Sandy Lake	CC11517	10,511	40	0	600
Big Dick - Snoopy	CC11518	10,861	25	338	38
Crystal Lake South	CC11519	3,024	100	1,350	150
Sunday Pond	CC11520	1,602	200	2,700	300
	TOTAL	121,776	3,100	22,815	23,685

Table 23 :FMD 12 Proposed Domestic Harvesting From 2021 to 2025.

FMD 12				Estimated 5 year volume (m3)	
OA Name	OA No	area (ha)	Number of Permits	Softwood	Hardwood
Burnt Pond - Quinn Lake	CC12579	13,002	25	0	375
Star Lake	CC12580	16,114	25	0	375
Badger Burn	CC12581	4,507	70	945	105
Buchans	CC12582	4,151	195	2,633	293
Millertown	CC12583	6,333	105	1,418	158
Buchans Junction	CC12584	786	25	338	38
Joe Glodes	CC12585	9,725	85	1,148	128
Badger Track	CC12586	1,524	25	338	38
Little Red Indian	CC12587	12,443	45	0	675
Warford's Ridge	CC12588	16,710	25	0	375
Noel Paul	CC12589	3,800	25	0	375
Harpoon	CC12590	3,549	25	0	375
Hungry Hill	CC12591	4,218	50	0	750
Tally Pond	CC12592	4,258	25	0	375
Lake Ambrose	CC12593	9,126	25	0	375
Snowshoe	CC12594	9,677	25	0	375
Rogerson Lake	CC12595	9,925	25	0	375
Costigan	CC12596	9,784	25	0	375
Harbour Round	CC12597	10,071	25	0	375
Sutherlands	CC12598	15,603	50	0	375
Skidder Brook	CC12599	15,730		0	750
	TOTAL	181,038	925	6,818	7,433

Table 24: FMD 13 Proposed Domestic Harvesting From 2021 to 2025.

FMD 13				Estimated 5 year volume (m3)	
OA Name	OA No	area (ha)	Number of Permits	Softwood	Hardwood
Victoria Lake Road	CC13504	218	50	1,100	0
Red Indian	CC13503	8,438	25	550	0
Portage Lake	CC13502	6,132	25	550	0
Peter Strides	CC13501	1,443	200	4,400	0
	TOTAL	16,230	300	6,600	0

8.1.2.3 Hardwoods

This domestic harvest of birch occurs as a mixture in softwood stands and is utilized as fuelwood. The commercial hardwood harvest is for sawlogs and fuelwood and occurs in some pure stands but mostly as residual in hardwood/softwood and softwood/hardwood stands.

8.1.3 Silviculture

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

Each district in the zone has unique silviculture challenges:

- FMD's 10, 11 & 12 have sites transitioning to alders or kalmia post-harvest; and limited pre-commercial thinning opportunity.
- FMD 13 challenges include more fir regeneration than spruce, making the forest more susceptible to insect outbreaks, and logistical concerns due to remoteness when applying silviculture treatments.

All districts share a common challenge of having to contend with associated balsam woolly adelgid issues. The range and severity of this insect is increasing within the province and it continues to target balsam fir trees by severely reducing both growth rates and productivity of certain sites to the point where commercial viability is questionable. The silviculture program over the next five year period will help mitigate the impacts of this insect on sites dominated by balsam fir. Potential silvicultural treatment areas need to undergo reconnaissance and / or intensive surveys to determine the regeneration level and severity adelgid attack. Such surveys will be conducted during this five year period but until they are completed, specific locations and treatment amounts cannot be identified. However, silviculture prescriptions have been developed for implementation on specific site conditions. Areas that are scheduled for commercial harvest or have been harvested are identified on the operating area maps and are candidates for planting or gap planting to black, white or Norway spruce. These areas will undergo reconnaissance and or intensive regeneration surveys to determine the need for planting and the presence of adelgid.

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

There have been problems in some parts of District 11 and12 with sites transitioning to alders after harvest. A treatment employing mulching, herbicide and planting in successive years has been conducted to try and reclaim some of these highly productive sites. The effectiveness of this treatment is still being evaluated; however it has been discontinued due to high cost. Since there is a known regeneration problem on these sites, planting with white spruce immediately after harvest is employed to allow the seedlings to "get the jump" on the alders.

Table 25: FMD 13 Proposed Silviculture treatment 2021-2025.

BLOCK	NAME	PROPOSED TREATMENT
CC13001	Hospital Pond	Site-Prep & Plant (700Ha)
CC13002	Red Indian Lake	Site-Prep & Plant (100Ha)
CC13003	Red Cross East	Site-Prep & Plant (250Ha)

8.1.4 Primary Access Roads and Bridges

There are 448 km of new forest access roads scheduled to be constructed within the zone for the next five years to access timber for commercial purposes. All roads will be built to the specifications of the Class C, C-2 standards and all pertinent EPG's will be followed. In addition, secondary, operational and winter access roads and upgrading of existing road will be required and will be submitted in the annual operating plan prior to the year that they are planned to be built. As well, referrals will be sent to all relevant agencies (including DFO and Water Resources Division) before any construction is initiated.

Table 26: FMD 10 Proposed Road Constructions for 2021 to 2025.

Area Name	Block No.	Construction (length km)	Reconstruction (length km)	Water Crossings	
				Culvers	Bridges
Seal Bay River West	CC10001	9.26	0	4	0
Seal Bay River East	CC10002	1.39	0	0	0
Long Pond West	CC10003	3.27	0	1	0
Trout Lake	CC10004	3.07	0	0	0
Mud Lake	CC10005	1.56	1.57	0	0
New Bay River	CC10006	4.96	5.78	0	0
Northern Arm Brook	CC10007	1.43	0	1	0
Northern Arm Brook 2	CC10008	7.76	9.64	8	2
Musquash Road	CC10009	2.85	7.11	4	0
Cassandra	CC10010	10.13	0	1	0
Badger Chute East	CC10011	0.84	0.55	1	0
Badger Chute	CC10012	3.44	0	0	0
Catamaran Brook	CC10013	4.96	0	1	0
Rocky Brook	CC10014	2.44	0	0	0
Rocky Pond South	CC10015	0.59	0	0	0
	District Total:	57.95	24.65	21	2

Table 27: FMD 11 Proposed Road Constructions for 2021 to 2025.

Area Name	Block No.	Construction (length km)	Reconstruction (length km)	Water Crossings	
				Culvers	Bridges
Tote Lake	CC11001	4.7	0	1	0
Tote Lake South	CC11002	2.26	0	0	1
Lower Chain Lake	CC11004	4.45	4.26	2	0
Haynes Lake 1	CC11005	19.9	0	1	1
Haynes Lake 2	CC11006	0.45	0	0	0
Rushy Pond	CC11007	3.16	2.08	0	1
Miguels Lake	CC11008	0.53	5.46	0	1
Miguel Lake South	CC11009	17.11	0	5	2
Great Rattling	CC11010	0.89	0	0	0
Paradise Lake South	CC11011	2.01	0	0	0
Stoney Lake East	CC11012	25.08	4.25	17	1
Stoney Lake	CC11013	12.56	1.33	4	0
Sepepet Lake	CC11014	1.3	14.51	4	0
Frenchmans Brook	CC11015	0.51	11.21	1	1
Tom Joes Brook	CC11016	2.92	13.18	3	0
West Lake	CC11017	6.69	10.63	2	1
West Lake South	CC11018	17.85	2.49	5	2
Leonards Lake	CC11019	6.91	10.15	7	0
Cornation Lake	CC11020	18.73	4.61	9	1
Sandy Brook	CC11021	17.75	9.9	9	3
Patchy Valley	CC11022	4.78	16.22	4	0
Cripple Back	CC11023	8.92	18.49	5	1
Mill Pond	CC11024	4.41	13.1	8	1
Noel Paul East	CC11025	5.15	18.64	6	0
Little Rattling	CC11026	5.43	3.28	0	0
Lemottes Lake	CC11027	0.8	0	0	0
	District Total:	195.25	163.79	93	17

Table 28: FMD 12 Proposed Road Constructions for 2021 to 2025.

Area Name	Block No.	Construction (length km)	Reconstruction (length km)	Water Crossings	
				Culvers	Bridges
Millertown Junction	CC12001	5.83	3.13	3	0
Moosehead	CC12002	4.35	3.43	4	0
Red Indian Lake	CC12003	5.19	3.1	3	1
Victoria River West	CC12004	15.56	6	5	1
Sutherland Pond	CC12005	13.53	5	11	1
Bobby's Pond	CC12006	3.3	0	2	0
Dennys Pond North	CC12007	4.48	0	2	0
Denny's Pond	CC12008	2.92	0	1	0
Victoria River South	CC12009	25.05	7.34	7	0
Lost Pond	CC12010	9.34	3.94	8	0
Red Cross	CC12011	11.5	27.33	12	2
Exploits	CC12012	10.02	5.41	2	1
Harpoon North	CC12013	3.45	2.99	2	0
Harpoon South	CC12014	7.12	3.36	1	0
Selbys Pond	CC12015	12.46	6.35	2	0
Duck Pond Road East	CC12016	0.58	0	0	0
Gills Valley East	CC12018	16.46	0	2	0
Lake Ambrose	CC12019	16.51	8.51	8	0
Haven Steady	CC12020	5.23	0	2	1
Noel Paul	CC12021	4.59	0	0	0
Island Pond	CC12022	1.96	0	1	0
Little Red Indian	CC12023	3.55	0	3	0
	District Total:	182.98	85.89	81	7

Table 29: FMD 13 Proposed Road Constructions For 2021 To 2025.

Area Name	Block No.	Construction (length km)	Reconstruction (length km)	Water Crossings	
				Culvers	Bridges
Hospital Pond	CC13001	11.83	0		3

8.1.5 Activities in Protected Water Supply Areas

Larger buffers are established inside PWSA and the pertinent EPG's will be attached to any commercial or domestic permits issued for these areas. There will be continuous monitoring inside these areas and buffers will be flagged to ensure compliance with the guidelines. All activity within a PPWSA must be approved by the Department of Environment. Within the zone, there are no commercial activities proposed within PPWSA's and only 2 domestic areas proposed as follows:

1. FMD 10 – CC10509 – Nanny Bay Lake – Four Mile Lake: – Water Supply Number : WS-S-0556 servicing Point Leamington
2. FMD 12 – CC12582 Buchans – Water Supply Number : WS-S-0092 – servicing Buchans

3.

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. Forest 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 applicable legislation, cutting permit conditions, and Environmental Protection Guidelines. Permit holders and contractors are also subject to financial penalties if deviations occur.

9.2 Amendments

Changes to an approved Operating Plan maybe required occasionally resulting from operational challenges or unforeseen circumstances. These changes are submitted as amendments and must be approved by the Forest Ecosystem Managment Division prior to implementation.

There are two types of possible amendments:

1) Internally within the Department of Fisheries and Land Resources, where approval is required by the Forest Ecosystem Management Division. Internal amendments are governed by the following conditions:

    a. 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

    b. 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

    c. 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

d. 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.

2) Externally, through the Department of Environment. Any required revisions which are not covered by the above internal requirements must be submitted for Environmental Assessment (EA) in the form of an amendment to the five year operating plan.

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