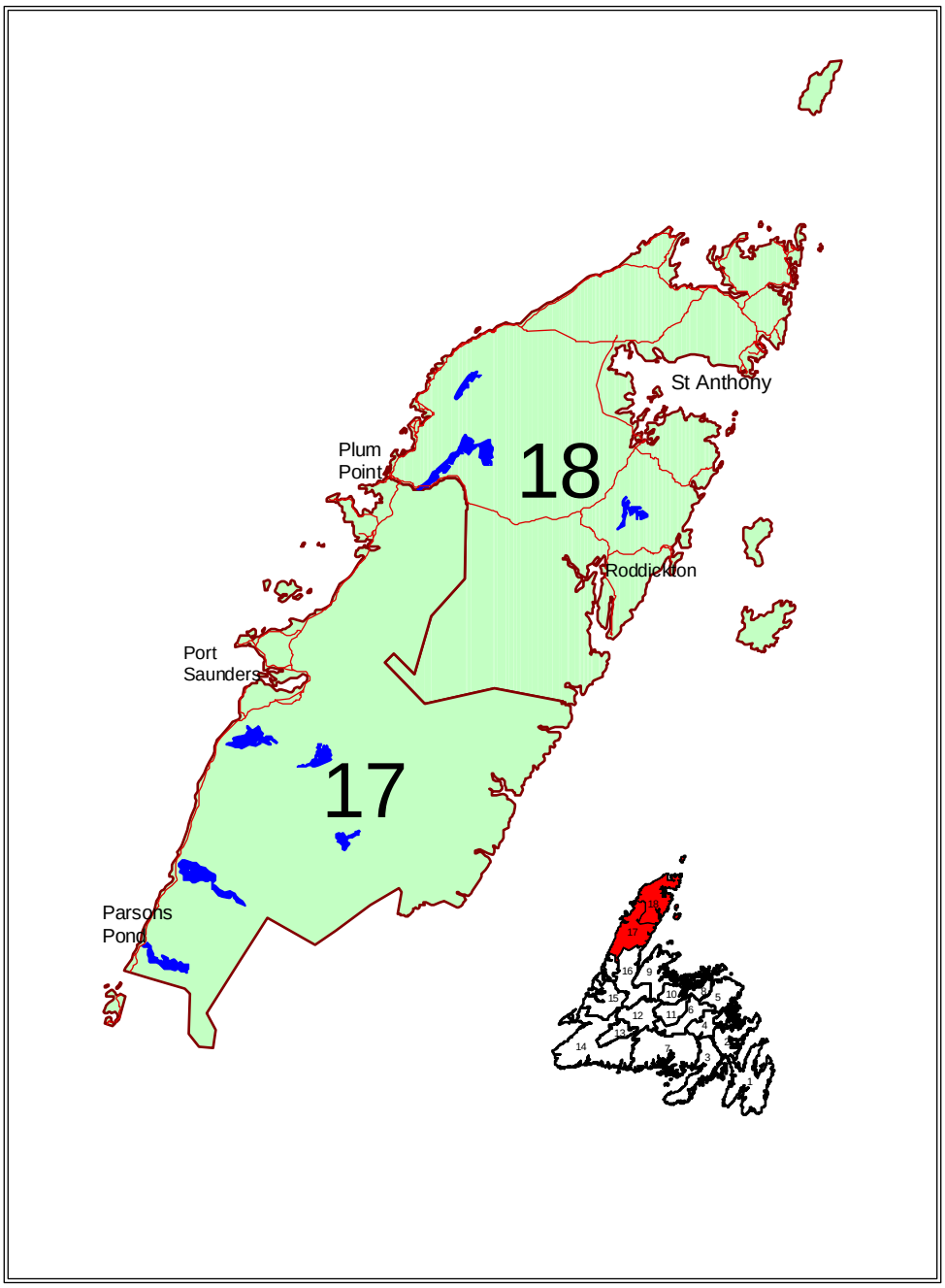
Forest Management Planning Zone 8



Five Year Operating Plan
2018-2022

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INTRODUCTION

This five year operating plan covers the period January 1, 2018 to December 31, 2022 and represents the second iteration that incorporates new provincial planning requirements. In the past, there were five major planning documents; the provincial sustainable forest management strategy, the district strategy document, the five year operating plan, the annual operating plan, and the past annual report. This new planning framework has eliminated the district strategy document; however, its former contents are now split between the provincial sustainable forest management strategy and the five year operating plan. Sections that are provincial in scope such as carbon, global warming and criteria and indicators are now included in the provincial sustainable forest management strategy while sections that are more descriptive or depict local conditions such as values, forest characterization and ecosystem description are moved to the five year operating plan. Linkages between strategies from the provincial sustainable forest management strategy and on the ground activities in the five year operating plan will be provided where applicable.

Another major change to the planning process is the creation of eight planning zones on the island which are based primarily on ecoregion composition. Districts 17 and 18 are adjacent and share common ecoregion characteristics and collectively form Planning Zone Eight. The requirement for submission to the Forestry Services Branch and for environmental assessment is one five year operating plan for each land owner in each zone. In this zone there will be one submission by the Crown. The past requirement was one five year operating plan by each owner in each district. Throughout this five year plan, references will be made to Districts 17 and 18 individually but when combined they will collectively be referred to as Planning Zone Eight or the zone.

This document will try to fully integrate presentation of information and discussion for crown land in the zone, where possible. This will be done by combining statistics and other information from each district and reporting for the zone. However, tables and figures will be constructed such that information for individual districts will be available if a breakout is required.

Discussion and information will be presented separately for each district where warranted based on unique and distinct differences in scope and content. The more descriptive sections of this plan will be generic in nature and give information for the entire zone as well as some broad comparative statistics.

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

Section 1 Description of the Land Base

1.1General

1.1.1 Location

Planning Zone Eight encompasses Forest Management Districts 17 and 18 (Figure 1). It extends from Gros Morne National Park in the south to include all of the Northern Peninsula. Major towns located within the zone are Parsons Pond, Port Saunders, Port au Choix, Roddickton, and St. Anthony. District 17 is administered from Port Saunders while District 18 is administered from Roddickton with a satellite office in St. Anthony.

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. Generally, settlement occurred around the coastal areas where the fishery was prevalent. 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.). Sawmills developed to supply the local demand for lumber and construction timber and there was a small export market for pulpwood. In the zone, logging towns such as Hawkes Bay, Main Brook and Roddickton developed as a result of the pulp and paper industry. Currently, there are two major forest manufacturing facilities in the zone; Holson Forest Products in Roddickton which has the capacity to produce wood pellets and lumber and Coates Lumber Company in Main Brook which produces lumber.

1.1.3 Ownership

The entire zone is owned and managed by the Crown. Corner Brook Pulp and Paper held timber rights in both District 17 and 18 but relinquished them to the Crown in 2010.

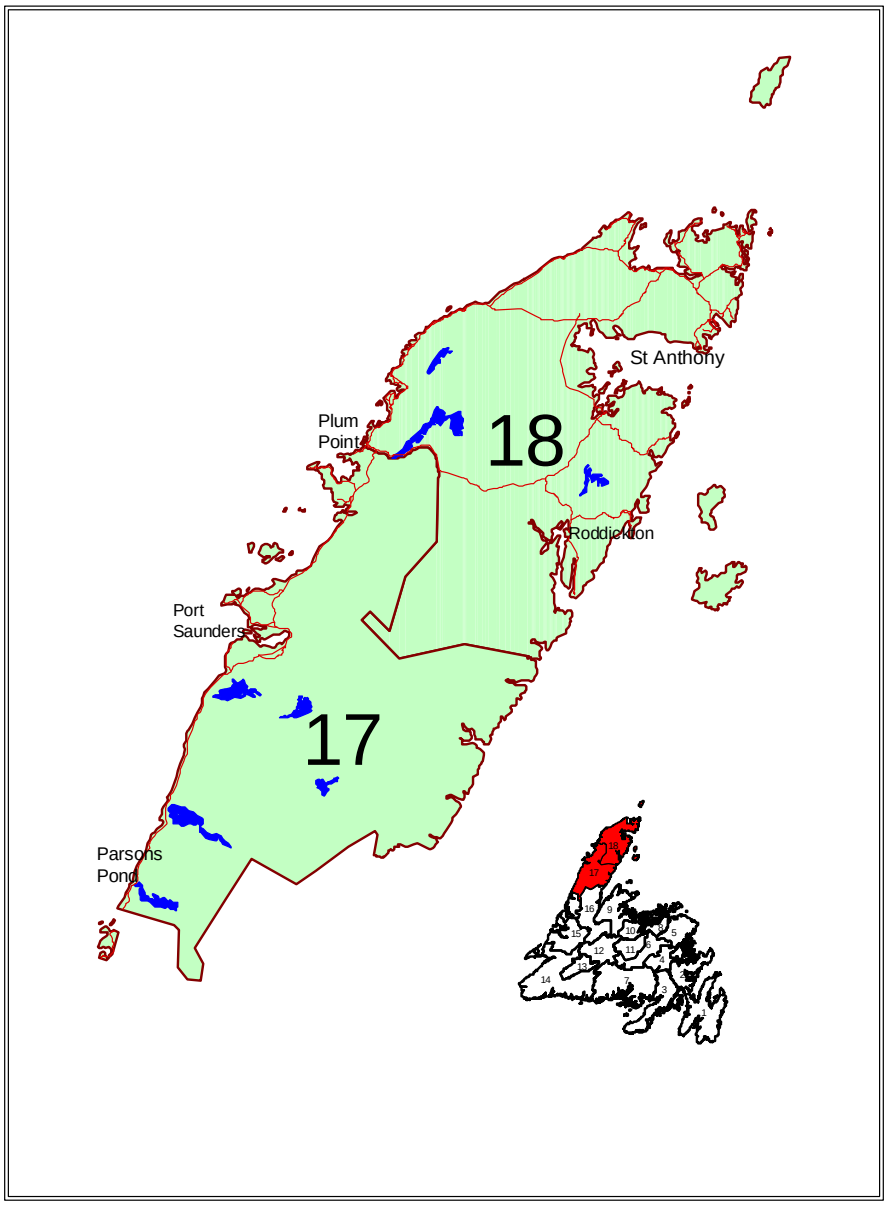

Figure 1 Location of Forest Management Planning Zone 8

1.2 Physical

1.2.1Topography and Hydrology

The two dominant topographic features of the zone are the rolling coastal plain and the Long Range Mountains (Brown, 1979). The coastal plain rises from the Gulf of St. Lawrence and continues eastward until it reaches the base of the Long Range Mountains. It varies in width from a few kilometers in the south to 40 kilometers in the north and extends in a north-south axis along the western side of the zone broken only by the Highlands of St. John. This plain is of a gentle rolling nature, reaching a maximum elevation of less than 200 meters. North of the Long range mountains lies a gently rolling sheltered lowland dominated by calcareous parent material. It is on the plains and sheltered lowlands that a large portion of the forestry activity within the zone takes place. Although officially termed mountains, the Long Range is more accurately a plateau. It rises abruptly from the coastal plain to elevations of 600 meters, then forms an eastward dipping plateau that extends unbroken to the eastern shore of the Great Northern Peninsula where it forms a steep rugged coastline. The two most striking topographic features of the Long Range Mountains are the numerous deeply incised glacially carved valleys, in many cases occupied by lakes, that interrupt the sheer western face and the several narrow steep sided valleys, eroded by the easterly flowing rivers, found on the plateau. Due to its exposed nature, the plateau supports little area of commercial forest except in the river valleys. Where trees have established, they are usually of a stunted, wind deformed nature known as tuckamore. The extreme northern part of the zone is characterized by extensive areas of coastal bog and barrens.

The two major topographic features present have given rise to separate hydrographic patterns. The flat coastal plain is characterized by large shallow lakes with broad slow moving rivers that drain large watersheds. The east-west orientation of these watersheds creates a barrier to the orderly development of a road network necessary for intensive forest management. The major watersheds in this category are; Parsons Pond, Portland Creek, River of Ponds, Torrent River, Castor's River, St Genevieve River, Main Brook, Beaver Brook, Northeast Brook, and Salmon River.

The other hydrographic pattern is present on the high plateau of the Long Range Mountains. Here there are few large lakes, the rivers being narrow and fast moving with narrow watersheds. The major watersheds of this nature are the Cat Arm River, Little Harbour Deep River, Soufflets River, Hooping Harbour, Northwest Brook and Cloud River.

1.2.2 Geology

The geological evolution of the Great Northern Peninsula is said to begin with the rocks of the Long Range Mountains. This complex of igneous and metamorphic rocks, dominated by granite and granitic gneiss are the oldest rocks on the Island aged at approximately 950 million years (Fleming, 1971). Other components of the Long Range Mountains include various types of schists, amphibalite and unseparated intrusions. The rock of the Long Range Complex were formed or deposited during the precambrian period.

The coastal highland area is composed of rocks from the Cambrian and Ordovician periods. They include shale, sandstone, slate, greywack, limestone, conglomerate and basic volcanic rocks. Conche Peninsula and Cape Rouge Peninsula, which protrude from the coastal highland, consist of rocks from the carboniferous period and make up the Anguille Group. These rocks include conglomerates, sandstones, siltstones, shales, dolomite, slate, conglomerate and basalt.

Both the coastal plain and White Hills massive were formed during the Ordovician period. The coastal plain consists of limestone, dolomite, quartzite, sandstone and shale, while the White Hills is made up of periodite with lesser occurrences of pyroxenite, dunite and talcarbonate alterations of mafic to ultramafic rocks.

Rocks forming the base of the coastal plain north of Portland Creek were formed during the Cambrian and Ordovician Periods when the Great Northern Peninsula was the slightly submerged eastern margin of the North American Continent. The sedimentary deposits formed into sandstone, limestones, dolostones and carbonate rocks. The sequence of deposit has been

deformed very little and is termed autochthonous. South of Portland Creek the bedrock is of a different nature having been deposited in a deep water environment and consists of sandstones, thin bedded limestones and shales, and limestone conglomerates. The sequence of deposit of these rocks is highly deformed and they are found on top of the autochthonous sequence. This inconsistency leads to the hypothesis that the rocks were formed some 65 kilometers to the east of the Great Northern Peninsula and moved in mass, by gravity, to their present location.

1.2.3 Soils

Damman (1962) developed a very detailed description and location for all the soil types in the zone.

In District 17 the most productive forest sites occur on the coastal plain. These soils are of several types; (1) orthic podzol soils of varied texture, usually with the parent material being a mixture of sandstone and limestone tills, (2) relatively deep nutrient-poor soil with non--calcareous tills as parent material; on these sites, moderately well-drained slopes with sandy loam to loam texture soil are more productive than the well-drained loamy sands to sandy loams, and (3) excessively drained, loamy or silt-sands with a non-calcareous till as parent material. The largest concentration of these productive sites is found between Portland Creek and Hawkes Bay.

Large areas of poorly drained peat bogs are also found throughout the coastal plain. Because of their excessive moisture and accumulation of organic material these sites have a very low productive capability. Along the east coast of the Great Northern Peninsula productive sites are usually shallow lithosolic soils. Because of exposure and their shallow nature these sites have only a moderate capability.

On the higher elevations of the exposed Highlands of St. John and Long Range Mountains the terrain consists of rock and soil barren which have little or no forest capability.

District 18 was glaciated during the Pleistocene period and a layer of glacial till consisting of calcareous (calcium and limestone) and non-calcareous (shale, slate and sandstone) sediment make up the majority of parent material. The most common soil type is well drained podzol. Other less common soil types found throughout the district are gleysols, regosols and organics.

The most productive calcareous soils occur in the central lowlands between Ten Mile Lake and Coles Pond. For the most part, these are fairly deep tills of varying texture underlain by limestone. The most productive non-calcareous soils occur on well drained, loamy sands to sandy loams.

The northern part of District 18 is almost completely covered by organic soils with predominately open ombrotophic peat bogs and contains very little productive forest sites.

1.2.4 Climate

The prevalent weather system affecting the zone is the maritime system. This weather mass has a moderating effect which results in cool summers and relatively warm winters. The warmest month is July with a mean temperature of 13^{o}C and the coldest month is January with a mean temperature of -9^{o}C. Rainstorms and high wind are frequent in the fall. The length of the vegetative season decreases rapidly along the northern peninsula, ranging from 150 days in Bonne Bay to 100 days at Cape Bauld (Hare, 1952). The annual precipitation averages 90 - 115 cm. which includes approximately 320 cm. of snow.

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 8, 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 favored 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 topo sequence, 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 sub-regions (also known as ecodistricts) All of the Newfoundland ecoregions and sub-regions contain many of the same ecosystem variables. It is the dominance and variance of these variables (e.g., vegetation and climate) that determine their classification.

Figure 3 depicts Planning Zone 8 relative to Damman's ecoregion classification system. The Northern Peninsula Forest ecoregion encompasses the majority of the area in the zone. The Long Range Barrens Ecoregion encompasses half of District 17 and one fifth of District 18. The entirety of the Strait of Bell Isle Barrens ecoregion is located in District 18.

Table 1 depicts the percentage of the ecoregions and sub-regions that are represented in the zone. It describes each ecoregion and sub-region as a percentage of the total in the Province as well as the relative importance within each District and in both Districts combined. For example, District 18 contains 100 percent of the Northern Coastal Sub-region of the Northern Peninsula Forest Ecoregion in the Province. As well, 17 percent of the District is located within this sub-region. The following is a detailed description from (Meades, 1990) of each ecoregion and sub-region in both Districts.

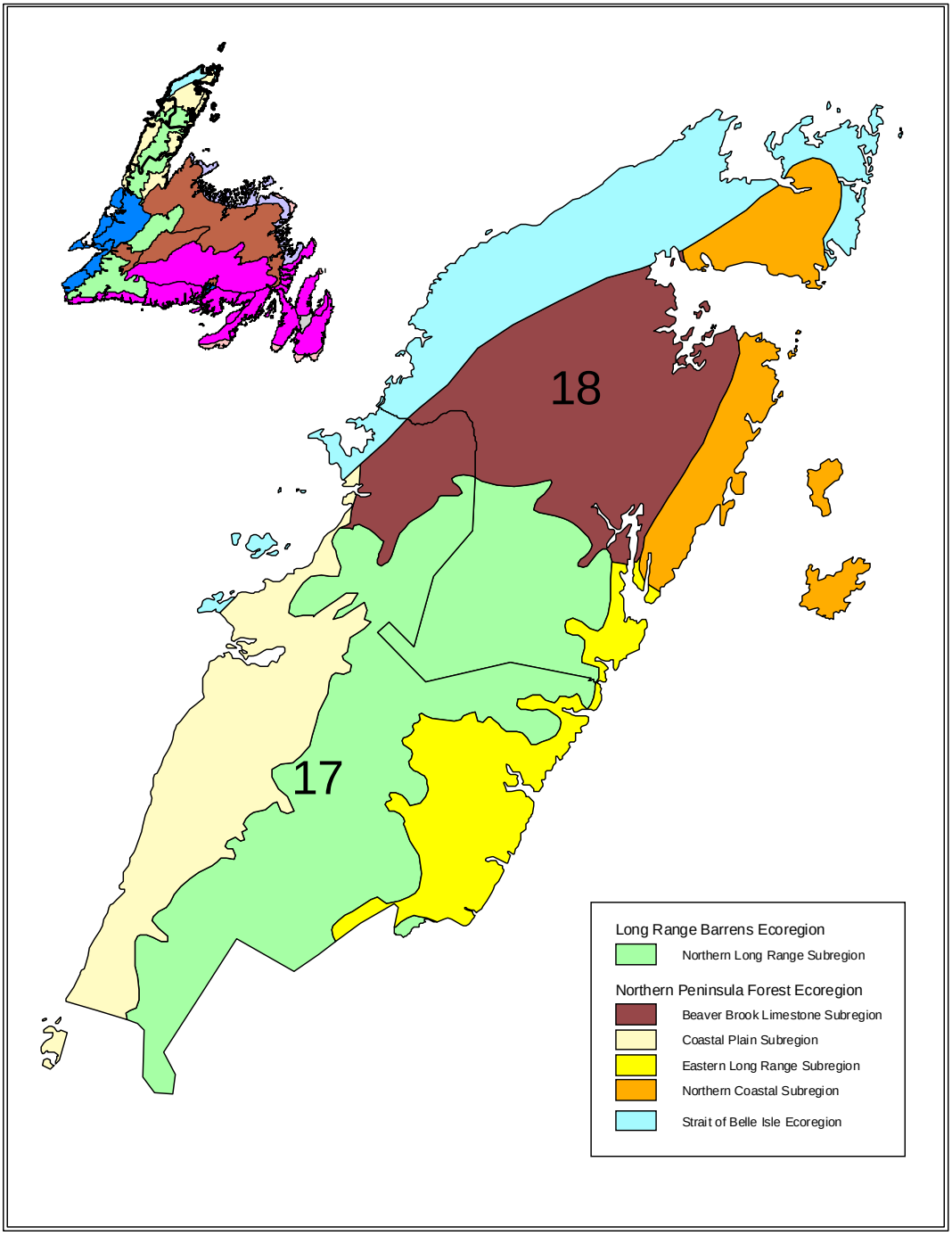

Figure 2 Ecoregions and sub-regions of Planning Zone 8.

Table 1- Percentage of ecoregions and sub-regions in Planning Zone 8.

Name of Ecoregion and Subregion	Total Area in Province (ha)	Percentage of Total Area in Districts			Relative Percentage of Ecoregion and Subregion in Districts		
		17	18	Total	17	18	Combined
Long Range Barrens							
Northern Long Range Subregion	689562	44	17	65	47	18	33
Northern Peninsula Forest							
Eastern Long Range Subregion	268059	38	6	44	16	3	9
Beaver Brook Limestone Subregion	255016	17	83	100	7	34	20
Coastal Plain Subregion	224658	81	0	81	28	0	14
Northern Coastal Subregion	107117	0	100	100	0	17	9
Strait of Bell Isle	188910	7	93	100	2	28	15

Table 1. Percentage of ecoregions and sub-regions in Planning Zone 8.

1.3.2.1 Northern Peninsula Forest Ecoregion

This ecoregion differs from most other forested parts of the Island by the shortness of the growing season, 110-150 days compared to 145-170 days for other areas. The frost-free period is comparable to most other areas and somewhat better than in central Newfoundland. Precipitation is lower, but, because of low summer temperatures and a shorter growing season, soil moisture supply is probably adequate at most times. The soils are comparable to those of western Newfoundland. Limestone underlies most of the region, with acidic rocks more common on the eastern side of the Peninsula.

Balsam fir is the dominant forest cover except at high elevations (300-400 m) on the eastern side of the peninsula where black spruce appears to be a natural component of the stands. There is very little fire history in this ecoregion. White pine, red maple, yellow birch and trembling aspen are conspicuous by their absence. There are approximately 100 species of plants that are

excluded from this ecoregion presumably because of the difference of climate. One of the most conspicuous changes is the replacement of speckled alder by green alder, satiny willow and balsam willow in swamps. Also tall shrubs such as mountain-holly, wild raisin and rhodora are sparse or lacking in the scrub bog-border forests. Silviculturally, they are similar to Western Newfoundland with hardwoods rather than ericaceous shrubs being the most common brush problem on understocked cutovers. Skunk currant, swampy red currant and red-osier dogwood appear to be a much more conspicuous component of seral vegetation on cutovers. Raspberry is also very abundant in the early years of succession.

1.3.2.1.1 Eastern Long Range Subregion

This sub-region includes the productive but inaccessible forest on the eastern slopes of the Long Range Mountains up to 450 m elevation. It extends from Cat Arm in the south to Canada Bay in the north. It extends farther inland in the south to include the Little Cat Arm and Soufflets River watersheds before narrowing to a thin coastal strip. The forests tend to be somewhat open balsam fir-black spruce mixtures. The tree line decreases towards the northern end of the sub-region.

1.3.2.1.2 Coastal Plain Subregion

This sub-region encompasses the flat coastal plain and the western lower slope of the Long Range Mountains from St Pauls north to Squid Cove. The coastal plain is occupied mostly by low plateau bogs. Forests are restricted to the slopes of the mountains and an area on till near Hawkes Bay.

1.3.2.1.3 Northern Coastal Subregion

This sub-region extends as a narrow coastal strip from Canada Bay in the south to Hare Bay in the North. This sub-region is climatically the least favorite because of the coldness of the

surrounding ocean water. Vegetation consists of exposed, rocky dwarf shrub barrens with local areas of poor forest. Serpentine barrens occur on the White Hills near St. Anthony.

1.3.2.1.4 Beaver Brook Limestone Sub-region

This sub-region contains the productive forests in the sheltered lowlands north of the Long Range Mountains. This is the most climatically favored sub-region in the Northern Peninsula Forest Ecoregion. Limestone underlies most of this area and rich, calcareous fens are common. Ombrotrophic bogs are limited to the northwestern part of the sub-region. It covers the entire Central Lowland from Ten Mile Lake in the west to Coles Pond in the east. This area is characterized by very gently rolling topography, with a variety of soil and bedrock types. The area has an abundance of underground brooks and sink holes, which have been eroded in the limestone substrate. Some of the most prominent are Under Ground Salmon Hole and Browsey Hole.

1.3.2.2 Long Range Barrens Ecoregion

This ecoregion comprises the highlands extending from the southwestern 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 sub-regions. They are separated by areas of more or less continuous forest.

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 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.

Forests dominated by balsam fir occur only in deep sheltered valleys on the northwest side of the Long Range Mountains and the Cloud River valley basin. The Cloud River Valley is a large, forested depression in the Long Range Mountains and is one of the most scenic locations on the Northern Peninsula.

Extensive areas of tuckamore, mostly of black spruce less than one meter 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 peat lands, patterned fens and slope bogs cover extensive areas. While northern and Arctic-alpine plant species are widespread, southern coastal plain species are absent.

Two major caribou herds, supporting year round populations, occur in this sub-region, with the Northern Peninsula herd being located in the zone. Arctic hare is mainly restricted to this ecoregion.

1.3.2.2.1 Northern Long Range Sub-region

This sub-region encompasses the central portion of the Great Northern Peninsula from Gros Morne National Park in the south to Cross Country Road in the north and includes the Highlands of St. John, which is the coldest part of the island. The best developed snow bank vegetation occurs in this sub-region. Mountain alder thickets are characteristic on alluvial soils in deep valleys. Many northern plant species occur in the forested valleys.

1.3.2.3 Strait of Belle Isle Barrens Ecoregion

The Straits of Belle Isle Ecoregion is a narrow strip of land which extends north along the western coastline from the northern part of St. John's Bay in the south to the community of St. Anthony. It is an undulating plain, predominately less than 47 metres in elevation, and only very locally rising to elevations of 60 metres. The southern section has a hummocky topography, but towards the north it becomes flatter (Damman, 1963). It widens gradually toward the north and extends across the Peninsula at Hare Bay. The area is characterized by barren, undulating topography, with extensive bogs that contain many small ponds. The entire area was glaciated during the Pleistocene period and there are numerous raised beaches caused by the submergence of the coastal plain. Due its flat topography and poor drainage, this area contains many bogs with a network of small scattered ponds.

1.4 Ecosystem Dynamics

1.4.1 Ecosystem Condition and Productivity

1.4.1.1 General Characteristics

Landscape patterns determine the variety, integrity, and interconnectedness of habitats within a region. These landscape patterns are a direct result of the relationship between physical landforms and soils, disturbance history, and relationships among various species that make up the ecosystem communities. These factors, while listed separately for clarity, are unavoidably interrelated. Landscape patterns play a pivotal role in determining the current conditions and health of forest ecosystems. These variables are evaluated in terms of productivity, stability and resilience.

Another important role determining the condition of a forest is change. Forests are an ever evolving entity, resisting stagnation, and constantly moving through their cycles of life, death, and renewal. The process of change over time is the essence of nature itself. It has been nature's underlying storyline since time began, and will continue to be until time ends.

The main forces of change in our natural forest ecosystems are disturbance and succession. A definition of disturbance would indicate that it initiates a change in a community structure which often ends up in the replacement of one set of species by another. However, replacement is not always the end result (e.g., a species like black spruce is aided in germination by disturbances like forest fire).

Disturbances range from the fall of a single tree, to the destruction of thousands of hectares by forest fires. While disturbances may be very destructive, they can often rejuvenate ecosystems and diversify landscapes.

Succession involves changes in both community composition and in the ecosystem structure and process. Succession is the orderly change whereby the dominant species is replaced by another species, then another etc. until a new dominant species establishes a relatively stable community.

1.4.1.2 Zone Specific Characteristics

As with other parts of the Newfoundland and Labrador's boreal forest, those of Planning Zone 8 have evolved in concert with a history of fire, insect attack and subsequent wind throw. Human intervention in this forest has been extensive and widespread with a resultant significant impact on current landscape patterns. The forests of the zone have been subject to many of the natural and human induced events that have shaped forests across Newfoundland. Natural disturbances such as insect-infestation and wind throw appear to be the two dominant factors that recycled the forest before the advent of large scale forest harvesting. Natural wildfires have not played a major role because the cool maritime climate of the zone has minimized the conditions necessary for their occurrence however, human caused fires have occurred. The start of commercial harvesting early in this century by groups such as Saunders and Howell and later Bowaters began the shift from a forest driven by natural disturbances to one that is dominated by harvesting.

Commercial and domestic harvesting has subsequently displaced natural disturbances as the dominant forces that recycle the forests of the zone. Although natural disturbances still occur on an annual basis, harvesting is the major disturbance type in our forests. The commercial harvesting has evolved since its beginning whereby wood was cut by bucksaw next to river systems, hauled by horses to the water and then floated downstream to awaiting mills. Today commercial harvesting utilizes rubber tired off road vehicles, an extensive road system and tractor trailers to move wood to mills and markets. The disturbance to forest soils following commercial harvesting is greater than that following insect outbreak but successful regeneration of these stands is not comprised by the harvesting technology. Extraction trails and landings are

the two areas where regeneration is problematic but with proper silviculture techniques these areas can be put back into a semi-natural condition.

Domestic harvesting of logs and firewood is a long standing tradition among the communities of the zone. This type of harvesting involves local residents creating small clearcuts or "blights" to obtain their yearly supply of wood. It generally occurs close to communities and during the winter months. Along the western cost of the Peninsula, many small domestic sawmills are located throughout the countryside. These sawmills operate in winter and lumber is transported to the communities by snowmobile. As with commercial harvesting forest regeneration after domestic harvesting is generally adequate however many domestic cutting areas are remote and become subject to heavy moose browsing. In all of the remote domestic cutting blocks, moose are having a major impact on the regrowth of balsam fir seedlings. Because of their remote locations, these sites are not easily accessed for planting purposes.

The current state of the forests in the zone could be considered good when looking at those areas that were harvested prior to the increase in moose populations. Recently however, successful natural regeneration of harvested balsam fir stands and in some instances insect killed stands has not been proceeding along its natural regeneration and growth cycle. The growth of the moose population, in moose management areas covering District 18 and the northern portion of District 17 has led to some instances of over browsing of habitat. Currently, the tree planting program in the zone has been partially aimed at restocking harvested sites with tree species (i.e. black and white spruce) that are not consumed by moose, to compensate for the loss of young balsam fir trees through moose browsing. Although this is a problem across the landscape, it is more pronounced in remote domestic harvesting blocks. Moose browsing is altering the process of natural forest succession many hardwood shrub and tree species are not successfully growing to maturity.

The following sections will discuss each of these concepts in more detail as they relate to the ecosystems of Planning Zone 8. For the most part this section will be descriptive and explanatory

in nature. Specific examples of strategies and linkages to the Provincial Sustainable Forest Management Strategy will be detailed in subsequent sections.

1.4.1.3 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 or a good site would have a higher potential than a poor site.

Overall, the landscape in Planning Zone 8 has approximately 33 percent productive forest. As well, the relative proportion of site types is 15 percent good, 60 percent medium and 25 percent poor with a mean annual increment (MAI) of 2.3, 1.7, and, 1.0 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 of the zone occur in the lowlands of District 17 and the areas with calcareous soils in District 18. These areas have deeper soils and less exposed bedrock. The landscape patterns are more consistent and the growing season is longer. In the northern part of District 18 the soils are mainly organic and in the central part (hills) of District 17 the soils are

shallower with bedrock at or near the surface. The terrain in 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. However, in the Provincial Sustainable Forest Management Strategy, criteria and indicators to monitor productivity have been identified. One method outlined is tracking mean annual increment in m3/ha/yr by tree species by ecoregion. This can be readily measured over time and manipulated through silviculture treatments or affected by poor harvesting practices which increase soil compaction. An example of secondary productivity is the number of moose per unit area. One must also recognize the forests inherent biological limits however, when attempting to measure or manipulate site productivity.

1.4.1.4 Resilience

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

The ability of forest stands to regenerate themselves demonstrates their resiliency in the face of harvesting or some other natural disturbance. An example of lowered resiliency following natural disturbance is near the St. Anthony airport where wildfire that killed all the standing trees and on the poorer sites killed all the young trees that were on the forest floor of the mature stand. Natural regeneration on this area is slow or non-existent even 30 plus years after the burn. Another example is harvesting on the more fragile sites where steep slopes and shallow soil over bedrock increase the potential of site degradation beyond repair.

1.4.1.5 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.

1.4.1.6 Disturbance Regimes and Successional Patterns

There are four main driving forces that cause disturbance in the boreal forest. As stated in section 1.5.5, harvesting accounts for the majority of disturbance in the zone and occurs on a regular and consistent basis. Fire and insect damage are the other two major disturbances and occur on a more irregular or cyclic basis. With the exception of a major atypical windstorm, wind throw usually occurs after a stand is weakened by some other agent like insects. 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.

1.4.1.6.1 Harvesting

Regeneration patterns in the black spruce type after harvesting is mainly back to the black spruce type especially on the poorer sites. The component of balsam fir regeneration increases as the sites get better. There is substantial regeneration failure in this forest type with average not sufficiently restocked (NSR) rates of approximately 20 percent. Another general trend is that the poorer the site quality the higher the NSR rate. These sites would be candidates for planting with spruce.

In the balsam fir types, regeneration success back to balsam fir is much higher averaging 65 percent. Regeneration rates to balsam fir are higher on the medium sites and fall off somewhat on the poor and good sites. There is also some regeneration to black spruce and white birch types. Regeneration failure is relative constant across all ecoregion types at 25 percent.

Regeneration pattern in the mixed wood types is generally back to mixed wood that is dominated by balsam fir. There is also a component of white spruce regeneration after harvest on these mixed wood 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 wood types is variable across site types and ecoregions depending on local conditions but averages 20 percent.

There are few pure hardwood stands in the zone. Anecdotal evidence from domestic cutting in these types indicates that they will regenerate to mixed wood types dominated by balsam fir and white birch.

1.4.1.6.2 Fire

White birch is the most prolific regeneration species after fire across all forest types, site types and ecoregions within the zone. It regenerates as pure stands or in combination with black and white spruce. Balsam fir is conspicuously absent after fir because most advanced regeneration in the under story is killed by the fire. White birch regeneration is correlated with the presence and distribution in the pre fire stand. Pure hardwood stands are uncommon. Therefore fire origin site will have large non-sufficiently restocked areas. In mixed wood stands a higher component of white birch is present after fire. Regeneration failure after fire is on average 55 percent across all forest types and is higher as sites get poorer.

1.4.1.6.3 Insect

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

Mature balsam fir types usually regenerate to balsam fir or to balsam fir hardwood mixtures following an insect disturbance. The component of white and black spruce will increase proportionally to its distribution in the original stand. Regeneration failure occurs approximately 20 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.

Some scientists estimate the total number of species on earth between two and 100 million, however, the best estimate is considered to be within the range of 10-30 million. This is remarkable considering only 1.4 million species have actually been given names. The largest concentration of biodiversity on the planet is found in the tropical areas of developing countries. Small areas of rainforest often contain species that are found nowhere else on earth. Mishandling even small tracts of land could lead to extinction of several species, one of which may hold the key for the prevention or cure of some disease.

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

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

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

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

1.4.2.1 Species Diversity

Species diversity describes the overall range of species in a given area or ecosystem. Species are groups of animals, plants, and microorganisms 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 color, 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, microorganisms and the soil, water, and air they occupy create virtually limitless ecosystems around the world.

A forest interspersed with barrens, marshes, lakes and ponds 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. Representative and protected areas will be discussed in more detail in Section 4.

1.5 Forest Characterization

1.5.1 Land Classification

Table 2 displays the land classification broken down by district for Planning Zone 8. The total mapped land area in the zone is approximately 1.12 million hectares. There are four basic categories that currently represent how the land is classified; productive, non-productive, non-forest and fresh water. The ratios across ownerships in each district are fairly consistent with some minor variations. Individual break outs by district and owner are shown in Table 2. Figures 3 and 4 displays the relative percentages of each major land class category in each district with all ownerships combined.

In general, District 17 has 35 percent of its total mapped land area in the productive forest category while District 18 has 30 percent. The higher the percentage of productive forest generally means that the forest is more contiguous and not as fragmented by bog, scrub and water. This has implications for harvesting and road building costs which are generally higher when the forest is more fragmented. Another point is that the Forest Service is now classifying scrub by site, height and density class as new inventories are completed. This information will be invaluable in determining which scrub area are marginally productive or can meet some other non-timber objective.

Table 2 Land classification by district in hectares for Planning Zone 8.

Land Class	Total		
	17	18	Total
disturbed	12,972	13,983	26,955
age class 1	22,995	10,922	33,917
age class 2	16,006	8,100	24,106
age class 3	21,447	24,118	45,565
age class 4	20,769	20,340	41,109
age class 5	16,158	20,672	36,830
age class 6	12,540	7,159	19,699
age class 7	90,021	71,447	161,468
Total Productive	212,925	176,759	389,649
softwood scrub	212,445	165,596	378,041
hardwood scrub	2,362	2,097	4,459
Total Non-Productive	214,807	167,693	382,500
rock barren	38,147	35,376	73,523
soil barren	31,523	44,823	76,346
bog	70,329	108,460	178,789
cleared land	843	1,258	2,101
agriculture land	498	18	516
residential	939	1,779	2,718
right of ways	455	567	1,022
miscellaneous	887	564	1,451
Total Non Forested	143,621	192,845	336,466
Fresh Water	66,165	76,844	143,009
Total All Classes	637,518	614,141	1,251,624

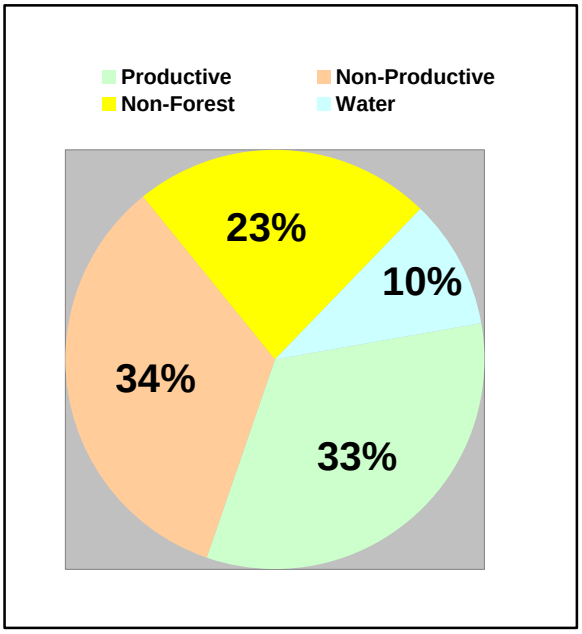

Figure 3 Land class breakout for District 17

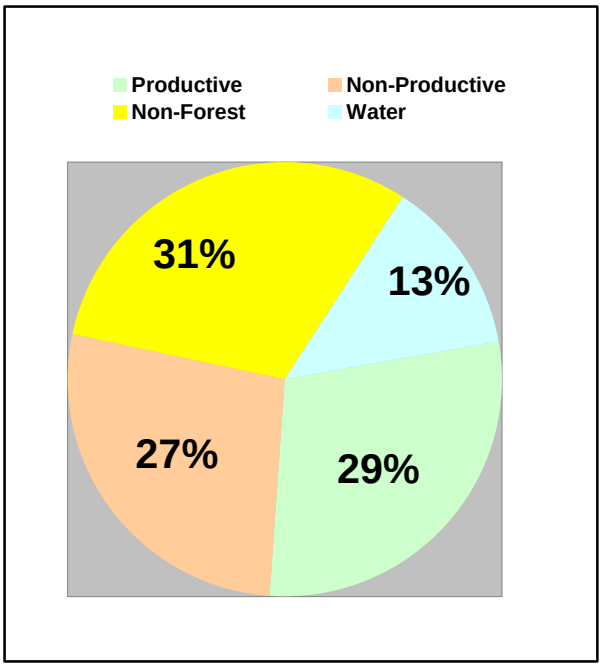

Figure 4 Land class breakout for District 18

1.5.2 Age Class

Individual tree ages in a stand can all be the same after fire or planting however, in most cases the ages vary. Foresters describe ages in terms of age classes which generally encompass 20 years. The age classes present in the zone are 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 combined age class distribution in each district for the entire productive forest is shown in Figures 5 and 6. In general terms, the more balanced the age class distribution in a district, the higher the potential even flow sustained yield of timber can be because continuous timber supply is limited by the age class with the lowest area. The age class structure for Districts 17 and to a lesser extent District 18 are typical of that of the island with an abundance of area in the young and old age classes with a dip in the intermediate age classes. Age class structures by owner and district will be discussed in more detail in each pertinent five year plan. The age class structures for Crown land in Districts 17 and 18 as well as strategies to rectify any imbalances or impacts on wood supply of poorly structured age classes will be presented in Section 3 of this plan.

1.5.3 Site Class

The productive forest in the zone is further sub-divided along a gradient of productivity ranging from poor to high 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 some of which include soil fertility, moisture regime and geographic (slope) position. Generally the balsam fir and softwood hardwood working groups occupy the better sites in the zone. The black spruce working groups dominate the very dry and very wet areas that are of poorer site quality.

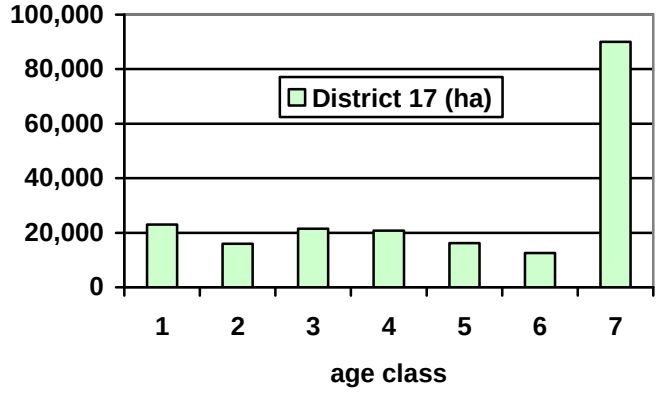

Figure 5 Age class distribution for District 17

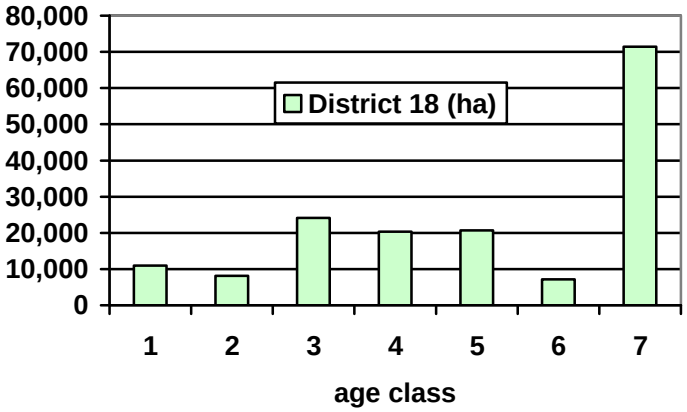

Figure 6 Age class distribution for District 18

The distribution of area of all ownerships combined by site class for each district is shown in Figures 7 and 8. This percentage distribution holds relatively true for individual ownerships with the exception of District 17 whereby the Crown has a higher proportion of poor sites and CBPPL has a higher proportion of goods sites. On average, good sites are capable of producing > 2.3 m3/ha/yr, medium sites 1.7 m3/ha/yr, and poor sites 1.0 m3/ha/yr

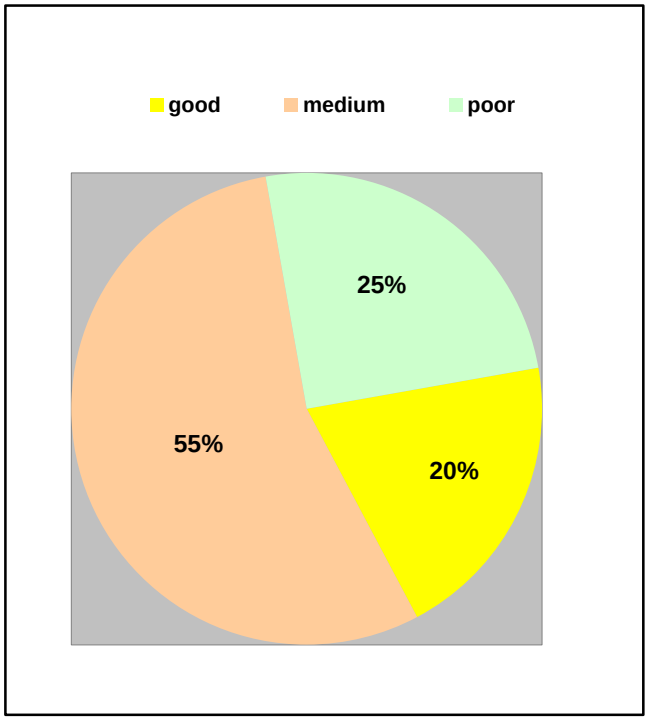

Figure 7 Site class breakdown for District 17

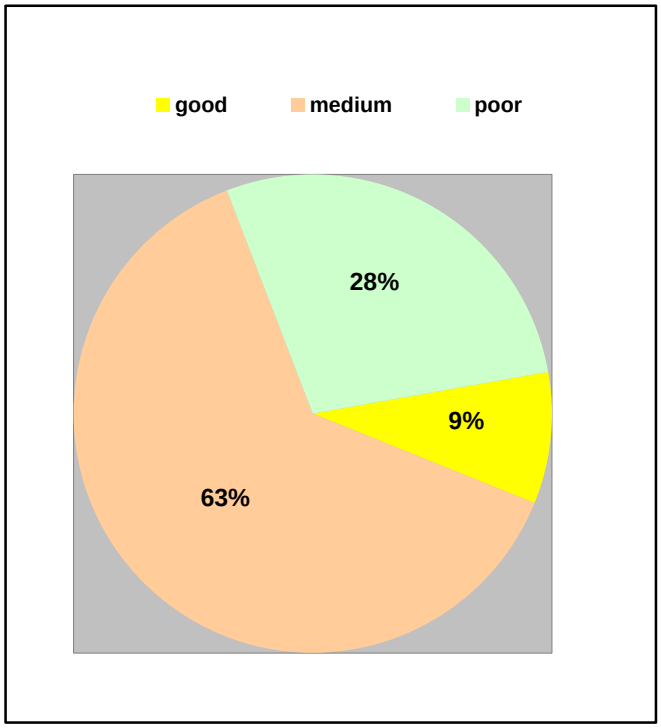

Figure 8 Site class breakdown for District 18

1.5.4 Species and Working Group

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

In the zone, the softwood working groups dominate accounting for over 90 percent of the productive forest. Balsam fir (bF) is by far the most prolific accounting for 76 percent of the working groups in District 17 and 85 percent in District 18 (Figures 9 and 10). Balsam fir can occur in pure stands or in association with one or more of black spruce, white spruce, white birch, or larch in varying species compositions. The black spruce (bS) working group is the second most abundant accounting for 8 percent in each District.

As with balsam fir, black spruce can occur as pure stands or in association with other species listed above. Softwood hardwood working groups occupy seven and two percent of the productive forest area in Districts 17 and 18 respectively. This working group occurs as varying mixtures of fir, spruce, and birch. The hardwood softwood (hS), and white birch (wB), white spruce (wS) working groups occupy less than five percent of the productive forest in both districts. Approximately five percent of the productive forest is classed as disturbed (DI). Disturbances include harvesting, which accounts for most of the total, insect damage, fire, wind throw, and flooding. The relative percentages hold true for all ownerships in both districts.

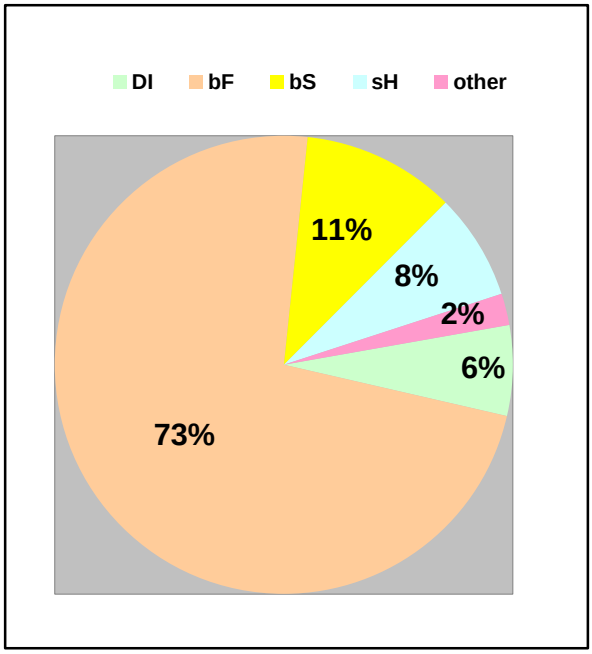

Figure 9 Working group breakdown for District 17

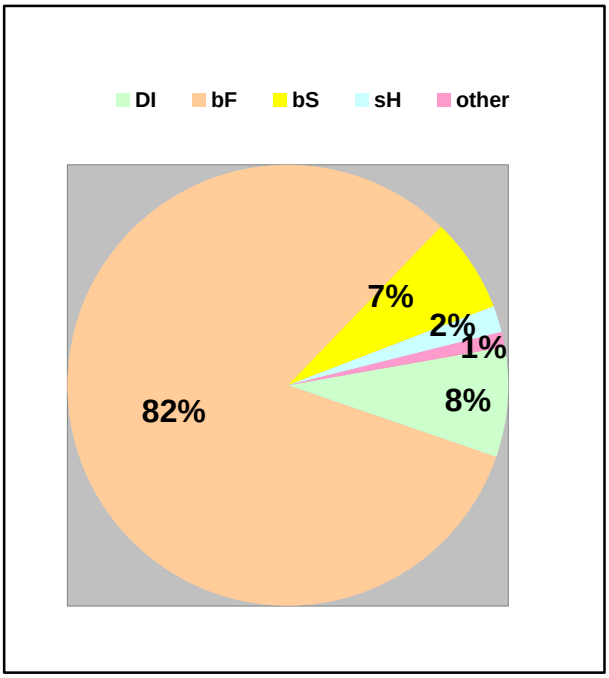

Figure 10 Working group breakdown for District 18

1.5.5 Forest Disturbances

In the past 20-25 years approximately 29 500 ha have been disturbed by some means on Crown land in the zone. Harvesting has accounted for the largest portion of this disturbance at approximately 16 000 ha. Insect damage has occurred on over 14 100 ha with 34 percent in light (0-25 percent mortality), 17 percent in moderate (26-50 percent mortality), 20 percent in severe (51 -75 percent mortality) and 29 percent in extreme (76+percent mortality). Fire has disturbed 2 330 ha and there has been over 1 800 ha of mortality due to blow down. This usually occurs after another disturbance (like insect damage) has weakened a stand. It should be noted that these areas are not mutually exclusive and there is overlap between disturbances. (ie. insects may have killed a stand, followed by salvage harvesting and then perhaps fire).

Historical records indicate that there have been major hemlock looper and spruce budworm infestations in 1962, 1972 to 1976, 1986 to 1989, and 1999 and 2001 in the northern portion of the zone near Plum Point has caused extensive mortality throughout FMPZ8. This infestation started in the Doctors Brook area and moved north towards St. Anthony and east towards Main Brook. The majority of this mortality was in remote domestic areas. A significant portion of this volume has been salvaged and continues to be salvaged as domestic and commercial fuelwood.

Over the past three years small infestations of hemlock looper have occurred thoroughout FMPZ8. Like the previous outbreak between 1999 and 2001, most of the mortality is in domestic harvest areas and will continue to be harvested in the future.

Aerial application of insecticides has been used regularly as a management tool to control insect pests of balsam fir. In more recent years chemical insecticide use has been dropped in favour of the more environmentally benign bacillus thurengiensis (bT), a naturally occurring, biological control agent. Despite the use of insecticides, the hemlock looper and spruce budworm continue to pose a significant threat to the forests of the zone due to the dominance of balsam fir.

Section 2 Past Activities

2.1 District 17

2.1.1 Overview

There was significant activity in District 17 from 2013 to 2017. There was over 199,814 m3 harvested both domestically and commercially on Crown Land. Domestic harvest was distributed throughout the district and occurred mainly adjacent to communities near the coast. Commercial harvesting was more concentrated, occurring near Bateau Barrens, Three Mile Lake, East Castor Pond and Mt. St. Margaret.

There were 1,230 hectares silviculturally treated, 6.3 km of access roads constructed and approximately 2,661 hectares treated with insecticide.

All areas harvested in the past five years can be viewed in context with proposed activities on the operating area maps in Appendix 3.

2.1.2 Harvesting

Table 3 summarizes the harvest in District 17 between 2013 and 2017. There was an under harvest of the AAC's on Crown in Core, Operationally constrained and Non-AAC areas. An explanation of Core, Operationally Constrained and Non-AAC landbases can be found in section 3.4.2. There was a significant undercut in the commercial AAC's. There is very little market small diameter wood (i.e. non sawlog fiber). There was a small volume of fiber that was sold to Corner Brook Pulp and Paper Ltd as pulpwood and hog fuel, but the majority of small diameter wood was sold locally as fuelwood. This market has seen a steady growth over the past five years.

Table 3 Summary of commercial harvest in District 17 by Crown for 2013 to 2017.

District 17		Core				Operational (Available)				Non-AAC Wood	
		AAC	Commercial	Deviation	Total	AAC	Commercial	Deviation	Total	Operational	Regulatory
SWD	Crown	379,484	72,126	307,358	379,484	88,812	0	88,812	88,812	4,497	
	Sub-Total	379,484	72,126	307,358	379,484	88,812	0	88,812	88,812	4,497	
		Core				Operational (Available)				Non-AAC Wood	
		AAC	Commercial	Deviation	Total	AAC	Commercial	Deviation	Total	Operational	Regulatory
HWD	Crown	2,328	0	2,328	2,328	216	0	216	216	5,638	
	Sub-Total	2,328	0	2,328	2,328	216	0	216	216	5,638	
District Total		381,812	72,126	309,686	381,812	89,028	0	89,028	89,028	10,135	0

There was approximately 82,216 m3 of softwood harvested commercially in District 17 in the last plan period which represents approximately 17.5 percent of the harvest. This total represents a ratio of 19% pulpwood, 25% sawlogs, 29% energy wood and 27% fuelwood.

2.1.2.2 Domestic

There were over 117,547 m3 of softwood harvested domestically in District 17 at a ratio of 6% sawlogs: 94% fuelwood It is expected that the domestic demand will remain constant at 1100 permits/year.

Table 4 Summary of domestic harvest in District 17 by Crown for 2013 to 2017.

District 17		Core				Operational (Available)				Non-AAC Wood	
		AAC	Domestic	Deviation	Total	AAC	Domestic	Deviation	Total	Operational	Regulatory
SWD	Crown	130,788	82,481	48,307	130,788	11,400	6,514	4,886	11,400	18,519	
	Sub-Total	130,788	82,481	48,307	130,788	11,400	6,514	4,886	11,400	18,519	
		Core				Operational (Available)				Non-AAC Wood	
		AAC	Domestic	Deviation	Total	AAC	Domestic	Deviation	Total	Operational	Regulatory
HWD	Crown	0				0				10,033	
	Sub-Total	0				0				10,033	
District Total		130,788	82,481	48,307	130,788	11,400	6,514	4,886	11,400	28,552	

2.1.3 Silviculture

Table 4 summarizes the completed silviculture treatments for the past planning period. There was no pre-commercial thinning completed in favor of a more aggressive planting program. The switch to gap or fill planting is becoming more popular because it increases stocking on the marginally stocked areas and increases the spruce content which is less susceptible to insect attack and moose browsing. The herbicide was done to remove competing vegetation from site in preparation for planting.

Table 5 Summary of silviculture treatments on Crown land in District 17 from 2013 to 2017.

Treatment Type	Area (ha)	
	Proposed	Treated
Pre Commercial Thinning	0	0
Site Preparation	0	206.90
Planting	0	726.33
Commercial Thinning	0	0
Plantation Maintenance	0	296.78

2.1.4 Road Construction

Table 6 Summary of access roads constructed on Crown Land in District 17 from 2013 to 2017.

Roads		
	Proposed (km)	Constructed (km)
New Construction Crown Built	0	6.3
New Construction Contractor Built	0	0
Re-Construction	0	0
Total	0	6.3
Bridges	0	2

2.1.5 Natural Disturbance

2.1.5.1 Fire

District 17 has had a very infrequent fire history due to its long winters and abundant precipitation. Over the past planning period there were only eight (8) reported forest fires. This resulted in only 6.36 ha of productive forest burnt which indicates a very aggressive and effective fire protection program.

2.1.5.2. Insect

There has been sporadic insect activity over the past five year period. While there has not been a major outbreak, small pockets of hemlock looper occur each year. In 2013, there was 2,661 hectors treated north of Daniels Harbour. There was a small pocket in the Squid Cove area in 2016. An aerial insecticide program is planned for 2017 in the Squid Cove area.

2.2 District 18

2.2.1 Overview

There has been significant activity by the Crown in District 18 from 2013 to 2017. There was nearly 251,736 m3 of timber harvested on Crown land during this period. A total of 1,384 ha was silviculturally treated, 13.5 km of forest access road was constructed or re-constructed, and 2 600 ha was treated for insects in the last planning period.

All areas harvested in the past planning period can be viewed in context with proposed activities on the operating area maps in Appendix 4.

2.2.2 Harvesting

Table 7 summarizes the commercial harvest in District 18 between 2013 and 2017. There was an under harvest of the AAC's on Crown in Core, Operationally constrained and Non-AAC areas. An explanation of Core, Operationally Constrained and Non-AAC landbases can be found in section 3.4.2. There was a significant undercut in the commercial AAC's. There is very little market small diameter wood (i.e. non sawlog fiber). There was a small volume of fiber that was sold to Corner Brook Pulp and Paper Ltd as pulpwood and hog fuel, but the majority of small diameter wood was sold locally as fuelwood. This market has seen a steady growth over the past five years.

2.2.2.1 Commercial

Commercial harvesting accounted for 137,482 m3 or 55 percent of the overall harvest in the district between 2013 and 2017. The product breakout for this harvest was approximately 26 percent pulpwood, 31 percent sawlogs, 31 percent energy wood and 16 percent fuelwood.

Table 7 Summary of Commercial harvest in District 18 by Crown for 2013 to 2017.

District 18		Core				Operational (Available)				Non-AAC Wood	
		AAC	Commercial	Deviation	Total	AAC	Commercial	Deviation	Total	Operational	Regulatory
SWD	Crown	310,530	112,110	198,420	310,530	40,255	0	40,255	40,255	18,622	
	Sub-Total	310,530	112,110	198,420	310,530	40,255	0	40,255	40,255	18,622	
		Core				Operational (Available)				Non-AAC Wood	
		AAC	Commercial	Deviation	Total	AAC	Commercial	Deviation	Total	Operational	Regulatory
HWD	Crown	490	0	0	0	90	0	0	90	6,750	
	Sub-Total	490	0	0	0	90	0	0	90	6,750	
District Total		311,020	112,110	198,420	310,530	40,345	0	40,255	40,345	25,372	0

2.2.2.2 Domestic

During the 2013-2017 planning period, domestic harvesting accounted for 114,254 m3 or 45 percent of the overall harvest in the district. The product breakout for this harvest was approximately 95 percent fuelwood and 5 percent sawlogs. Local residents still have a very strong attachment and sense of ownership of the forest in the district. There were between 1400-1600 domestic cutting permits issued annually. The number of permits issued at approximately 1500 has remained fairly constant over the past five years.

Table 8 Summary of domestic harvest in District 18 by Crown for 2013 to 2017.

District 18		Core				Operational (Available)				Non-AAC Wood	
		AAC	Domestic	Deviation	Total	AAC	Domestic	Deviation	Total	Operational	Regulatory
SWD	Crown	194,162	103,868	90,294	194,162	12,975	10,386	2,593	12,975	0	0
	Sub-Total	194,162	103,868	90,294	194,162	12,975	10,386	2,593	12,975	0	0
		Core				Operational (Available)				Non-AAC Wood	
		AAC	Domestic	Deviation	Total	AAC	Domestic	Deviation	Total	Operational	Regulatory
HWD	Crown	0	0	0	0	0	0	0	0	0	
	Sub-Total	0	0	0	0	0	0	0	0	0	
District Total		194,162	103,868	90,294	194,162	12,975	10,386	2,593	12,975	0	0

2.2.3 Silviculture

Table 9 summarizes completed silviculture treatments for the 2013-2017 planning period. There were a total of 1,384 hectares completed over this period. An extremely high moose population and their impact on advance balsam fir regeneration have resulted in a major shift in the silviculture program from thinning to planting. The planting program has almost doubled due to the change from full planting to gap planting. The prescription has changed from 2500 seedlings per hectare to 1500 seedlings per hectare. Therefore, almost double the area can be planted with the same number of seedlings.

Table 9 Summary of silviculture treatments on Crown land in District 18 from 2013 to 2017.

Treatment Type	Area (ha)	
	Proposed	Treated
Pre Commercial Thinning	0	0
Site Preparation	874.41	718.99
Planting	735.00	639.69
Commercial Thinning	0	0
Cone Collection	0	0

2.2.4 Road Construction

Table10 summarizes proposed and completed forest access road construction for the 2013-2017 planning period.

Table 10 Summary of access roads built on Crown Land in District 18 from 2013 to 2017.

Roads		
	Proposed (km)	Constructed (km)
New Construction Crown Built	32.49	13.5
New Construction Contractor Built	19.65	0
Re-Construction	99.10	0
Total	151.24	13.5
Bridges	7	1

2.2.5 Natural Disturbance

2.2.5.1 Fire

District 18 does not have an active fire history due to its long winters and abundant precipitation. In fact there were only four (4) fires recorded in the last planning period which burnt .17 ha of productive forest.

2.2.5.2. Insect

There has been sporadic insect activity in District 18 over the past five years. In 2014, a pocket of 2,506 hectares of moderate & severe defoliation was discovered in the Ten Mile Lake area. In 2015, 2,600 hectors were sprayed with BtK in the Ten Mile Lake area to control the hemlock looper. In 2016, a total of 3,897 hectors of moderate to severe defoliation was found in various forestation across the district. The majority of the defoliation was in the Straits and St Anthony domestic areas. There is no spray program planned in District 18 for 2017.

Section 3 Timber Supply Analysis

3.1 Introduction

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

3.2 Guiding Principles and Policy Direction

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

In concert with establishing sustainable timber harvest levels, legislation requires that 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 this analysis, public input was achieved through the district managers and, in some cases, planning teams. The forest industry was consulted directly throughout the process. As well, there was a 30 day consultation process whereby a draft of the gross AAC's and methodology was published on the government web site for public review and comment.

3.3 Factors Affecting Timber Supply

The forests of insular Newfoundland are very variable in terms of age distribution. Typically, there are significant amounts of mature/over-mature forest and regenerating forest, and limited intermediate aged forests. This imbalance is not unusual in a boreal forest where cyclic catastrophic disturbances are common.

The insufficient amount of intermediate age forest on the island is one of the most important factors influencing AAC's therefore it is the basis for many of our forest management strategies. Essentially a matrix of measures is employed which is designed to fill the gap in the age structure. These range from an aggressive forest protection program to keep the mature and over-mature stands alive as long as possible so that they can be harvested before they collapse naturally, harvesting programs that attempt to exclusively target the oldest stands first in order to minimize the harvesting pressure on the naturally weak intermediate age classes, and thinning of the regenerating forest so that it becomes operable at an earlier age.

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

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 eroded by other users. There is an approximate correlation between AAC and land base in that a one percent loss of land base represents a one percent

drop in AAC. It is important therefore that we minimize loss to the forest land base and continue to explore ways to grow more volume on the existing land base to mitigate this loss.

3.4 Timber Supply Analysis

In 2014, the Forest Service began another review of the provincial timber supply which was completed in December of 2015. Consistent with department's vision, the analysis was structured to determine sustainable timber supplies while respecting a multitude of social, economic and environmental objectives. Timber supply, in this context, refers to the rate at which timber is made available for harvesting on a sustainable basis.

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

3.4.1 Forest Characterization

To get a current description of the forest resource (or stock), the province has invested significant resources into creating and maintaining a Provincial Forest Inventory. An estimate of forest stock is kept current through an update program which is conducted each year to account for all natural and man-made disturbances such as fire, insects, and harvesting, and any enhancement programs such as tree planting and pre-commercial thinning. Also, each stand in the forest inventory is updated to reflect any yield changes that may have occurred since the previous inventory update.

3.4.2 Land Availability

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

3.4.2.1 Non-Timber Related

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

3.4.2.1.1 No-Cut Buffer Zones

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

3.4.2.1.2 American Marten and Caribou Habitat

Results from any ongoing studies and research are incorporated during the timber supply analysis where possible or are used to conduct sensitivity analysis.

3.4.2.1.3 Protected Areas

All established and proposed protected areas under the Natural Areas Systems Plan are removed from the AAC calculations.

3.4.2.1.4 Watersheds

For each forest management district several of the major watersheds were digitized and captured within the forest inventory. These watersheds were added to the database in order to address any concerns about forest management within these watersheds and to permit the Forest Service to report on proposed activities within the watershed over time.

3.4.2.2 Timber Related

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

3.4.2.2.1 Insect/Fire/Disease Losses

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

3.4.2.2.2 Logging Losses

Surveys of recent harvested areas are conducted each summer throughout the province to determine the quantity and quality of fiber remaining. The estimates 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 up front. Also, significant adjustments are applied to the provincial forest inventory for stands deemed operable in the timber analysis but left unharvested within operating areas. The reasons for this are linked to the character of Newfoundland's forests; low volume, steep slopes, rough terrain, and excessively wet ground conditions etc.

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

3.4.3 Growth Forecasting

A key requirement for forecasting future wood supply is an understanding of how forest stands grow and develop through time. That is, as a forest stand develops, how much merchantable (i.e. harvestable) volume does it carry at any given point? These yield forecasts (referred to as yield curves) are required for each type of forest stand (called a stratum) comprising the forest under consideration. In Newfoundland there are dozens of distinct forest strata for which separate yield curves are required. These are defined by the tree species in question (e.g., balsam fir, black spruce), the site quality (e.g., good, medium, poor), the geographic region (e.g., 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 certainty how stands will actually grow in the future, care must be taken to ensure that the yield projections used are realistic and reasonable. Respecting the sensitivity and importance of these forecasts, the Newfoundland Forest Service has directed a large portion of its resources and time into developing realistic yield curves. Two growth models were used, one for projecting stand development under natural conditions and the other for projecting growth under managed (i.e., silviculturally enhanced) conditions. Tree and stand development data generated from the Forest Service's forest inventory program were used to make stand growth predictions. These projections were then checked against empirical data from thousands of temporary plots established throughout the island. If the projections varied from the real life evidence, the curves were adjusted to make them more accurate.

In this analysis, yield curves were developed on an ecoregion basis. 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 was used in the analysis to maximize the sustainable harvest level. This strategy produced the maximum even flow harvest but resulted in less than optimum economic

use of the forest resource. If no even flow constraint is used and harvest levels are permitted to fluctuate in response to market value, the overall economic potential of the forest will increase. However, the lower economic potential is offset by stability in mills and employment.

3.4.4.2 Spatial Analysis

A major improvement in the wood supply analysis is the introduction of manual harvest scheduling. In 2001, the harvest scheduling was an automated process where the software picked the stands to be harvested over the 25 years based on user supplied criteria. While, the 2001 approach was an improvement over previous wood supply analysis where no harvest scheduling was done, the software used cannot realistically know all the operational restrictions within a forest management district. In the manual process, the on the ground conditions that restrict harvesting are accounted for when a spatial harvest schedule is defined. The proposed harvest schedule is then played back through the modeling software to see if it is sustainable and see if non-timber objectives are met. In most case, this harvest schedule has to go through several cycles before an acceptable harvest schedule could be found. 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 25 year 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 next 25 years must already be in the second (20-40 years old) or third (41-60) age class and can be easily identified and highlighted on the harvest schedule maps. Being able to see the wood that will be harvested in the future will help reassure

people that the resource is being used in a responsible manner. Next, harvest scheduling will help integrate the management of other forest resource values into timber management planning. All forest values can be tied directly to discreet forest areas, and these forest areas can be the link that allows the many different forest values to be managed simultaneously. The forested areas needed for each resource can be mapped and potential conflicts can be addressed before they become an issue. Finally, the harvest schedule maps developed for the wood supply analysis can be a starting point for the 5 year planning process, especially the first two periods. The harvest schedule maps, if done correctly, can help reduce the work of the 5 year planning process. One point to note is that harvest scheduling is only done for the class 1 land base. The class 3 AAC, for the most part, is opportunistic at best and is harvested only if extra effort is applied. It is not scheduled because of the uncertainty of obtaining extra funding for access and harvesting.

3.4.4.3 Planning Horizons

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

3.4.4.4 Operable Growing Stock Buffer

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

explicitly due to operational restrictions on harvesting. Third, the province is not willing to assume high risk with the sustainability of the timber supply. For these reasons a growing stock constraint of two times was used. This constraint was used in concert with harvest scheduling to help map out a reasonable harvest for the next 25 years.

3.4.4.5 Old Forest Targets

Consistent with the ecosystem policy, the province introduced into the analysis an old forest target that at least 15 percent of forests be older than 80 years. While this is a minimum target, actual results are usually higher. There is approximately one percent of the productive landbase disturbed by harvesting each year. This initiative was designed to provide a coarse filter approach to maintaining representative forest structure. It ensures the presence of certain amounts of old forest across the landscape into the future. With advances in modeling, this target can now be tracked across a district rather than a single ownership. This has resulted in this strategy being less restrictive than the last analysis. As well, the site class distribution of the older forest reserve is being examined in an attempt to make it representative of each ecoregion and subregion. This is in line with Value 1.1, Representative Landscapes, of the Ecosystem Diversity Element of Criterion 1, Biodiversity, in the *Provincial Sustainable Forest Management Strategy*.

3.4.4.6 Operability Limits

Operability limits are the time windows in which forest management actions such as harvesting can be undertaken within forest stands. Stand growth development as measured in stand merchantable timber volume and individual piece size of trees determine a stands readiness for harvest. In some young stands, one can have acceptable harvest volumes, but still have trees that are too small to harvest. In the 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 develops faster (10 percent); a small portion will lag behind (30 percent); with the bulk of the stand type (60 percent) representing the average condition. The ending operability limits or the last age in which a stand can be harvested before it becomes too old to harvest is solely determined on a minimum stand volume of between 60 to 80 m3/ha, after which that stand does not have enough volume to make it economical to harvest. It should be noted that while the operability limits define the extreme end points of when stands can be harvested, very few stands are ever harvested at these extreme points. In order to meet other non-timber objectives and in order to maximize the total volume of wood harvested the model schedules stands to harvest somewhere inside the operability limit window.

3.4.4.7 Silviculture

Silviculture is one of the main forest management tools available to forest managers when they are analyzing the many different future forests that are generated using the wood supply modelling software. The silvicultural actions use in the 2006 analysis include; 1) pre-commercial thinning of balsam fir, black spruce, and softwood hardwood stands, 2) full plant of any areas that do not regenerate naturally with either white spruce, black spruce, or Norway spruce, and 3) gap planting of either black spruce or balsam fir stands with either white spruce or black spruce. Gap plant is the filling of "holes" within stands that have inadequate natural regeneration of either balsam fir or black spruce. The thinning levels (ha) for districts 17 and 18 used in the analysis were 25 and 75 ha respectively. The planting levels (ha) for districts 17 and 18 used in the analysis were 400 and 525 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 a result of; fire, insects and disease, timber utilization practices and the presence of stand remnants. In previous analyses the lack of province wide digital stand information, the absence of computer tools and the small number of people involved with the wood supply analysis, resulted in a high degree of uncertainty around values derived for each depletion. It was recognized that a need existed to study each component more intensely and to expand the time frame and staff responsible for such an analysis. Such was the task of the Forest Engineering and Industry Services Division whose staff, over a seven year period, completed an analysis of the individual components.

3.5.1 Fire

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

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 DNR to determine the amount of productive area lost to insect mortality each year. These numbers were in turn reviewed by district managers and adjustments were made for local conditions.

3.5.3 Yield Comparison

Information for this adjustment was derived by comparing the anticipated volume from an operating area by using the yield curves and operability limits as specified in the timber supply analysis with the

actual volume that was attained after harvesting. The difference between the anticipated harvest volume and the actual harvest volume is the deduction applied for yield.

The total inventory adjustment for District 17 is 28 percent for commercial and 19 percent for domestic and for District 18 is 27 percent for commercial and 25 percent for domestic.

3.6 Results

3.6.1 District 17

Table 11 summarizes the result of the timber supply analysis for District 17. There has been an increase in all AAC categories because of the inclusion of the landbase purchased from CBPPL. It is difficult to make any other AAC comparisons because of the difference in size of the landbase between the 2006 and 2011 analyses.

Table 11 Annual Allowable Cut results (m3) for Crown Land District 17.

District 17	Core Softwood	Oper. Constr. Softwood	Class I Hardwood	Oper. Const. Hardwood	Residual Hardwood
District 17 Commercial	79,492	17,856	396	108	16,600
District 17 Domestic	25,344	0	0	0	3,400
Total	**104,836**	**17,856**	**396**	**108**	**20,000**

3.6.1.1 Sensitivity Analysis

In the 2015 timber supply analysis, a number of new management objectives like, reserve of operable growing stock, 81+ forest targets, and operability limits were introduced. Since these were new, a

significant effort was put into sensitivity analysis to determine the impact of these objectives. The more sensitive objectives were thoroughly evaluated and subcommittees were formed to gather more information to refine any assumptions used. These refined assumptions were used as a basis for this analysis therefore little sensitivity analysis is needed.

The thinning levels (ha) for districts 17 and 18 used in the analysis were 25 and 75 ha respectively. The planting levels (ha) for districts 17 and 18 used in the analysis were 400 and 525 ha respectively. While doing maximum silviculture would give an increase in AAC, operational and monetary constraints render this option unrealistic. Similarly, increased yield would give a higher AAC, but current yield curves have been constructed using the best available data so a further increase in unwarranted. Lowering the operability limits would also increase the AAC. This would represent a significant and unwarranted risk however, if stands situated at the lower end of operability are not operationally ready when queued for harvest.

The 81+ target was not constraining for this analysis. The 15 percent target was maintained or exceeded for the full analysis period. The harvest scheduling was the most constraining objective. This is due mainly to the natural fragmentation of our forest and to the limitations in baseline data when describing the forest. This limitation is due to the way we describe the forest into 20 year age classes and the way the model uses 5 year age classes. A major initiative is required for the 2015 analysis to describe the forest into 5 year age and condition classes particularly at the lower operability limits.

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

3.6.1.2 Forest Composition and Structure Change

A positive advancement with the use of computer models is the ability to track the forest through time. This ability allows the user to evaluate the effects of management activities on the structure of the forest at any point in the simulation period. For this analysis, age and species composition through working group was tracked at three time intervals 1 time 0 (current forest) 2 time 25 (after the 25 year harvest schedule) and 3 time 160 (at the end of the simulation period).

Figure 11 shows the change in total forest age on Crown land in District 17 by 20 year age classes for the simulation period. The age distribution in all classes is well distributed throughout the three comparison periods during the simulation. There are shifts in age classes from period to period as a result of natural progression as stands age, however, overall representation is balanced. The 81+ forest target ensures that the forest will be well represented in all age classes through time. Of particular note is the decrease in the area in the 81-100, 100-120, and 120-140 age classes and increase in the140+ age class at the end of the simulation period. This is a result of the alienation Class 3 stands on the east side of the Peninsula not being harvested and tracking along their yield curves. There is a special set of yield curves developed for this area which reflect the unique gap replacement forest as described in section 1.4.2.3.1. These curve “flat line” in volume after 140 years and continue on in perpetuity which simulates the forest of the area that never breaks up. Normally, after stands are harvested they are regenerated and revert back to the first age class.

There is insignificant change in the balsam fir and black spruce working groups as a result of forest management activities on Crown Land for the next 25 years. There is however a significant shift from balsam fir to the spruce (particularly white spruce) at the end of the simulation period. The major reason for this is that the planting program is geared toward spruce. This program will see a gradual stand conversion from fir which is highly susceptible to insect attack and particularly moose browsing to white spruce which is more resistant to these pests.

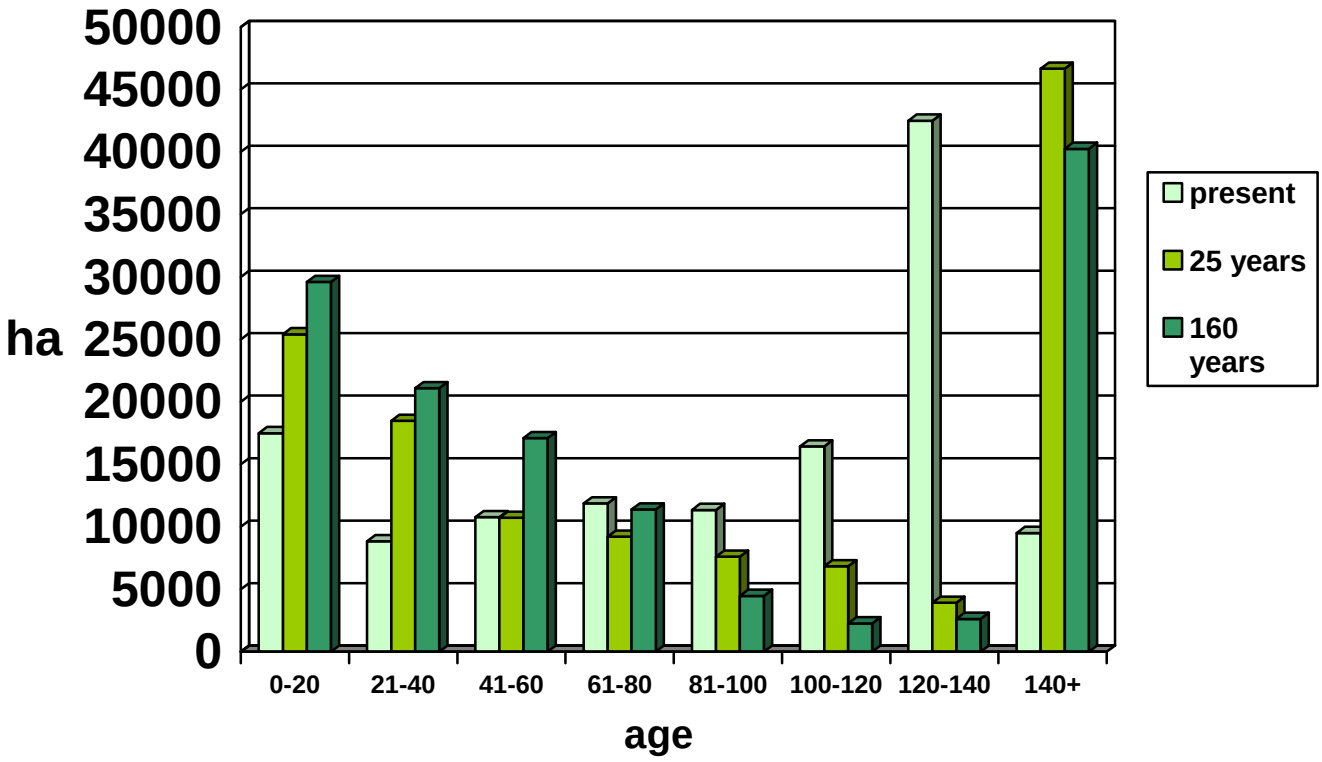

Figure 11 Change in age class structure in on Crown Land District 17 for the 160 year simulation period

3.6.2 District 18

Table 12 Annual Allowable Cut results (m3) for Crown Land District 18.

District 18	Class I Softwood	Class III Softwood	Residual Hardwood
Central Zone Commercial	73,365	13,213	10,300
Central Zone Domestic	7,081	0	800
Straits Zone	9,417	0	1,200
St. Anthony Zone	14,763	0	2,000
Total	**104,626**	**13,213**	**14,300**

3.6.2.1 Sensitivity Analysis

The sensitivity analysis for District 17 is the same at that listed in section 3.6.1.1 for District 18 with the same results. The silvicultural inputs are 250 ha for planting and 50 ha for thinning.

3.6.2.2 Forest Composition and Structure Change

Figure 12 shows the change in total forest age on Crown land in District 18 by 20 year age classes for the simulation period.

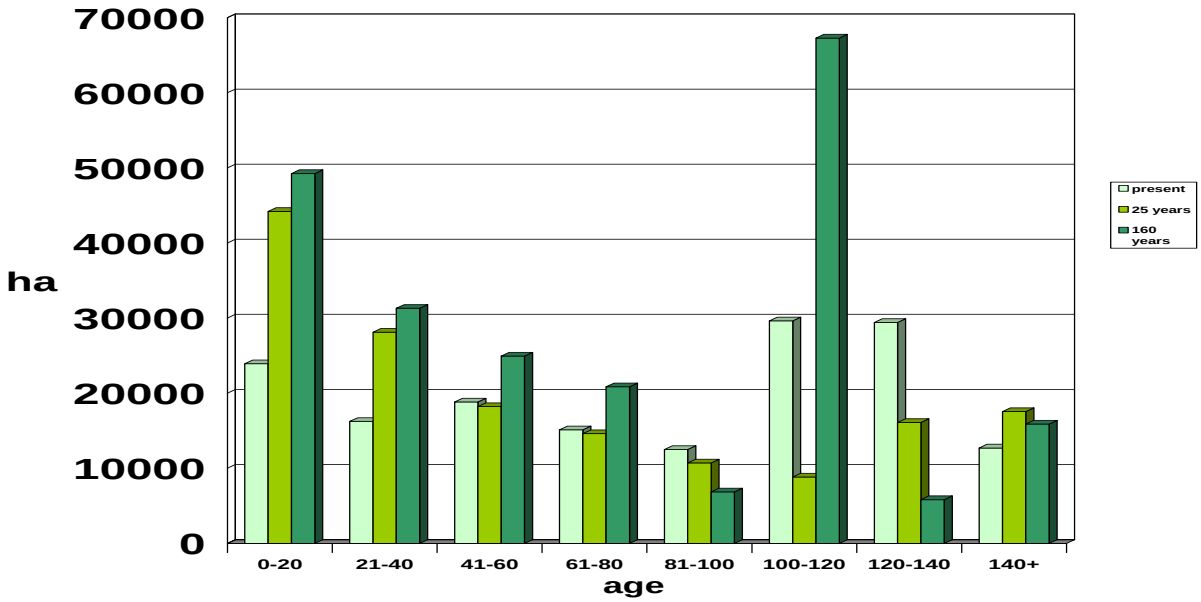

Figure 12 Change in age class structure on Crown Land in District 18 for the 160 year simulation period.

The age distribution in all classes is well distributed throughout the three comparison periods during the simulation. There are shifts in age classes from period to period as a result of natural progression as stands age, however, overall representation is balanced. The 81+ forest target ensures that the forest will be well represented in all age classes through time.

As with Crown Land in District 17, there is very little change in area of all working groups over the first 25 years of the simulation period. There is a slight decrease in the balsam fir working group and a subsequent increase in the DI working group. This is mainly due to a build up of NSR areas on the poorer sites in the Straits and St. Anthony Zones. There is however a significant shift from balsam fir to the spruce (particularly white spruce) at the end of the simulation period. The major reason for this is that the planting program is geared toward spruce. This program will see a gradual stand conversion from fir which is highly susceptible to insect attack and particularly moose browsing to white spruce which more resistant to these pests.

Section 4 Values

4.1 Guiding Principles of Sustainability

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

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

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

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

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

Cultural sustainability is attained by applying Newfoundland's culture to the planning process. A forest management strategy cannot be successful without allowances within the strategy for traditional access and use of the land. For generations, many of Newfoundland's public has had free range in our pristine wilderness, a fact that cannot be ignored when planning for the zone.

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

4.2 Value Description

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

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

Characterization

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

Critical Elements

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

Guiding Principles

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

1. policies that should be in place to protect or enhance the resource value;

2. methods for negotiation or inclusion of other stakeholders in resolving potential conflicts;

3. special management provisions/strategies - such as buffer zone consideration, temporal operating periods, modified harvesting, or a best management policy; and/or

4. models and/or forecasting strategies to determine economic contribution, biodiversity impact, or community sustainability

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

In many instances, the EPG's **(**Appendix 1**)** form the guiding principles for a value. Quite often the spatial extent or location of all values is not known (eg., raptor nests). Specific guidelines are still listed in order to provide a direction or course of action when and if these values are encountered.

4.2.1 Biotic Values

4.2.1.1 Big Game

4.2.1.1.1 Moose

Characterization:

Moose are not native to the island. A pair was introduced to Gander Bay in 1878 and two pairs were introduced to Howley in 1904 (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 50 management areas and license quotas are set annually for each area. Quotas are set based upon the management objective for each area (i.e., whether it is desired that the population increase, decrease or stabilize). Generally, if an area has too high of a moose population, managers will increase quotas to bring down the population in order to prevent damage to the habitat. However, if the habitat is in good condition, and the area could support more animals, future quotas may be increased. All or portions of moose management areas 1, 2, 3, 3a, 39, 39a, 40 and 45 are located within the zone.

Critical Elements:

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

4.2.1.1.2 Caribou

Characterization:

Caribou is the only native ungulate species on the island (Northcott, 1980). Prior to the railway being built in 1898 the population was approximately 100 000 animals but by 1930 the population had declined to about 10,000 animals. Between 1980 and 2000 the number of caribou has increased

considerably on the island with a population estimated at 90,000 – 100 000 animals. In the past few years however populations have declined significantly in many areas of the island. All or portions of caribou management areas 69 and 76 are located in the zone.

Critical Elements:

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

4.2.1.1.3 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 (due to difficulty in conducting a census) but is crudely estimated to about 6 - 10,000 animals (Christine Doucette, Pers. Comm.). Portions of black bear management areas 1, 2, 3, 3a, 39, 39a, 40 and 45 are located within the zone.

Critical Elements:

- den sites for winter hibernation;
- forest cover

Guiding Principles:

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

Management of big game species in the Province is accomplished by a planning process in which a Big Game Management Plan is prepared annually by the Inland Fish and Wildlife Division (IFWD) of the Department of Tourism Culture and Recreation. This process takes into consideration information provided by the public and wildlife and forestry staff. Each year the IFWD reviews all relevant data,

such as recent census work, information provided on license returns, and jawbone or skull data and makes decisions on types and numbers of licenses of each species in each management area. Management of big game in the zone will continue to be addressed through this process.

Environmental Protection Guidelines

Moose

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

Caribou

Because the caribou population has experienced a decline in the past, the WD in conjunction with forestry division and industry has identified important caribou habitat areas which were incorporated into a document produced by WD entitled *Forest Management Guidelines for Woodland Caribou for the Island of Newfoundland 2007.* Since that time new information has been collected from radio collared animals which suggest that usage of the habitat and dispersion across the landscape is different from the original thinking. This data will be used to develop a new set of caribou guidelines. The forest service, in conjunction with wildlife division, is currently conducting an adaptive management experiment using operating areas from Zone 5 (Districts 10, 11, 12, and 13). Once completed, results will be incorporated into a new set of caribou guidelines for forest management.

Bear

A 50-metre, no-cut, treed buffer must be maintained around known bear den sites (winter) or those encountered during harvesting. Den sites must be reported to the Wildlife Division.

4.2.1.2 Furbearers

Characterization:

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

Critical Elements:

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

Guiding Principles:

Fur Bearer Management Strategy:

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

Environmental Protection Guidelines:

To protect beaver habitat, all hardwoods within 30 meters of a waterbody occupied by beaver are to be left standing during harvesting operations.

4.2.1.3 Species of Interest

4.2.1.3.1 Harlequin Duck

Characterization:

The eastern North American population of harlequin duck was listed as endangered in Canada in 1990; however in May of 2001 the status was changed to special concern. In Newfoundland these birds breed along clear, turbulent rivers, in Labrador and on the Northern Peninsula. These birds winter along the east coast at Cape St. Mary's. In District 17, harlequins are present in Doctors Brook and the head waters of the Torrent River.

Critical Elements:

- Buffered rivers near or around waterfowl breeding, molting and staging areas.

Guiding Principles:

CWS recommend that a 100 meter buffer zone be left on any river where harlequins are found. On all other stretches of these rivers, a treed buffer of at least 30 meters should be maintained for other waterfowl species utilizing the area. This is in agreement with the Department's Environmental Protection Guidelines which state that a minimum 30 meter, no-cut, treed buffer will be maintained from the high watermark in waterfowl breeding, molting and staging areas.

4.2.1.3.2 Rare Plants

Characterization:

"For those interested in rare and unusual plants, the island of Newfoundland has been called the best kept secret in North America (Hermanutz, 2000). The island's west coast is especially diverse, with more than 200 plant species assigned as provincially rare (Hermanutz, 2000). The western side of the Great Northern Peninsula with its cool moist climate, strong prevailing winds and shallow limestone soils rich in calcium support a vast array of rear vascular plants from northern arctic alpine plants to

the more southerly Appalachian species. Two of the most notorious are Long's braya (Braya longii) and Fernald's braya (Braya fernaldii). Braya species are small plants (about 8 cm in height) which bloom in white flowers and are a member of the mustard family. They are restricted to the Straits of Belle Isle Ecoregion, which is characterized by tundra like vegetation, extremely cold winters, extreme exposure and shallow calcareous soils.

Longs braya inhabits limestone barrens and may be found in turfy areas of loose limestone gravel. It has been listed by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) as endangered in this province. Currently, there are only four known populations located at Yankee Point, Shoal Cove East and Sandy Cove. The Sandy Cove Site has two populations which have been separated due to disturbance.

Fernald's braya inhabits limestone barrens and may be found in turfy areas of loose limestone gravel. It has been listed by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) as threatened in this province. Currently, there are nine known locations from Point Riche to Burnt Cape.

Critical Elements:

- Quarrying and road construction
- All-terrain vehicle traffic also poses a potential threat in some areas.

Guiding Principles:

- To ensure that rare and endangered plant species present in the district due not become extinct because of forest management operations.
- To protect rare plant habitat
- To educate field staff on the locations and importance of rare plants
- Encourage domestic harvesting in the winter
- Work with the IFWD to develop mitigative measures in areas where rare plants occur.

4.2.1.3.3 Other Species

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

4.2.1.4 Water Resources

Characterization:

The protection of water resources has emerged as a major issue in recent years both nationally and provincially. Events such as the E.coli 0157 outbreak in Walkerton, Ontario, our own 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 toward drinking water, it is also recognized that an equal importance must be attached to waters which have other beneficial uses. Human impacts both locally and globally have the potential to impair water for future uses.

In Planning Zone 8, water is used beneficially for numerous purposes. Most communities within the zone have water supplies. Twenty one of these supplies are protected under the province's Protected Water Supply Program. Recreational waters within this zone are used for activities such as fishing, boating and as a water supply source for numerous cabin owners.

Human activity on the land has the potential to alter water quality and water quantity. Commercial forest harvesting is the predominant activity and occurs throughout the zone. Hydroelectric development has resulted in several river diversions. There is a vast array of roads associated with the harvesting and traditional access routes as well as newly constructed roads which dissect the unit. Mining operations within the zone are limited to mostly 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, use and maintenance, timber harvesting, and silviculture may substantially alter the quality of water draining from watersheds as well as other defining characteristics such as stream hydrology, sediment loadings, stream characteristics, and aquatic discharges from municipalities. Careless storage and handling of
fuels by industrial and recreational users, stream diversions and agricultural operations are other examples.

Guiding Principles:

There are numerous protective measures listed in the Environmental Protection Guidelines under the broad categories of road construction, stream crossings, road abandonment, fuel oil handling and storage, support services and structures, harvesting, silviculture, and protected water supply areas. The EPG's are listed in their entirety in Appendix 1 and specific guidelines under the above sections can be found there.

4.2.2 Human Values

4.2.2.1 Timber Resource

Characterization:

One of the major resource values of the forest ecosystem is the harvesting of timber to provide forest products. Historically timber has been harvested since the first inhabitants settled in the zone. Initial uses were mainly domestic in nature to supply timber to build houses, fishing sheds and equipment and for heating and cooking. With the increase in population, more commercial uses have arisen to supply

lumber and pulp and paper products. The zone supports an annual allowable cut (AAC) of both softwood and hardwood on Crown land of 113,948 m3 in District 17 and 96,878 m3 in District 18.

An allocation of approximately 75 percent of the annual allowable cut is available to commercial logging contractors on Crown land in the zone. Commercial harvesting and sawmilling activity provides many jobs in harvesting, trucking, sawmilling, pellet production, pulp and paper manufacturing and related spin off industries for local residents. There is a potential of 120 direct jobs in the industry with an estimate of nearly twice that many in spin off industries.

Domestic harvesting still provides fuelwood to heat many homes and sawlog material for residential house construction in the zone. In fact, the easy access to domestic sawlogs and lumber is one of the reasons why this Province has the highest rate of home ownership in the country. There are between 2500-2700 domestic cutting permits issued annually and this will account for approximately 25 percent of the harvest on crown land.

Silviculture treatments are important to the forest resource of the zone because they ensure a vigorous and healthy forest is maintained. Forest renewal activities are critical because they ensure that the productive land base is maintained by planting areas that are not sufficiently restocked. Forest improvement activities help improve and enhance the growing stock which can reduce harvest cost, enhance forest product options and increase sustainable timber supply. There is approximately $400,000 spent on silviculture in the zone each year creating more than 20 seasonal jobs.

Timely access to timber is critical to planning any forestry operations. Primary, secondary and tertiary roads form an integral part of operating areas and are used after timber extraction is completed for recreational purposes. In excess of $150,000 is spent by the Crown to construct forest access roads each year in the zone.

Protection of the forest from various disturbances is also a major characteristic of resource management. Because of the long insect history in the zone, protection through integrated pest

management techniques is an important activity. While fire has not been a major disturbance, protection is still critical since a large fire can potentially be devastating. Protection of other resource values through modification of activities and enforcement is also important.

Critical Elements:

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

- maintenance or enhancement of productive land base
- planting of non-regenerating areas
- minimizing loss of land base to other users
- minimize losses to fire, insect and disease
- timely access road construction
- enhancement of younger age classes through thinning to correct age class imbalance
- maintain both a sawlog and pulpwood industry in the zone through timber exchanges

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 *Environmental Protection Guidelines for Ecologically Based Forest Resource Management* outline courses of action and mitigative measures for forest activities. These EPG's are outlined in their entirety in Appendix 1 with some highlighted subject areas listed below.
    - garbage disposal
    - fuel storage
    - mineral soil exposure
    - buffer requirements
    - road and bridge construction
    - silviculture and harvesting activities

4.2.2.2 Agriculture

Characterization:

There is only one major commercial agriculture facility located in Daniels Harbour. There are also a number of commercial sheep farmers scattered throughout the zone with an average flock size of less than 40 ewes. In addition, there is hundreds of subsistence farming plots 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 and raspberry) plays a significant role in the economic picture for the zone. While there is no actual record of production, thousands of kilograms of berries are harvested annually. These berries are locally and too travelling tourists. There is at least one jam producer in District 18 who purchases berries and produces jams on a commercial basis.

Critical Elements:

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

Guiding Principles:

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

The agriculture leasing policy initiated in 1976 ensures that new or existing land allocated for agriculture continues to be used for agriculture. The leases have no provision for fee simple grants and must be used exclusively for agriculture purposes

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 should include a business plan approved by the Agrifoods Division of the Dept. of Natural Resources.
- Wood harvested on agriculture leases shall be completed under a crown cutting permit.
- Where possible, existing commercial forest operators should be encouraged to work with farmers to clear new land for development.

4.2.2.3 Mining

Characterization:

There has is very little mining activity in Zone. Aurion Minerals started two small open-pit marble mines near Croque and Coles Pond in the late 1980's. In 1995, they sold their claims to Industrial Fillers a subsidiary company of Pluess-Stauefer, which is the second largest marble mining company in the world. There was also open pit zinc mine which operated near Daniels Harbour in the 1980's but it has since closed. There are a number of active aggregate and quarry

leases located throughout the zone. These are usually for very small areas which can be rehabilitated; thereby, minimizing their impact upon the forest ecosystem.

Critical Elements:

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

Guiding Principles:

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

4.2.2.4 Historic Resources

Characterization:

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

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

Archaeological surveys have been carried out in several areas within the zone over the past 20 years. Many areas still remain to be surveyed so there is potential for other historic resources to be found in the zone. Archaeology is very important for our tourist industry. Archaeological excavations and interpretive sites draw thousands of visitors each year to this province. The preservation and interpretation of archaeological sites will continue to benefit the tourism industry in this province for years to come. Thousands of tourists from all over the world visit our archaeological sites each year and the numbers continue to increase, i.e. Gros Morne Park and Lance Au Meadows World National Historic Park have more than 100 000 visitors per year.

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

Sites at Port au Choix and Lance au Meadows have been and continue to be important archaeological sites in the zone.

Guiding Principles:

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

In order that known archaeological sites and potential unknown sites are protected from forestry activities buffer zones will be necessary in some areas whereas archaeological assessments may be required in others. Known archaeological sites must be avoided and buffers will be required around them. Buffers will also be required along all rivers and ponds, as well as long 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 at 729-2462.

4.2.2.5 The Greater Gros Morne Ecosystem

Characterization:

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

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

Biodiversity goes beyond the range of wildlife and plant species to include the range of habitats and landscapes. Loss of special habitats such as the old-growth forest and associated species may impair the ecological integrity of GMNP in ways that are not currently understood.

> While ecological integrity has prominence regarding the management of national parks, legislation and policy dictate broader responsibilities for national parks. These include providing opportunities for Canadians and others to have high-quality experiences in a natural setting. Currently, 61 percent of GMNP is classified as Zone II - Wilderness. The northern portion of this zone borders on District 17 however minimal forestry activity takes place here. The Long Range Traverse, a 3-4 day hike within GMNP, currently has a reputation as a high-quality wilderness experience due to its remoteness and difficult access. Increased access, as a result of forestry operations can threaten this wilderness quality. The presence of the endangered Newfoundland pine marten has been noted in the northern and southern areas of the park. Those sighted in the south are not closely connected with a core population and are likely "dispersers" from either the Little Grand Lake/Red Indian Lake or Main River populations. Habitat connectivity with these other core populations may be critical to long term survival of marten in GMNP.

Critical Elements:

- to maintain ecological integrity:

- to maintain native biodiversity and natural processes.
- to maintain viable wildlife populations

Guiding Principles:

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

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

4.2.2.6 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 that contribute 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, and public or crown reserves may be established for conservation reasons under the *Lands Act*. Finally, 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, provide opportunities for environmental education, provide standards against which the effects of development can be measured, and provide natural venues for recreation, enjoyment of nature and ecotourism.

Protected areas in the zone include: Gros Morne National Park and L'anse aux Meadows National Historic Site; Port au Choix and Big Droke Historic Sites; Watts Point and Table Point Ecological Reserves; and Underground Hole and Browsey Hole. There are also some areas being

considered through the Natural Areas System Planning process as study areas for future protected areas. At the time of the forest management planning process for Zone 8, these areas have not yet been finalized or released for public review.

Critical Elements:

- preservation of biodiversity
- maintenance of protected area integrity
- maintain natural processes and features
- act as control areas against which an assessment of forest management activities elsewhere on the landscape may be made

Guiding Principles:

- The type of activities encouraged or permitted within the different protected areas in the province depends entirely on the type of protected area and the reasons for its establishment
- Generally all non-consumptive activities are permitted; educational activities and scientific research within protected areas generally require a permit but are encouraged
- in most protected areas, new development is prohibited, such as mining activity, hydroelectric projects, forestry activity, agriculture activity, roads and trails and cabins and new structures; legislation for Wildlife and Crown Reserves is generally more flexible than the other Acts.
- a 500 m no roads buffer is to be maintained around all existing and proposed protected areas to reduce access and resulting damage from motorized vehicles
- where forestry operations are within one kilometer of provisional and ecological reserves, wilderness reserves or provincial parks, modified operations may be necessary and any amendments to the forest plan within that buffer should be brought to the attention of the managing agency

4.2.2.7 Outfitting

Characterization:

The outfitting industry has been an integral component of the tourism industry on the Northern Peninsula since the early 1900's. This region has always been a popular hunting and fishing destination because of the pristine environment and abundance of fish and wildlife species. There are 21 hunting and sport fishing businesses with 40 base lodges and out camps in the zone. These businesses bring in 600 clients annually, 95 percent of which are non-residents. There is $4.4 million generated annually from hunting and $0.5 million from fishing which create 160 part time rural jobs. There figures were presented to the planning team by Todd Wight of the Newfoundland and Labrador Outfitters Association (2007 planning team). It should be recognized that the outfitting industry provides this revenue to the Province each season and has the potential to do so indefinitely.

Over the past 10 years, a significant number of traditional hunting and fishing facilities have diversified into the non-consumptive areas of the tourism industry. Such activities include but are not limited to: snowmobiling, dog sledding, kayaking, canoeing, nature viewing, hiking, and wildlife photography. The ability to diversify has positively impacting the viability of outfitting operations and as such, increasing numbers of operators are considering these opportunities. Diversification can lengthen seasons of operation, increase and lengthen employment, and reduce dependency on a single sector of the tourism industry. Pristine wilderness settings are necessary for many of these types of diversification.

Critical Elements:

Remote outfitting camps are dependent on their remoteness. Forest access roads inevitably impact the ability of a camp to maintain its remote status. Increasing accessibility through increased access roads can also lead to increased hunting and fishing pressures in a given area. This can in turn lead to decreased success rates of tourists. This is of particular concern since Newfoundland is often the hunting destination of choice due to success rates upwards of 80

percent. An increase in access roads also tends to lead to increased cottage development that in turn can have an impact on both remoteness and game availability.

Removal of large areas of forest has the immediate effect of destroying big game habitat, particularly winter cover, although this impact has been poorly studied (particularly in remote areas). Forest harvesting also has the ability to impact negatively upon travel corridors, bear denning areas, and caribou feeding and calving areas.

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

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

Guiding Principles:

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

- Consideration should be given to decommissioning roads and bridges (where possible) after harvesting is completed. This will eliminate damage to the hunting area by reducing the possibilities of increased hunting pressure. When roads are in use actively for harvesting purposes, access to hunters should be restricted or limited.
- Harvest in the winter whenever possible. Winter roads are less passable in summer and fall and will help to reduce traffic. These roads will also be cheaper and easier to decommission.
- construct new roads as far away from existing outfitting camps as possible. The benefits of this are obvious. Harvesting should be restricted around hunting and fishing camps during their season of operation. At these times, harvesting should occur as far away as possible from outfitters.
- Forest operations should be carried out in compliance with existing regulations
- Efforts should be made to ensure that the integrity of the view from outfitter cabins is maintained when conducting forest operations.
- Forest operations should ensure that whatever is brought into an area is removed from the area once harvesting is complete.

4.2.2.8 Recreation

Characterization:

The Great Northern Peninsula has outstanding scenery, interesting topography, and opportunities for viewing wildlife and flora in a natural setting. These elements represent a small list of reasons why the zone is used extensively for recreational purposes. Hiking, skiing, canoeing and snowmobiling are major recreational activities in the area. Of particular importance is the Appalachian Trail which traverses the Northern Peninsula. Non-timber recreational values are expected to play an increasing role in forest management practices.

Canoeing and kayaking around the coastline and on the many rivers, the hiking trails, numerous ski and snowmobile trails, and excellent hunting, fishing and adventure tourism areas highlight some of the recreational opportunities in the zone.

Critical Elements:

Wilderness

Backcountry recreational activities are dependent on the existence of natural pristine wilderness areas. The temporary removal or alteration of this pristine wilderness through forest harvesting practices will result in a decrease in these recreational activities for some period of time.

***A**ccessibility*

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

Viewscapes

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

Guiding Principles:

To prevent negative ecological effects and to ensure a positive experience, access and levels of recreational activities can be monitored. Public surveys can be used to measure the experiences and the levels of recreation occurring in the zone.

Wilderness

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

Limiting Accessibility

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

V*iewscape*

In areas where high concentrations of recreational activities occur, aesthetic views should be maintained using landscape design techniques where possible, when conducting forest operations. This is especially relevant in areas where the recreational activities are occurring because of the aesthetic view. Reforestation of areas with high aesthetic values should occur without delay in returning the site to a forested condition.

4.2.2.9 Tourism

Characterization:

The tourism industry in Newfoundland and Labrador is based on our natural and cultural resources. Protection of these resources is critical for our industry to survive and grow**.** We currently have the resources to compete internationally with tourist destinations; however, competition for the international traveler is high in the tourism marketplace. The tourism industry in Newfoundland and Labrador has experienced significant growth since 1997. Tourism has been contributing between $580 million and $700 million annually to the provincial economy. Government tax revenue from tourism in 1998 was estimated to be $105 million. The worldwide growth of tourism at rate of 41 percent, the national growth of 25 percent and the provincially growth of 33 percent indicates tourism is Newfoundland and Labrador's best opportunity for economic diversification and growth.

There are many excellent tourist destinations in the zone. Gros Morne and L'anse aux Meadows, National Parks, Port au Choix and Big Droke Historic Site, iceberg and whale watching in St

Anthony, and hiking the Appalachian Trail are examples of the more prominent tourist attractions and activities.

Critical Elements:

- viewscape
- accessibility
- wilderness ambiance
- remoteness

Guiding Principles:

Work with GMNP and tourism operators to implement strategies to minimize the visual impact of harvesting operations on the aesthetic values associated with viewscapes. By bringing together GMNP, CBPPL, NFS, and the tourism operators, strategies will be discussed, negotiated, and implemented to provide a balance between harvesting and the values associated with tourism. If required, the Forest Service, CBPPL, local Town Councils, Parks Division and other relevant groups will get together to examine the viewscape issues where applicable in the zone. As well, the connectivity committee will examine issues in relation to GMNP.

Section 5 Mitigations

Site specific mitigations arising from concerns identified during the planning process and from other regulatory agencies are identified on the summary sheets accompanying each operating area in Appendix 3. As well, guiding principles which outline procedures to follow should an unforeseen conflict arise have been identified for each value in Section 4. Highlights of the mitigative measures that arose as a result of planning team and local concerns are listed below. More specific details by individual operating area can be found on the map cover sheets.

5.1 District 17

Table 13 Mitigations FMD 17

Stakeholder	Contact method	Issue/Concern	Forestry and Wildlife Division Response/Mitigation/Resolution
NLSF Snowmobile Trail	Correspondence Previous Five-Year planning Process	Buffers left on approved snowmobile trails. Seasonal restrictions on forest access roads used as part of the NLSF trail network.	In Domestic Cutting areas ther will be a 30 meter no cut buffer left on approved trails. In commercial Harvest blocks, where old large timber is expected to blow down 2 meter trail markers will be left to identify the trail. Areas harvested will be planted immediately. The Forestry and Wildlife Division will work with the NLSF to minimize winter use of forest access roads that are part of the NLF trail network.
Day Use Park Three Mile Lake Melvin Coombs	Correspondence Previous Five-Year planning Process	Buffers and viewscape from park.	A privately owned Day Use and Recreational Park at Three Mile Lake share the same boundary with Operating Areas CC17501, Ten Mile Lake, and CC17503 Castor River. The Forestry and Wildlife Division will work with the Park Owner and develop mitigative measures to address any issues that may arise.
Private Camp Ground River of Ponds	Correspondence Previous Five-Year	Viewscape	The Owner of a privately owned camp Ground in the Community of River of Ponds wants to ensure that the harvesting of Domestic wood

	planning Process		does not impact the viewscape from the camp ground.
Crown Lands Division	Correspondence Previous Five-Year planning Process	Buffers on Cabin lots and harvesting around cottage development areas.	20 meter buffer on all PTO cabin lots. The Forestry and Wildlife Division will work with the Crown Lands Division and develop mitigative measures to address any issues that may arise near cottage development areas.
Outfitters and Spawn	Correspondence Previous Five-Year planning Process	Salmon River buffer widths	A 50 or 100 m buffer will be established around all salmon rivers depending upon density of forest cover and intensity of recreational use.
Water Resources Division	Correspondence Previous Five-Year planning Process	Permits required	The Forestry and Wildlife Division will get permits for operating inside of protected water supply areas.
Gros Morne National Park	Correspondence Previous Five-Year planning Process	Domestic cutting areas that border the park boundary.	The Forestry and Wildlife Division will work with Gros Morne National Park and develop mitigative measures to address any issues that may arise.
Municipalities	Correspondence Previous Five-Year planning Process	Domestic cutting blocks within and adjacent to municipal and planning boundaries.	The Forestry and Wildlife Division will work with individual town councils and develop mitigative measures to address any issues that may arise
Parks and Natural Areas Division	Correspondence Previous Five-Year planning Process	Parks and Protected Areas Road building and domestic harvesting within proposed protected areas	The Forestry and Wildlife Division will not construct any roads within 500 meters of park boundary. Domestic harvesting inside of proposed protected areas will only occur where it was a traditional activity.
Parks and Natural Areas Division	Correspondence Previous Five-Year planning Process	Rare Plants storage of Domestic fuelwood	The storage of domestic fuelwood on Rare plant sites is a continuous issue. The Forestry and Wildlife Division will work with Parks and Natural Area Division to develop mitigative measures to address issues as they arise.
Local Domestic wood cutters and Forestry and Wildlife Division district	Correspondence Previous and current Five-Year planning	Deadwood and blown down outside of approved domestic cutting blocks	The following condition has been added to domestic cutting permits in FMD 17 and18. “Green Timber and Birch can only be harvested

Staff	Process		in approved cutting blocks. Cutting of Deadwood and blow down is permitted within 100 meters of a public highway and also permitted outside of domestic cutting blocks, but **NOT** within areas designated for **NO** cutting such as Municipal boundaries, Protected Water Supply Areas, Ecological Reserves and Proposed Protected Areas".
Rod Biggin	Open House meeting Hawkes Bay June 6	Maintenance of Forest Access roads and Buffers around cabins	Commercial Logging Contractors operating in the Angle Pond Block CC17034 must ensure that the existing road is graded and maintained. Maintain at least a 20 meter buffer around approved cabins.
Con Hoddinott Samuel Sheppard	Open House meeting Hawkes Bay June 6	Extension on Camp 10 Domestic Cutting Block	Adjustment was made to this operating boundary.
Con Hoddinott, Walter Sheppard, Donald Rankin, Sam Hoddinott, John White, Lloyd Bennett, Keith Billard, Bruce way	Open House meetings Hawkes Bay June 6 and Plum Point June 7	Public presentation before any land agreement is signed with Active Energy	This issue was brought forward to Director of Regional Services.
Wildlife	ADM Review	Caribou Areas	Removed areas in conflict with core caribou areas. Forestry will adhere to seasonal conditions on secondary caribou areas.

5.2 District 18

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

Table 14 Mitigations FMD 18

Stakeholder	Contact method	Issue/Concern	Forestry and Wildlife Division Response/Mitigation/Resolution
NLSF Snowmobile Trail	Correspondence Previous Five-Year planning Process	Buffers left on approved snowmobile trails. Seasonal restrictions on forest access roads used as part of the NLSF trail network.	In Domestic Cutting areas ther will be a 30 meter no cut buffer left on approved trails. In commercial Harvest blocks, where old large timber is expected to blow down 2 meter trail markers will be left to identify the trail. Areas harvested will be planted immediately. The Forestry and Wildlife Division will work with the NLSF to minimize winter use of forest access roads that are part of the NLF trail network.
Barb Genge Tuckamore Lodge	Correspondence Previous Five-Year planning Process	Viewscapes from Lodge	A major tourism resort development is under construction at Burnt Head near operating area CC18524 Burnt Village domestic. The Forestry and Wildlife Division will work with Council and the resort developer to maintain the aesthetics of the area.
Barb Genge	Correspondence Previous Five-Year planning Process	Water Quality	There is a proposed water bottling plant adjacent to this CC18056 Wilbert's Road. The NFS has agreed to a 300 meter buffer and will only conduct winter harvesting within 500 meters of the intake.
Triple Falls RV Park	Correspondence Previous Five-Year planning Process	Viewscape	The Owner of a privately owned camp Ground near the Community of St Anthony wants to ensure that the harvesting of Domestic wood does not impact the viewscape from the camp grounds.
Town Council Main Brook	Correspondence Previous Five-Year planning Process	Viewscape	Operating area CC18523 Main Brook also borders the boundary of Georges Park. This is a private park managed by the Town of Main Brook. This Forestry and Wildlife Division will work with the owner to develop mitigative measures to address whatever issues that may arise.
Crown Lands Division	Correspondence Previous Five-Year	Buffers on Cabin lots and harvesting around cottage	20 meter buffer on all PTO cabin lots. The Forestry and Wildlife Division will work with the

	planning Process	development areas.	Crown Lands Division and develop mitigative measures to address any issues that may arise near cottage development areas.
Outfitters and Spawn	Correspondence Previous Five-Year planning Process	Salmon River buffer widths	A 50 or 100 m buffer will be established around all salmon rivers depending upon density of forest cover and intensity of recreational use.
Water Resources Division	Correspondence Previous Five-Year planning Process	Permits required	The Forestry and Wildlife Division will get permits for operating inside of protected water supply areas.
Parks Canada	Correspondence Previous Five-Year planning Process	Domestic cutting areas on Route to L'anse aux Meadows National Historic Site.	Route 436 is the highway used to access the L'Anse Aux Meadows National Historic Park. Operating area CC18504, Griquet Road borders on the park boundary. Aesthetics and maintaining the integrity of this area is extremely important. The Forestry and Wildlife Division will work with the town councils and the park to develop mitigative measures to address any issues that may arise.
Municipalities	Correspondence Previous Five-Year planning Process	Domestic cutting blocks within and adjacent to municipal and planning boundaries.	The Forestry and Wildlife Division will work with individual town councils and develop mitigative measures to address any issues that may arise
Parks and Natural Areas Division	Correspondence Previous Five-Year planning Process	Parks and Protected Areas Road building and domestic harvesting within proposed protected areas	The Forestry and Wildlife Division will not construct any roads within 500 meters of park boundary. Domestic harvesting inside of proposed protected areas will only occur where it was a traditional activity.
Parks and Natural Areas Division	Correspondence Previous Five-Year planning Process	Rare Plants storage of Domestic fuelwood Domestic harvesting	The storage of domestic fuelwood on Rare plant sites is a continuous issue. The Forestry and Wildlife Division will work with Parks and Natural Area Division to develop mitigative measures to address issues as they arise. The Watts Point Ecological Reserve is located near the CC18518 Big Brook operating area. Regular patrols will be conducted to ensure no

			harvesting activity occurs within this reserve.
Local Domestic wood cutters and Forestry and Wildlife Division district Staff	Correspondence Previous and current Five-Year planning Process	Deadwood and blown down outside of approved domestic cutting blocks	The following condition has been added to domestic cutting permits in FMD 17 and18. "Green Timber and Birch can only be harvested in approved cutting blocks. Cutting of Deadwood and blow down is permitted within 100 meters of a public highway and also permitted outside of domestic cutting blocks, but **NOT** within areas designated for **NO** cutting such as Municipal boundaries, Protected Water Supply Areas, Ecological Reserves and Proposed Protected Areas".
Justin Boyd Leonard Payne	Correspondence Previous and current Five-Year planning Process	Forest Access Road barricade	Two Forest access roads in FMD 18 (Wilbert's Road and Belvey Pond Road) are barricaded with boulders to restrict vehicular traffic from areas which were previously remote hunting.
Wildlife	ADM Review	Caribou Areas	Removed areas in conflict with core caribou areas. Forestry will adhere to seasonal conditions on secondary caribou areas.

Section 6 Public Consultation Process

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:

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

Adaptive management makes decisions based on input from 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.

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 10year Provincial Sustainable Forest Management Strategy (PSFMS) Document (20142024), which emerged through wide consultation with citizens of the Province. The 20142024 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.

In 2016, in addition to transferring issues/concerns/mitigations from previous planning processes, a revised approach of stakeholder involvement for the development of this plan was implemented. Known interested stakeholders from previous planning processes were engaged on a “one-on-one” basis to evaluate potential activity prior to the plan submission to the Environmental Assessment Process.

For Zone 8, there were 3 formal meetings held

- June 5, from 2-8 pm Roddickton Forestry Office Roddickton
- June 6, from 2-8 pm Maynards Torrent River Inn Hawkes Bay
- June 7, from 2-8 pm Plum Point Motel Plum Point
- June 8, from 2-8 pm College of North Atlantic

The results of stakeholder involvement are identified in the Mitigations Table in Section 5.

Section 7 Management Objectives and Strategies

The overarching goal is to manage the forests of the zone in a sustainable manner. The *Provincial Sustainable Forest Management Strategy* 2003 defines sustainable forest management as:

"to maintain the long-term health of forest ecosystems while providing ecological, economic and cultural opportunities for the benefit of present and future generations."

Specific objectives and strategies employed to work toward achieving sustainable forest management are outlined below.

7.1 Harvesting

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

7.1.1 Commercial

Section 3 outlines in some detail the general approach for the timber supply analysis and specific results and sensitivity analysis for both districts in the zone. The model used to calculate the

wood supply is a maximization model which outlines a specific course of action and timing of such actions to maximize timber production. The harvest schedule indicates the specific forest strata to be harvested and the timing of such harvest. The districts must follow this schedule as closely as possible in order for the AAC to remain valid.

In general, the oldest timber that is in the worst condition and losing volume fastest is targeted as first harvest priority. Younger stands that have been damaged by insects and disease may also receive high priority. Once managed stands are eligible for harvest, this priority may change in some cases to allow for a faster rotation on good sites that are silviculturally treated.

Specific commercial strategies are as follows:

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

7.1.2 Domestic

The harvest of domestic fuelwood and sawlogs occurs from four main sources in the zone; from designated domestic cutting blocks and from commercial cutovers roadside clean up and the salvage of deadwood and blowdown in areas where cutting is a permitted activity. For the designated cutting blocks, the harvest scheduling and priorities apply, however it may not always be practical to follow. Domestic cutting blocks are generally established near communities where concentrations of timber that is eligible for harvest exist. Mixed within these

blocks may be timber that normally would not be scheduled for harvest in the planning period. Ideally, each individual domestic cutter would be issued their own cutting block which would ensure harvest of optimal stands. This is not practical and domestic cutters are allowed to cut anywhere within the designated area provided that immature timber is not harvested. For this reason, the optimal harvest schedule may not always be followed in domestic areas. Utilization of cutover residue, dead timber and scrub areas which are not part of the timber supply analysis, more than makes up for this difference. Domestic cutting is generally conducted on a small patch cut system. All domestic cutting is done under permit which has conditions attached that outline the species, volume, location and utilization standards to be followed. Most cutting occurs in fall and winter with approximately 95 % of the extraction conducted by snowmobile. The domestic permit allocation is 22 m3. Crown Domestic cutting permits also allow the cutting of deadwood and blow downs anywhere in the district and on any crown land license to occupy.

Specific domestic strategies are as follows:

- target low volume stands that have poor commercial harvest chances
- encourage use of under-utilized species (birch, larch and aspen)
- target dead and insect damaged stands that are beyond commercial salvage.
- where possible, target alienation Class 3 lands that have low commercial potential
- in areas of high domestic demand, limit volume allocation in designated cutting areas and encourage alternate sources (birch, cutovers, landings, scrub etc)
- monitor stands harvested in domestic cutting areas for compliance to the harvest schedule and change areas available for harvest to reflect this schedule
- with the exception of boat building materials, leave all white spruce on domestic cutting areas to provide a regeneration source that is not susceptible to moose browsing

7.2 Silviculture

Section 1.4.1.4 describes the regeneration patterns of the major tree species by each disturbance type and generally by ecoregion. On average, there is a 20 percent regeneration failure rate (NSR) across all disturbance types. Generally, areas that do not regenerate naturally are renewed by some combination of site preparation and planting or gap planting. Areas that are regenerated are left to develop naturally. In the case of balsam fir which is a prolific regenerator and usually forms an overstocked stand, some form of thinning is usually applied to improve the growth and development characteristics of the regenerating stand. The high density of moose in the zone particularly in the northern portion of District 17 and southern half of District 18 combined with the high occurrence of balsam fir and low occurrence of hardwoods have created a serious problem with browsing of the regenerating and immature balsam fir stands In just a few short years a fully regenerated site can be reduced to an inadequately stocked site by moose browsing. Prescriptions to deal with these problems will be presented in sections to follow.

7.2.1 Forest Renewal

Since maintenance of the forestry landbase is crucial, forest renewal treatments are the most important silviculture technique in the zone. Forest renewal silvicultural treatments are designed to ensure that a new forest is established after disturbance by harvesting, insect, wind or fire. In most regions of the Province these prescriptions normally involve some form of treatment to prepare the site to accept planted seedlings. In most parts of the zone planting is usually done without mechanical site preparation. Planting, whether full planting or gap planting is done to ensure stocking of desired species is at acceptable levels.

As stated, little mechanical site preparation has been carried out in the zone. Treatment of sites that have been overgrown with hardwoods and other herbaceous species with herbicides has been done to reduce this competition and make the site more accessible and suitable for planting. Herbicide usually reduces the competition for a few years to allow planted seedlings to get established and “get the jump” on the non-crop tree species that occupy the site. Herbicides,

while used sparingly, are sometimes a necessary tool to help establishment of a new forest particularly on the better sites.

Complete regeneration failure requiring full planting is rare in the zone because of the excellent regeneration capabilities of balsam fir. When it does happen however, the site is prepared, if necessary, and planted with mainly black or white spruce and to a lesser extent Norway spruce. The majority of the planting requirement in the zone is for gap planting. This treatment is designed to increase the stocking on sites that have not regenerated to sufficient levels or on sites that have sufficient balsam fir regeneration but have a high moose density. On these latter sites planting is done through the existing regeneration to obtain a sufficient stocking level of a browse resistant species. Gap planting is done with the same species as above, and, coupled with the natural regeneration already present on site result in a mixed softwood forest. On domestic cutting areas all white spruce with the exception of those utilized as sawlogs, are left on the cutover as a browse resistant seed source.

Where possible, seedlings are grown with seed from local seed sources. A seed orchard has been established at Pynns Brook 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 this orchard starts producing seed the majority of the planting stock will be grown from this source. The ultimate goal is to establish plantations with 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 that they will form any substantive proportion of the planting program in the future.

7.2.2 Forest Improvement

Forest improvement prescriptions are designed to treat existing, established forest stands in an attempt to enhance development. These treatments usually involve thinning overstocked balsam

fir stands at either a young age 10 -15 years (precommercial thinning) or an intermediate age 25 - 35 years (commercial and diameter limit thinning). In areas that have high moose browsing potential, the pre-commercial thinning age is increased to 20 – 25 years so that the crop trees are tall enough to be out of reach of moose.

Pre-commercial thinning reduces density levels on overstocked areas in order to maximize volume increment and operability (piece size) in the shortest period of time. Trees removed are not of merchantable size and are left behind to return the nutrients to the site. In the zone, balsam fir is usually thinned to favour any spruce that may be in the stand. In this way a mixed softwood stand is produced (depending on the original density of spruce) which is more diverse and less susceptible to insect infestation. As well, any hardwood species that are not in direct competition with spruce or fir are left to increase the biodiversity of the stand.

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

Specific strategies:

- 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 increase stand development, reduce rotation age, and increase the percentage of sawlogs in stands
- where possible, promote species mixes particularly with spruce and hardwoods to reduce susceptibility to insect attack and increase biological diversity
- where possible, use seedlings grow from local seed sources to protect genetic diversity
- ensure levels of planting and thinning used in the wood supply analysis are achieved

- work towards pre harvest planning to identify areas with potential moose browsing problems so that alternate silvicultural prescriptions can be promptly employed
- in areas with high moose browse potential, allow the young fir stand to develop an adequate height prior to precommercial thinning to ensure moose can not reach the crown after thinning. As well, leave white spruce on the cutover, where possible, as a browse resistant seed source.

7.3 Access Roads

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

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

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

In many instances forest access roads “open up” new areas which are then subject to cabin development (often illegal). They also provide access to remote areas where outfitting businesses operate. This generally leads to competition for hunting areas between local and “sport” hunters and may detract from the “remote” designation of the lodge. In such instances cabin

development should be controlled to limit local access. Road decommissioning may also be considered, depending on cost and mitigation of conflicting uses for that road.

The nature of the current wood supply, particularly on Class 3 areas, is that harvestable areas or stands are becoming smaller and more remote and scattered. Achievement of the allocated harvest is contingent on accessing these areas and stands therefore more roads are needed to access this timber. It is imperative that additional funding sources become available to construct these roads if we are to maintain this harvest level. Failure to secure additional road monies will result in potential decreases in commercial timber allocation.

Specific strategies:

- where possible, build winter roads to access sensitive and wet areas
- minimize amount of road built by maximizing forwarding distances
- use minimum road standard to safely and effectively match the logging chance
- work with appropriate agencies (crown lands) to control cabin development
- consider road decommissioning on roads near remote outfitting lodges and other areas of concern where requested and where feasibly possible
- 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 a major natural disturbance factor in the zone. The main tree species, balsam fir, is susceptible to most of the major insects we have including spruce budworm, hemlock looper, balsam fir sawfly, and balsam woolly adelgid. In the past, severe mortality has occurred resulting in massive salvage efforts. In recent years, quality standards at local pulp mills have changed to require a timely supply of fresh, green timber. As a result, the window to salvage insect damaged timber is now one to two years after mortality. On

a positive note, access to most areas has increased and improved allowing for quicker reaction to salvage insect mortality.

Populations of hemlock looper were building in the early 2000's and resulted in significant mortality and a subsequent treatment program in 2002 and 2003. Since that time the populations of these insects have been in decline.

As outlined in the harvesting and timber supply analysis sections the timber supply is based on following a rigid predetermined harvest schedule and minimizing inventory deductions (of which insect damage is a portion). In the event of a major insect infestation, salvage efforts may change harvest priorities and thus the optimal harvest schedule may not be followed. If insect damaged stands cannot be harvested in a timely manner, an additional harvest in the form of unsalvaged mortality may occur resulting in inventory deductions that are higher than anticipated. In both eventualities, deviations from harvest schedules and inventory adjustment levels will have to be closely monitored to ensure that the validity of the AAC calculations is not compromised.

Specific strategies:

- use silvicultural techniques at the stand level to alter species mix and increase stand vigor to make stands less susceptible to insect attack
- where possible, use harvest scheduling techniques to alter species mix across the landscape to avoid "setting the table" for severe insect infestation
- in conjunction with Provincial and Federal initiatives, use pertinent and approved biological and chemical insecticides such as BTK virus)

7.4.2 Fire

As outlined in previous sections, most of the zone has little fire history due to the relatively abundant rainfall and above average snowfall, however, some major fires have occurred.. A fire in an unusually dry year can have devastating effects on the forest however and can exacerbate

an already tight wood supply situation. The zone can minimize the risk of a serious fire by maintaining a highly trained, efficient and effective fire control program and by minimizing the risk in forest stands through maintenance of health and vigor.

Specific strategies:

- use silvicultural treatments and protection from insects to increase health and vigour of stands
- maintain fire control capabilities by both the Crown and Industry.
- where possible, promote species mixes in stands to minimize risk

7.4.3 Windthrow

Wind throw usually occurs in stands that are old and decrepit or in stands that have been predisposed by some other disturbance such as insects and disease. To minimize the effects of blow down, stands will be managed to promote health and vigor mainly through silvicultural treatments and protection from insects.

Specific strategies:

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

7.5 Information and Education

Information and education is one of the key elements to providing for more active and effective participation in the planning process at all levels. Through interaction with various user groups and the general public a better understanding of each other's values and positions is gained. The more we know about each other's values and where these values are located on the landscape the better the ability to mitigate any potential impacts of harvesting on these values. For example, learning where a cabin is located can help planners when selecting areas for harvest and provide a contact to discuss impacts and mitigations. Many comments were made during the planning team meetings about the good exchange of information and ideas that occurred. It is through such forums that information can be shared which will provide a basis for more effective and informed participation in such processes. Other such vehicles for information and education which will be actively pursued are:

Specific strategies:

- field trips
- school visits
- open houses
- commercial operator environmental training programs
- information meetings
- training courses
- seminars
- general day to day contact

Section 8 Proposed Activities

8.1 District 17

8.1.1 Overview

This section will outline all forest activities that will occur on Crown Land in District 17 from 2013-2017. More specifically, all proposed harvesting, silviculture and access road construction activities as well as environmental protection measures, activities inside protected water supply areas, surveys, and information and education initiatives will be presented and discussed in detail.

To present a more comprehensive overview of proposed activities on the entire district an overview map is presented in (Appendix 3). Maps of individual operating areas and summary sheets are also presented in Appendix 3. The summary sheets give a brief description of each area, the type of activities that will occur and any issues raised and mitigative measures employed.

8.1.2 Allocation of Timber Supply

There is 626,729 m3 of timber scheduled to be harvested by the Crown in District 17 for the next 5 years. To put the total harvest for Crown land in perspective, there is approximately 6,000 ha scheduled for harvest in this five year period out of a total of 212,925 ha of productive forest. This represents 2.8 percent of the productive landbase being harvested in the next five years and only 0.6 percent in any given year.

There will be 557,291 m3 of softwood timber harvested from Crown land in District 17 in the next 5 years with 478,406 m3 scheduled from the Core and 78,885 from the Operationally

Constrained landbase. Table 12 details this proposed volume by harvest type and compares it to the 5 year AAC. The ratio of domestic to commercial harvest is 15:85 percent.

There is 69,438 m3 of hardwoods scheduled for harvest on Crown Land in District 17 in the next five years (Table 14). The commercial allotment of this harvest is 59,447 m3 which represents 86% of the harvest and will be mainly for fuelwood. The domestic allocation will be 9,991 m3 which represents 14% of the hardwood harvest and will also be fuelwood. All harvest is in the form of residual birch from cutovers or from birch intermixed in softwood stands.

Table 15 Proposed commercial harvest on Crown Land in District 17 from 2018-2022

	Core Softwood	Oper. Constrained	Residual Hardwood
Commercial AAC	397,460	89,280	73,000
Commercial Harvest	397,460	78,885	59,447
Deviation (+/-)	0	-10,405	-13,553
Domestic AAC	126,720	0	17,000
Domestic Harvest	80,946	0	9,991
Deviation (+/-)	-45,774	0	-7,009

8.1.2.1 Commercial

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

There are 535,792 m3 of timber scheduled to be harvested commercially in the next five years (Table 15). Commercial harvesting accounts for over 85 percent of the total proposed harvest in the district. Approximately ten percent of the commercial harvest will be hardwood fuelwood or pellet wood.

Table 16 Summary of commercial harvest by operating area in District 17 for 2018-2022

Operating Area		Volume (net m3) by Commercial AAC Source		
Number	Name	Core Softwood	Operationally Constrained Softwood	Residual Hardwood
CC17025	East Castor	18,449	100	1,849
CC17026	Kelly's Pond	39,067	500	3,906
CC17027	Mt. St. Margret	15,943	0	1,594
CC17028	Big Feeder	7,879	0	787
CC17029	Raft Pond	11,846	1,000	592
CC17030	Pittman's Pond	26,745	1,000	2,674
CC17031	Squid Cove	50,081	2,500	5,008
CC17032	Eddies Cove	5,000	0	500
CC17033	Rat Pond	7,654	100	765
CC17034	Angle Pond	111,120	0	18,168
CC17035	Camp Ten	8,428	200	842
CC17036	Bateau Barrens	80,748	500	12,112
CC17037	Five Mile Road	500	200	50
CC17038	Zinc Mine Road	4,000	0	600
CC17039	Wood Hill	10,000	72,775	10,000
	Total	**397,460**	**78,885**	**59,447**

8.1.2.2 Domestic

There are 118,079 m3 scheduled to be harvested domestically from 2018 to 2022 which represents 15 percent of the proposed overall harvest (Table 16). Harvesting will occur in designated domestic cutting areas and is generally conducted on a small patch cut system. Domestic wood cutters will also be allowed to harvest deadwood and blow down outside of domestic cutting blocks, but not on commercial cutovers or areas designated for no harvest activity All domestic cutting is done under permit which has conditions attached that outline the species, volume, location and utilization standards to be employed. For the most part cutting occurs in winter with extraction by snowmobile

Table 17 Summary of domestic harvest by operating area in District 17 for 2018 – 2022.

Operating Area		Volume (net m3) by Domestic AAC Source		
Number	Name	Core Softwood	Non-AAC Wood	Residual Hardwood
CC17501	Ten Mile Lake	5,610	1,898	743
CC17502	St Margarets Bay	7,180	2,429	950
CC17503	Castor River	748	253	20
CC17504	Otter Pond	2,992	1012	396
CC17505	Squid Cove	4,264	1,442	113
CC17506	John Mahar Barren	2,169	734	287
CC17507	Flat Brook/Sandy Cove	12,566	4,250	1,663
CC17508	Middle Arm	899	304	119
CC17509	Little Brook Pond	2,917	987	386
CC17510	Scaffold Marsh	2,244	759	297
CC17511	Burnt Head	2,169	733	287
CC17512	Bateau Barrens	4,338	1,467	574
CC17513	Belburns	5,086	1,720	673
CC17514	Daniels Harbour	1,945	655	257
CC17515	Portland Creek	1,720	582	228
CC17516	Feeder Ridge	3,441	1,164	455
CC17517	Parsons Pond	1,346	455	178
CC17518	Parsons Pond Head	4,188	1,417	554
CC17519	Cow Head/St. Paul’s	5,834	1,973	772
CC17520	Mooney	1,421	480	188
CC17521	Harbour Deep	90	50	9
CC17522	Camp 10	2,169	734	287
CC17523	Forkie Feeder	2,543	860	337
CC17524	Torrent River	1,197	405	158
CC17525	Fox Road	1,496	253	50
CC17526	Raft Pond	374	126	10
	Total	**80,946**	**27,142**	**9,991**

8.1.2.3 Hardwoods

There are 59 897 m3 of hardwoods (birch) scheduled to be harvested for Commercial (49,447) and Domestic (9,991) purposes over the next five years (Tables 12 and 13). This birch occurs as a mixture in softwood stands and is utilized as fuelwood. At this point there are insufficient pure hardwood stands or residual on commercial cutovers to support any commercial hardwood sawlog activity however birch is sold commercially as fuelwood.

8.1.3 Silviculture

There are three silviculture prescriptions for Zone 8; planting/gap planting including site preparation (herbicide) where required, pre-commercial thinning and commercial/diameter limit thinning. Planting is designed to return a site to a minimum stocking level with the desired species, mainly spruce. There is full planting when there is complete natural regeneration failure and gap planting when a site has some desired regeneration but not enough to meet minimum stocking standards. Pre-commercial thinning is done to reduce the density on overstocked regeneration so that growth can be concentrated on the remaining crop trees and thus reduce the time to harvest. Commercial/diameter limit thinning is done on older stands (25-40 years) and is designed to produce a sawlog crop while salvaging any trees thinned out as pulpwood or fuelwood.

As stated in previous sections, there is a problem with moose browsing in District 17. Browsing affects young balsam fir trees by severely reducing growth rates or killing trees and thus reducing the productivity of some sites to a point where commercial viability is questionable. Part of the silviculture program in the next five years will be designed to mitigate the impacts of moose browsing on sites dominated by balsam fir. The other part of the program is to plant or gap plant sites where competition problems are immanent to get the jump on the competing vegetation. To help achieve both objectives, white spruce is only to be harvested domestically

for sawlogs. All other white spruce is to be left as seed trees which are less susceptible to moose browsing.

Potential silvicultural treatment areas need to undergo reconnaissance and/or intensive surveys to determine the severity of moose browsing and competition problems. These surveys will be conducted during this five year period but until they are completed, specific locations and treatment amounts cannot be identified. There has been silviculture prescriptions developed however, which will be implemented for specific on the ground conditions. These prescriptions are described below.

Areas that are scheduled for commercial harvest or have been harvested in the past five years (eligible planting areas) are identified on the operating area maps and are candidates for planting or gap planting to black, white or Norway spruce.

1a) If the sites are adequately regenerated to balsam fir then moose browsing is assessed. If browsing or potential browsing is not a problem then the site is left to develop naturally. If browsing or potential browsing is a problem then the site is gap planted to a density of 1000 to 1500 stems per hectare.

1b) If the sites are not regenerated adequately but there is some balsam fir regeneration then the site is gap planted to a density of 1100 to 1500 stems per hectare.

1c) If there is complete regeneration failure the sites are planted to a density of 1500 to 2000 stems per hectare.

If sites which require planting have competing vegetation which may hinder the planting operation and future development of seedlings then they may be treated with herbicide to prepare them for planting. Other sites which are planted but develop a regeneration problem may be treated with herbicide to release seedlings from competing vegetation.

Stands that are candidates for pre-commercial thinning have been identified on operating area maps.

2) If moose browsing is not a problem in the area then the stands are thinned at 10-15 years to a density of 1600 -1800 stems per hectare. If moose browsing is a problem, then stands are thinned at age 20-25 to a density of 1600-1800 stems per hectare so that remaining crop trees are too tall to be browsed by moose.

The silviculture levels used in the timber supply analysis for District 17 is 400 ha of planting and 25 ha of pre-commercial thinning per year. Depending on survey results, it is anticipated that these levels will be surpassed during the planning period.

8.1.4 Primary Access Roads and Bridges

There are 46.2 km of primary forest access roads scheduled to be constructed in District 17 in the next five years (Table 16) to access timber for commercial purposes. All roads will be built to the specifications of the Class C-2 standard and all pertinent EPG's will be followed. In addition, operational and winter access roads 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 18 Summary of primary access road construction in District 17 for 2018-2022

Operating Area		Length (km)
Number	Name	
CC17026	Kelly's Pond	9.6
CC17030	Pittman's Pond	1.0
CC17031	Squid Cove	2.0
CC17033	Rat Pond	1.2
CC17034	Angle Pond	11.3
CC17036	Bateau Barrens	8.8
CC17039	Woody Hill	12.3
	Total	**46.2**

8.1.5 Activities in Protected Water Supply Areas

There is one commercial operator (CC17039) planned inside of the Hawkes Bay protected water supply. There are domestic operations scheduled to occur in protected water supply areas (PWSA) in the following operating areas: Ten Mile Lake CC17501, St Margaret's Bay CC17502, Flat Brook/Sandy Cove CC17507, Burnt Head CC17511, Bellburns CC17513 and St. Pauls/Cow Head CC17519. There are wider buffers established inside these 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. In addition, a Certificate of Approval under Section 10 of the Environment Act must be obtained by the Forest Service before any commercial or domestic harvesting commences inside the PWSA.

8.1.6 Environmental Protection

8.1.6.1 Fire

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

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

8.1.6.2 Insect and Disease

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

8.1.6.3 General Environment

The environmental protection guidelines form the basis for protecting the environment from the effects of forest activities. Forest activities have the potential to impair water quality, erode and compact soil, destroy fish and wildlife habitat, impact viewscapes, and disturb sensitive and rare sites etc. The guidelines are designed to provide site specific measured to ensure that these impacts are avoided. Highlights of measures to avoid these impacts include no activity buffer zones, modification of harvesting design and equipment, avoidance of sensitive site during

critical periods, consultation with other regulatory agencies and of course, monitoring. Specific measures that govern each forestry activity are detailed in Appendix 1.

8.1.7 Surveys

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

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

8.1.8 Information and Education

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

8.2 District 18

8.2.1 Overview

This section will outline all forest activities that will occur on Crown Land in District 18 from 2018-2022. More specifically, all proposed harvesting, silviculture and access road construction activities as well as environmental protection measures, activities inside protected water supply areas, surveys, and information and education initiatives will be presented and discussed in detail.

To present a more comprehensive overview of proposed activities on the entire district an overview map is presented in Appendix 4. This map shows all proposed operating areas by the Crown in District 18. Maps of individual operating areas and summary sheets are also presented in Appendix 4. The summary sheets give a brief description of each area, the type of activities that will occur and any issues raised and mitigative measures employed.

8.2.2 Allocation of Timber Supply

There is 537,404 m3 of timber scheduled to be harvested by the Crown in District 18 for the next 5 years. To put the total harvest for Crown in perspective, there are approximately 5040 ha scheduled for harvest in this five year period out of a total of 176,759 ha of productive forest. This represents 2.8 percent of the productive landbase being harvested in the next five years and only 0.6 percent in any given year.

There will be 493,390 m3 of softwood timber harvested from Crown land in District 18 in the next 5 years with 477,590 m3 scheduled from Core and 15,800 from Operationally Constrained landbase. Table 17 details this proposed volume by harvest type and compares it to the 5 year

AAC. The majority of the harvest 77 percent will be commercial with the remainder being domestic.

Table 19 Proposed harvest on Crown Land in District 18 from 2018-2022 (5 year totals)

Zone	Core Softwood	Operationally Constrained Softwood	Residual Hardwood
St Anthony Zone AAC	73,815	0	10,000
Domestic Harvest in St Anthony Zone	41,811	0	5,537
Deviation (+/-)	-32,004	0	-4,463
Straits Zone AAC	47,085	0	6,000
Domestic Harvest in Straits Zone	33,819	0	5,772
Deviation (+/-)	-13,266	0	- 228
Central Zone Commercial AAC	366,825	66,065	51,500
Commercial Harvest in Central Zone	366,825	15,800	28,650
Deviation (+/-)	0	- 50,265	- 22,850
Central Zone Domestic AAC	35,405	0	4,000
Domestic Harvest in Central Zone	35,135	0	4,055
Deviation (+/-)	- 270	0	+ 55

There is 44,014 m³ of residential hardwoods scheduled for harvest on Crown Land in District 18 in the next five years (Table 19). Approximately 66 percent of this harvest is for commercial purposes with the remainder being domestic. All harvest is from residual birch intermixed in softwood stands.

8.2.2.1 Commercial

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

There are 411,275 m3 of timber scheduled to be harvested commercially in the next five years (Table 18). There are 366,825 m3, 15,800 m3, and 28,650 m3 scheduled from the softwood Core AAC, softwood Operationally Constrained AAC, and the Residual Hardwood AAC respectively. Commercial harvesting accounts for 77 percent of the total proposed harvest in the district.

Table 20 Summary of commercial harvest by operating area for the Central Zone in District 18 for 2018-2022

Operating Area		**Volume (net m3) by Commercial AAC Source**		
Number	Name	Core Softwood	Operationally Constrained Softwood	Residual Hardwood
CC18041	Round Lake	65,000	1,500	6,500
CC18042	Spring Hill	20,000	600	2,000
CC18043	Brig Bay	15,000	0	750
CC18044	Fox Steady	15,000	1,000	750
KK10845	Mitchells Steady	10,000	500	500
CC18046	Rubes Steady	10,000	500	500
CC18047	Dawes Pond	10,000	500	1,200
CC18048	Kings Road	8,000	0	200
CC18049	Roddickton Highway	15,000	0	300
CC18050	Five Mile Steady	40,325	3,000	4,000
CC18051	Beaver Pond	10,000	4,000	200
KK18052	Penny's Pond	40,000	200	3,200
CC18053	Sail Pond	5,000	0	100
CC18054	White Hump	10,000	500	1,500
CC18055	Dog Pond	25,000	1,000	2,000
CC18056	Wilbert's Road	20,000	500	1,600
CC18057	Camp Twenty	25,000	0	1,200
CC18058	Catch-a –Feeder	5,000	0	400
CC18059	Frying Pan Pond	2,000	0	100
CC18060	Coates Road	10,000	0	1,000
CC18061	Ocean Pond	6,500	2,000	650
	Total	**366,825**	**15,800**	**28,650**

8.2.2.2 Domestic

There are 126,129 m3 scheduled to be harvested domestically from 2018 to 2022 which represents 23 percent of the proposed harvest (Table 19). Harvesting will occur in designated domestic cutting areas and is generally conducted on a small patch cut system. Domestic wood cutters will also be allowed to harvest deadwood and blow down outside of domestic cutting

blocks, but not on commercial cutovers or areas designated for no harvest activity. All domestic cutting is done under permit which has conditions attached which outline the species, volume, location and utilization standards to be employed. For the most part cutting occurs in winter with extraction by snowmobile.

Table 21 Summary of domestic harvest by operating area and zone in District 18 for 2018-2022

Operating Area		**Volume (net m3) by Domestic AAC Source**		
Number	Name	Softwood Core	Non-AAC Wood	Residual Hardwood
St. Anthony Zone				
CC18501	Raleigh/Ship Cove	3,890	1,316	515
CC18502	Second Pond	1,047	354	139
CC18503	Stinking Pond	4,114	1,391	544
CC18504	Griquet Road	5,834	1,973	772
CC18505	Brehat/St Carols	3,366	1,138	446
CC18506	Goose Pond	6,657	2,251	881
CC18507	Pilgrims Pond	2,693	911	356
CC18508	First Pond	1,571	531	208
CC18509	Pincents Brook	5,909	1,999	782
CC18510	Goose Cove Grout	673	228	89
CC18511	Cooks/Boat Harbour	1,270	430	168
CC18512	St. Anthony Burn	2,468	835	327
CC18513	Mount Mer	75	25	10
CC18514	Watson’s Pond	748	253	100
CC18515	Big Brook Grout	150	51	20
CC18516	Phil’s Pond	748	253	100
CC18517	North West Arm	598	202	80
	Total ST. Anthony Zone	**41,811**	**14,141**	**5,537**
Straits Zone				
CC18518	Big Brook	1,716	634	290
CC18519	Green Island Brook	6,792	2,508	1,149
CC18520	Sandy Cove	9,581	3,538	1,621
CC18521	Bear Cove	7,865	2,904	1,331
CC18522	Blue Cove	7,865	2,904	1,331
	Total Straits Zone	**33,819**	**12,488**	**5,722**

Table 20 cont.

Operating Area		Volume (net m3) by Domestic AAC Source		
Number	Name	Softwood Core	Non-AAC Wood	Residual Hardwood
Central Zone				
CC18523	Main Brook	4020	1340	465
CC18524	Burnt Village	3035	1010	350
CC18525	Croque	1900	635	220
CC18526	Conche	2960	985	345
CC18527	Brophy's Pond	75	25	10
CC18528	Coles Pond	455	150	55
CC18529	Rushey	1215	405	140
CC18530	Shoal Cove	3490	1165	405
CC18531	Stennies Hill	910	305	105
CC18532	Beaver Arm	1595	530	185
CC18533	Bushey's Pond	2505	835	290
CC18534	Englee/Big Pond	10325	3440	1195
CC18535	Hancocks Pond	530	175	60
CC18536	Chimney Bay	1820	605	210
CC18537	Wild Cove	150	50	20
CC18538	Batteau Cove	150	0	0
	Total Central Zone	**35135**	**11655**	**4055**
	Domestic Total	**110,765**	**38,284**	**15,364**

8.2.2.3 Hardwoods

There are 44,014 m3 of hardwoods (birch) scheduled to be harvested for commercial (28,650) and domestic (15,364) purposes over the next five years (Tables 18 and 19). This birch occurs as a mixture in softwood stands and is utilized as fuelwood. At this point there are insufficient pure hardwood stands or residual on commercial cutovers to support any significant commercial sawlog activity however birch will be utilized commercially as fuelwood.

8.2.3 Silviculture

There are three silviculture prescriptions scheduled for Zone 8; planting/gap planting including site preparation (herbicide) where required, pre commercial thinning and commercial/diameter limit thinning. Planting is designed to return a site to a minimum stocking level with the desired species, mainly spruce. There is full planting when there is complete natural regeneration failure and gap planting when a site has some desired regeneration but not enough to meet minimum stocking standards. Pre-commercial thinning is done to reduce the density on overstocked regeneration so that growth can be concentrated on the remaining crop trees and thus reduce the time to harvest. Commercial/diameter limit thinning is done on older stands (25-40 years) and is designed to produce a sawlog crop while salvaging any trees thinned out as pulpwood or fuelwood.

As stated in previous sections, there is a problem with moose browsing in District 18. Browsing affects young balsam fir trees by severely reducing growth rates or killing trees and thus reducing the productivity of some sites to a point where commercial viability is questionable. Part of the silviculture program in the next five years will be designed to mitigate the impacts of moose browsing on sites dominated by balsam fir. The other part of the program is to plant or gap plant sites where competition problems are immanent to get the jump on the competing vegetation. To help achieve both objectives, white spruce is only to be harvested domestically for sawlogs. All other white spruce is to be left as seed trees which are less susceptible to moose browsing.

Potential silvicultural treatment areas need to undergo reconnaissance and or intensive surveys to determine the severity of moose browsing and competition problems. These surveys will be conducted during this five year period but until they are completed, specific locations and treatment amounts cannot be identified. There has been silviculture prescriptions developed

which will be implemented for specific on the ground conditions. These prescriptions are described below.

Areas that are scheduled for commercial harvest or have been harvested in the past five years (eligible planting areas) are identified on the operating area maps and are candidates for planting or gap planting to black, white or Norway spruce.

1a) If the sites are adequately regenerated to balsam fir then moose browsing is assessed. If browsing or potential browsing is not a problem then the site is left to develop naturally. If browsing or potential browsing is a problem then the site is gap planted to a density of 1000 to 1500 stems per hectare.
1b) If the sites are not regenerated adequately but there is some balsam fir regeneration then the site is gap planted to a density of 1100 to 1500 stems per hectare.
1c) If there is complete regeneration failure the sites are planted to a density of 1500 to 2000 stems per hectare.

If sites which require planting have competing vegetation which may hinder the planting operation and future development of seedlings then they may be treated with herbicide to prepare them for planting. Other sites which are planted but develop a regeneration problem may be treated with herbicide to release seedlings from competing vegetation.

Stands that are candidates for pre-commercial thinning have been identified on operating area maps.

2) If moose browsing is not a problem in the area then the stands are thinned at 10-15 years to a density of 1600-1800 stems per hectare. If moose browsing is a problem, then stands are thinned at age 20-25 to a density of 1600-1800 stems per hectare so that remaining crop trees are too high to be browsed by moose.

The silviculture levels used in the timber supply analysis for District 18 is 525 ha of planting and 75 ha of pre-commercial thinning per year. Depending on survey results, it is anticipated that these levels will be surpassed during the planning period.

8.2.4 Primary Access Roads and Bridges

There is 52.2 km of primary forest access roads scheduled to be constructed in District 18 in the next five years (Table 20) to access commercial timber. All roads will be constructed to the specifications of the Class C-2 standard and all pertinent EPG's will be followed. In addition, operational and winter access roads 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 22 Summary of primary access road construction in District 18 for 2018-2022.

Operating Area		**Length (km)**
Number	Name	
CC18041	Round Lake	5.5
CC18042	Spring Hill	2.5
CC18043	Brig Bay	2.1
CC18044	Fox Steady	5.0
CC18047	Dawes Pond	3.0
KK18050	Five Mile Steady	4.1
CC18051	Beaver Pond	3.5
CC18053	Sail Pond	0.5
CC18054	White Hump	6.3
CC18055	Dog Pond	8.1
CC18056	Wilbert's Road	11.6
Total Length (km)		**52.2**

8.2.5 Activities in Protected Water Supply Area

There are no commercial operations scheduled to occur in any of the protected water supply areas (PWSA). There is limited domestic activity scheduled in the Green Island Brook CC1859, Sandy Cove CC18520, Blue Cove CC18522, Bushey's Pond CC18533 operating areas. Harvesting in these areas will take place in the winter utilizing snowmobiles for extraction. There are wider buffers established inside these PWSA and the pertinent EPG's will be attached to any domestic permits issued for these areas. There will be continuous monitoring inside these areas and buffers will be flagged to ensure compliance with the guidelines. In addition, a Certificate of Approval under Section 10 of the Environment Act must be obtained by the Forest Service before any domestic harvesting commences inside the PWSA.

8.2.6 Environmental Protection

8.2.6.1 Fire

Wildfire has not been prevalent in the district in the past number of years and as a result there have been few timber losses. Despite this fact the district must remain vigilant in its fire suppression program to ensure any future losses are minimized.

There are fire crews and equipment stationed at Roddickton and St. Anthony in the fire season whose direct responsibility is fire protection. In addition, support, equipment and manpower at both the regional and provincial level is available should the need arise. There is an air tanker stationed at Deer Lake and a helicopter at Pasadena that are available for initial attack.

8.2.6.2 Insect and Disease

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

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

8.2.6.3 General Environment

The environmental protection guidelines form the basis for protecting the environment from the effects of forest activities. Forest activities have the potential to impair water quality, erode and compact soil, destroy fish and wildlife habitat, impact viewscape, and disturb sensitive and rare sites etc. The guidelines are designed to provide site specific measured to ensure that these impacts are avoided. Highlights of measures to avoid these impacts include no activity buffer zones, modification of harvesting design and equipment, avoidance of sensitive site during critical periods, consultation with other regulatory agencies and of course, monitoring. Specific measures that govern each forestry activity are detailed in Appendix 1.

8.2.7 Surveys

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

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

8.2.8 Information and Education

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

Section 9 Plan Administration

9.1 Monitoring

Monitoring of planned activities at the operational level is critical to ensure objectives and operations are carried out in a manner consistent with various guidelines and provincial and federal legislation. All harvesting activity is regulated using a permitting system and all activities are inspected and monitored on the ground by conservation officers to ensure compliance with the Forestry Act and regulations, cutting permit conditions, and Environmental Protection Guidelines. In 2015 the Forestry Services Branch of the Forestry and Agrifoods Agency was registered to ISO-14001 (2004). Conservation Officers will continue to monitor operations in the zone to ensure compliance with this Environmental Management System during this planning period. Permit holders and contractors are also subject to financial penalties if work does not meet specifications. Conservation Officers conduct inspections on a weekly or monthly basis

spending on the level of activity. These inspections may entail surveys such as utilization assessment to ensure compliance with permit conditions.

9.2 Amendments

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

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

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

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

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

Changes that are not covered by the above must be submitted for Environmental Assessment (EA) in the form of an amendment to the five year operating plan. Once approved through EA

the amendment still has to be approved by the Ecosystem Management Division of the Forest Service however.

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

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