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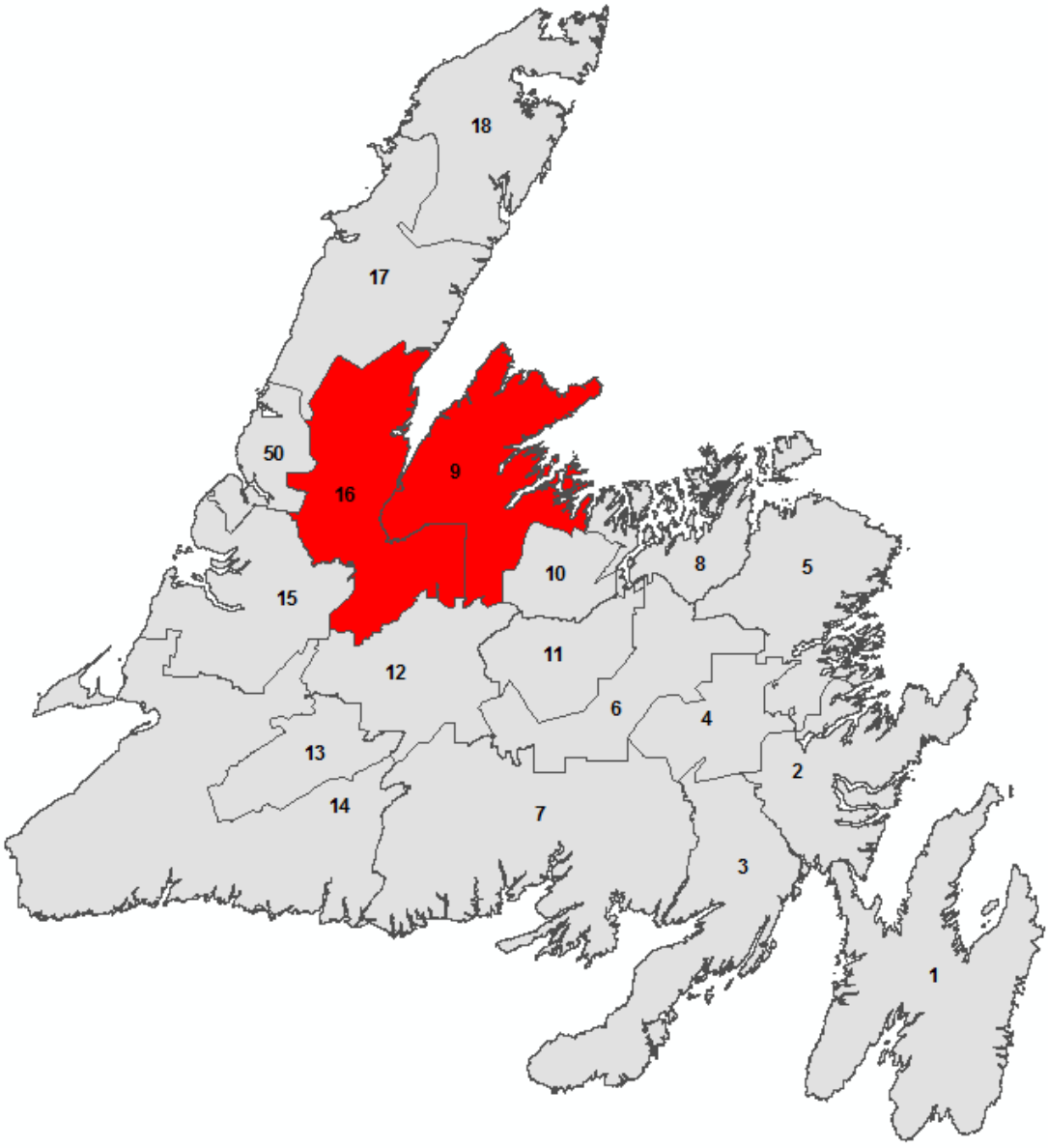
Corner Brook Mill

Corner Brook Pulp and Paper Limited
Five - Year Operating Plan

Zone 7
Forest Management Districts 9 and 16

January 1st, 2017 – December 31st 2021



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1. Introduction

This five year operating plan covers the period January 1, 2017 to December 31, 2021 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 9 and 16 are adjacent and share common ecoregion characteristics and collectively form Planning Zone Seven. The requirement for submission to the Forestry and Agrifoods Agency (FAA)and for environmental assessment is one five year operating plan for each owner in each zone. In this zone there will be one submission by the Crown and one by Corner Brook Pulp and Paper Limited. 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 9 and 16 individually but when combined they will collectively be referred to as Planning Zone Seven or the zone. Open house meetings for this zone are located in Pasadena for District 16 and Springdale for District 9. 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.

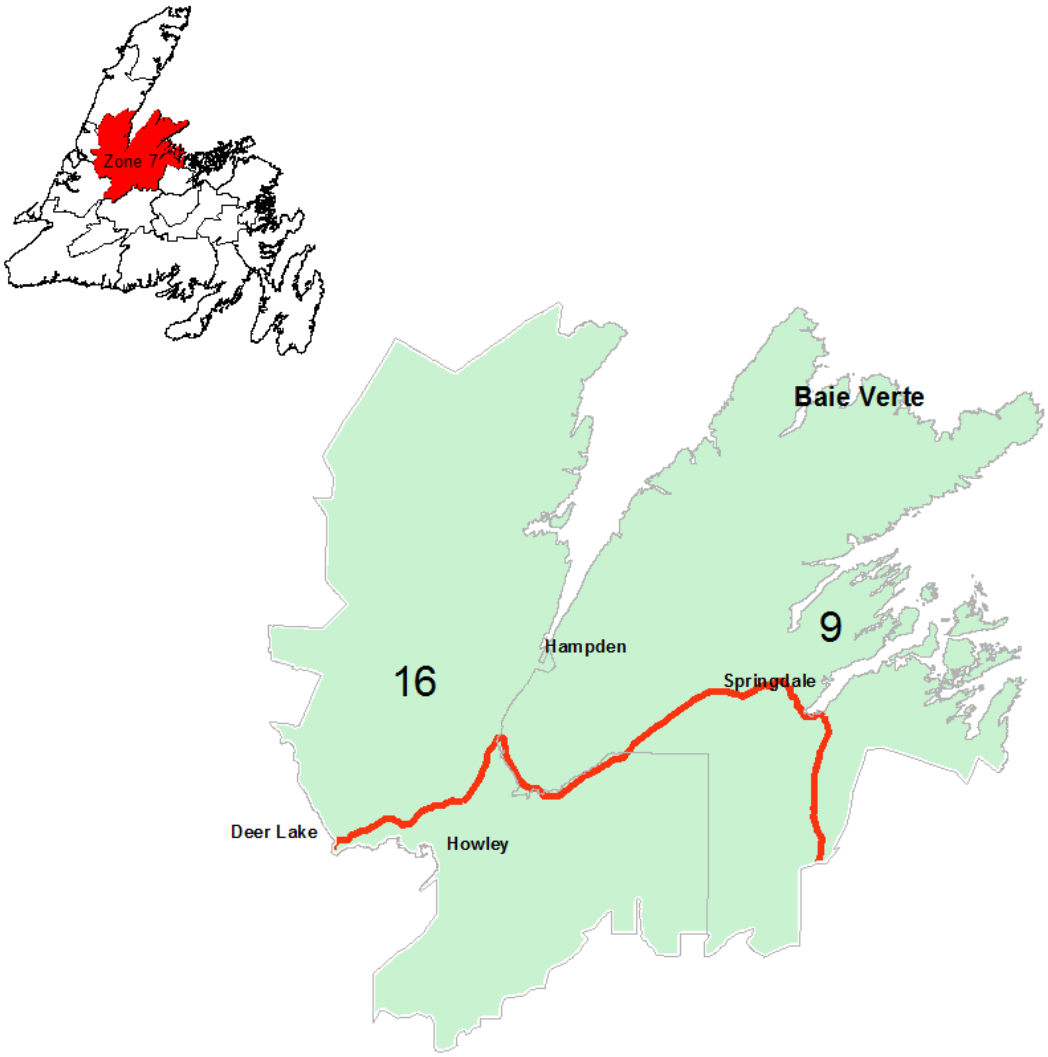
Finally, this document will attempt to build on previous documents and on efforts of previous plans. Information will be updated as required or new sections will be added if any new information is available.

2. Landbase Description

2.1. General

2.1.1. Location

Planning Zone Seven encompasses Forest Management Districts 16 and 9 (Figure 1). It extends from Deer Lake in the west to Cat Arm in the north and includes all of the Baie Verte Peninsula. Major towns located within the zone include Deer Lake, Hampden, Sops Arm, Springdale, and Baie Verte. District 16 is administered from Pasadena while District 9 is administered from Springdale with depots in Baie Verte and millertown.



Map 1-1 Planning Zone / District Map, Zone 7.

2.1.2. History

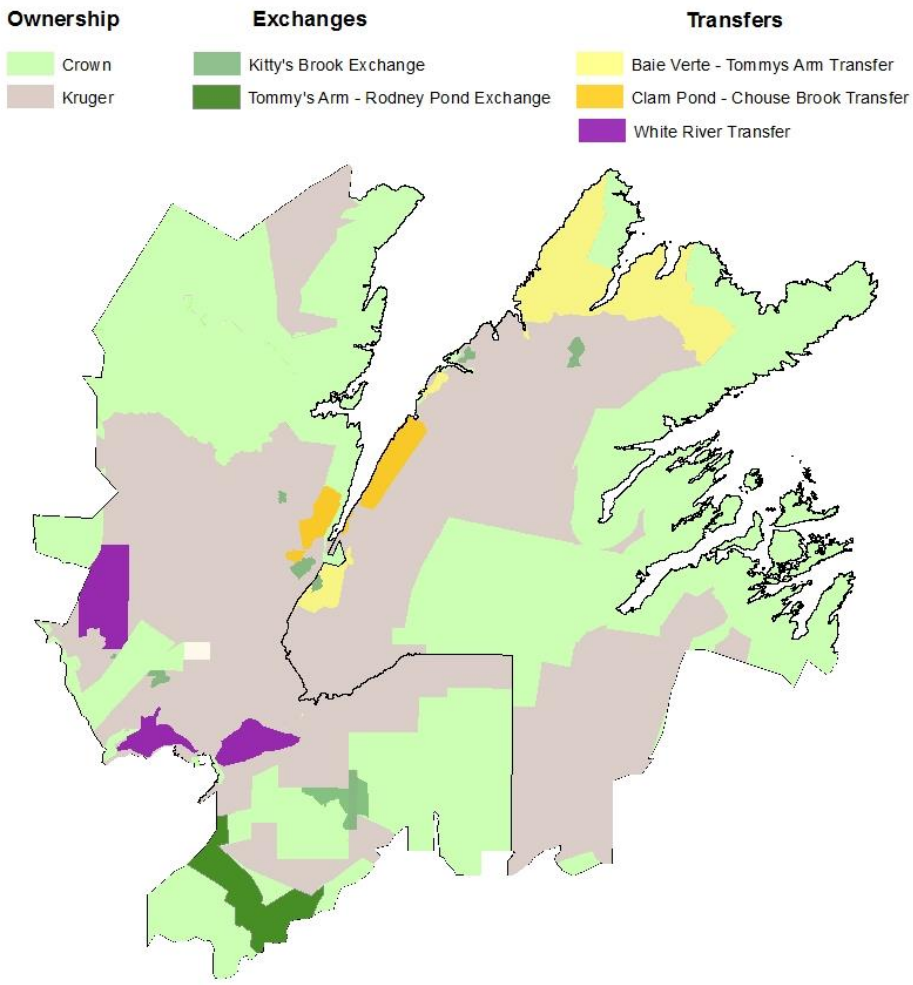
The natural resources of the zone have played a major role in the wellbeing of the residents. Since the earliest settlement, the forest and fish resources were the mainstay of the economy. Generally, settlement occurred around the coastal areas where the fishery was prevalent. Initially the forest was 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 interior of the

zone, logging towns such as Howley and Deer Lake developed as a result of the pulp and paper mill in Corner Brook. Today pulpwood and pulp chips are shipped to the mill in Corner Brook. As well, there is a major integrated sawmill in Hampden that produces lumber for both the local and export market and pulpchips which are sold to Corner Brook Pulp and Paper Limited (CBPPL).

2.1.2.1. Ownership

There are two major ownerships in the zone; Crown and CBPPL (Figure 2). Crown land accounts for 46 percent of the area and is located around the extremities of the zone. Corner Brook Pulp and Paper timber rights account for 54 percent of all land holdings. These timber holdings are in the form of long term licenses that are not due to expire until 2037.

Within these ownerships there have been a number of exchanges and transfers between the Crown and CBPPL that are mutually beneficial to both parties (Map 1-2). The CBPPL to Crown transfers and exchanges provide a sawlog supply for commercial operations and a firewood supply near communities for domestic cutters.



Map 1-2. Timber ownership and active transfers and exchanges occurring throughout Zone 7.

2.1.3. Physical Description

The planning zone is a large area (approx 1.2 million ha) covering much of northeastern Newfoundland. Physical features vary a great deal over such a large landscape. The following descriptions apply generally to the districts in the planning area.

2.1.3.1. Topography and Hydrology

The topography of the area is varied ranging from coastal lowlands to broadly rolling uplands to undulating plateaus to hilly, mountainous regions. Bogs with wooded ridges can be found throughout.

The northern part of District 16 includes the southern extent of the Long Range Mountains while in the southern portion the Topsails form several prominent hills that rise above undulating plateaus that extend over 460 meters above sea level. The northern edge of these plateaus is dissected by a number of valleys. Between these two extents lies a large lowland region extending northeast from Deer Lake.

The coastal areas of District 9 are hilly and mountainous with flat areas of bog containing woody ridges. These areas fall steeply into the lowland and coastal areas forming a rugged coastline. The central and southern portions of this district consist of broadly rolling uplands with low, parallel, northeasterly trending ridges.

The area contains several large drainage basins which flow in a general easterly or northerly direction and empty into the Atlantic Ocean. The main exception is in the southwest portion of District 16 which forms the upper reached of the Humber River watershed and empties into the Gulf of St. Lawrence. Other prominent rivers include the Main, Indian River, South Brook and Taylors Brook. These rivers have sources from lakes along their courses plus other feeder streams and ponds. Other small streams and ponds feed directly from the higher elevations into the ocean. Major watersheds include the Humber, Main, South Brook and Indian River.

2.1.3.2. Geology

The area is underlain by areas of contrasting geology and varying mineral potential. Five different geological terrains are exposed at various locations

The oldest rocks in the zone consist of metamorphic rocks (gneisses) that are part of the ancient Canadian Shield and are approximately 1.2 billion years old. These rocks have been intruded by younger granite and gabbroic rocks. They are referred to as the Long Range Complex or the Long Range Inlier. This complex forms the core of the Great Northern Peninsula and is exposed in the northwestern part of District 16.

Sandstone, limestone and marble overlie the basement rocks of the Long Range Complex. These are of Cambrian to Ordovician age and correlate with similar rocks that form an extensive

carbonate platform that was deposited along the ancient margin of the North American continent. Within District 16, these rocks are exposed in the Great Coney Arm area and southwards close to the Jackson's Arm - Sop's Arm highway.

Rocks of oceanic affinity are exposed between Coney Head and Frenchman's Cove and extends to the southwest as narrow thrust slices. These rocks consist of gabbro to granite and deformed basaltic, volcanic and sedimentary rocks. They are of Cambrian to Ordovician age and were thrust from the eastern oceanic area westwards over the ancient continental margin. Correlative rocks occur within the oceanic terrain southwest of Grand Lake.

Terrestrial volcanic and sedimentary rocks overlie the Cambro-Ordovician platformal and oceanic rocks in the Sop's Arm area in the west and between Springdale and Grand Lake in the southeast and are of Silurian age. The volcanic rocks consist of rhyolitic and basaltic flows, tuffs and braccia. The sedimentary rocks are widespread in the Sop's Arm area and consist of conglomerates, sandstones, silt stones and shales. Southwest of Springdale, sedimentary rocks are less widespread and consist of red sandstones and pebble conglomerates. These volcanic and sedimentary rocks were deposited in a sub-aerial to shallow sub-aqueous environment in large caldera complexes. Equivalent granitic rocks occur in the Topsails area and probably were sub-volcanic magma chambers that fed the overlying volcanic pile.

The youngest rocks are of Carboniferous age and occupy the central part of the zone. They extend southwards from White Bay through the area between Deer Lake and Grand Lake. This area is known as the Deer Lake Basin. The rocks consist of red, grey and brown sandstones, conglomerates, shale and limestones. They were deposited in a non-marine environment on lakes and rivers.

The whole area has been glaciated by an ice sheet in the Wisconsin age. On the whole, erosion by the glaciers has exceeded deposition and the greater part of the upland areas consist of ice scoured bedrock exposures, thinly littered with stones and boulders ranging from rhyolite and porphyry to granite gneiss and greenstone.

In the lowland areas there is however, a considerable amount of drift deposit. This occurs chiefly in the form of till consisting of the harder rocks such as granite, rhyolite, diorite, and quartzite. It is, therefore, full of large stones and boulders as this material has been resistant to mechanical abrasions and chemical weathering. There are, however, considerable deposits of marine deltaic, lacustrine, and outwash materials in the lower valleys of the major rivers. In some areas, till deposits composed largely of slate, shale, and sandstone occur. These materials have been pulverized and weathered and are far less stony than deposits composed of harder rock.

2.1.3.3. Soils

The soils of the area can be identified by three separate modes of deposition: morainal (till), glaciofluvial/fluvial (water deposited), or organic (bogs/fens).

The majority of the soils in the zone have developed on morainal tills. These soils range in thickness from thin veneers over bedrock to thick extensive deposits. The textures range from silty loam to loamy sand and are usually stony. These soils are found throughout the area with the thinner veneers usually found in the higher elevations such as the Whites River/Silver Mountain areas. The predominant soil classification of these tills would be orthic humo ferric podzols and in poorly drained areas, gleyed orthic humo ferric podzols. In areas such as the Topsails, ortstein humo ferric podzols (cemented) are common.

Other soils have developed on glaciofluvial/fluvial deposits with greatest occurrence being in the Sandy Lake/ Grand Lake areas. The textures range from coarse sand to sandy loam and can be stone free to very stoney. The predominant soil classification associated with these types of deposits would be ortstein humo ferric podzols as well as orthic humo ferric podzols. Where poor drainage occurs these soils will be “gleyed.”

Organic depositions occur throughout the entire zone. These deposits vary in depth from less than one meter to more than five meters. They are derived from sphagnum moss and sedges. The most common organic deposits are blanket bogs and sloping fens. The predominant soil classification is typic fibrisols and terric mesisols.

In addition to the mineral and organic soils, some areas can be referred to as rockland. Rockland consists of very shallow soils (< than 10 cm.) and exposed bedrock, enough to be dominant over the soils.

2.1.3.4. Climate

The climate of the area is variable as a result of differences in topography and the proximity to the sea. January mean temperatures average about -14 ^{o}C, and July mean temperatures range from over 15.5^{o}C in the valleys to less than 13^{o}C in the mountains. The frost-free period averages 110 days at lower elevations. The growing season (mean daily temperature above 6^{o}C) is more than 160 days at Deer Lake and less than 130 days in the mountains, and begins between May 10 and 30. Annual precipitation ranges from 1020 to 1400 mm and is lowest in the Deer Lake valley. Summer rainfall normally accounts for 250-300mm while the balance is snow. Generally, snowfall on the Baie Verte Peninsula is the highest in the zone, 5.0 to 6.0 meters compared to 3.0 to 3.5 meters in the southern part. The average potential evapotranspiration ranges from less than 430 to more than 510 mm.

The forests in the zone are directly related to climatic influences. The Baie Verte Peninsula has mostly balsam fir forest because of the abundance of moisture. The southern part has mainly black spruce and hardwoods due to drought and fires. The central part of the zone forms a transition area between of these two extremes with a mixture of these two main species plus white birch and trembling aspen. (from Meades, 1990)

2.1.4. *Ecological Characteristics*

2.1.4.1. Ecosystem Description

An ecosystem is a community of interacting and interdependent plants, animals and microorganisms, together with the physical environment within which they exist (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 7, like all forests on the island, form part of the boreal forest ecosystem. The boreal forest is a green belt which spans much of the northern hemisphere. It stretches from the Atlantic shores of Scandinavia through Russia, across Alaska, through the mid latitudes of Canada until it reaches the Atlantic Ocean again in Newfoundland and Labrador. One of the distinguishing characteristics of the boreal forest is the phenomena of periodic, catastrophic stand replacement natural disturbances such as fire and insect outbreaks which typically give rise to uniform, even aged forests dominated by a few tree species.

The tree species which characterize the Canadian boreal forest include black spruce, white spruce, balsam fir, eastern larch, trembling aspen, white birch and jack pine. All of these, with the exception of jack pine, commonly occur on the Island. However, by far the dominant species are black spruce and balsam fir; together they represent more than 90 percent of the growing stock on the island. Spruce is most abundant in north central Newfoundland where a climate characterized by relatively dry, hot summers has historically favoured this fire-adapted species. In western Newfoundland the climate is somewhat moister and fires are far fewer in this region resulting in the ascendance of balsam fir, a species which is poorly adapted to fire.

2.1.4.1.1. Ecoregions and Subregions

Damman 1979, defined ecoregions as areas where comparable vegetation and soil can be found on sites occupying similar topographic positions on the same parent material, provided that these sites have experienced a similar history of disturbance. Thus, an ecoregion cannot be defined in isolation from the physical landscape, but vegetation toposequence, vegetation structure, floristic composition, and floristic distributions can provide the primary criteria. According to Damman, nine ecoregions are represented in Newfoundland. Each of these is further divided into subregions

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

Figure 3 depicts Planning Zone 7 relative to Damman's ecoregion classification system. The North Central Subregion of the Central Newfoundland Forest encompasses the majority of District 9 and a large portion of District 16. The North Shore Forest Ecoregion covers the remainder of District 9 primarily in a narrow band along the north and east coasts of the Baie Verte Peninsula. The Western Newfoundland Forest, Northern Peninsula Forest and Long Range Barrens Ecoregions cover the remainder of District 16.

Table 2 depicts the percentage of the ecoregions and subregions that are represented in the zone. It describes each ecoregion and subregion as a percentage of the total in the Province as well as the relative importance within each District and in both Districts combined. For example, District 9 contains 22 percent of the Northcentral Subregion of the Central Newfoundland Forest Ecoregion in the Province. As well, 82 percent of the District is located within this ecoregion. The following is a detailed description of each ecoregion and subregion (from Meades, 1990) in both Districts.

2.1.4.1.1.1. Central Newfoundland Ecoregion

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

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

Hylocomium-balsam fir is the zonal forest type and is dominant in areas not disturbed by fire. Kalmia-black spruce and pleurosium-balsam fir forests are also common. The kalmia-black spruce-lichen forests, which occur on outwash sands and gravels, are unique to this ecoregion. Red pine also occurs but is restricted to extremely dry sites.

North Central Subregion

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

2.1.4.1.1.2. Northern Peninsula 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 Great Northern 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. One of the most obvious 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 more common component of seral vegetation on cutovers. Raspberry is also very abundant in the early years of succession.

Eastern Long Range Subregion

This subregion includes the productive but inaccessible forest on the eastern slopes of the Long Range Mountains up to 450 m elevation. The forests tend to be somewhat open balsam fir-black spruce mixtures. The tree line decreases towards the northern end of the subregion.

2.1.4.1.1.3. Long Range Barrens Ecoregion

This ecoregion comprises the highlands which extend from the southwestern coast to the northern part of the Northern Peninsula. It consists of three distinct subregions, the Southern Long Range, the Buchan's Plateau-Topsails, and the Northern Long Range. 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. Cool summers and cold winters are typical of this ecoregion. It has a relatively short growing season due to the persistence of the heavy snow cover late into spring.

This area is covered by mostly barren vegetation with shallow, ribbed fens and tuckamoor dominating the landscape. Sheep laurel heath is the predominant dwarf shrub vegetation and covers large areas. Arctic-alpine vegetation is common on all highlands and exposed sites. Snow bank species like moss heather, mountain sorrel and dwarf bilberry are common in areas with persistent snow cover. Forests dominated by balsam fir occur only in deep, sheltered valleys. Extensive areas of black spruce tuckamoor occur on slopes and in valleys.

Buchan's Plateau-Topsails Subregion

A small part of the Buchan's Plateau-Topsails subregion occurs in District 16. The northern extensions of the Topsails and possibly White Bay Downs are also part of this subregion. Most of the ecoregion is barren. Dwarf shrub heaths, shallow patterned peatlands, and areas with low "Krummhotz" or tuckmoor dominate the landscape. Small patches of forest occur in some sheltered valleys.

Northern Long Range Subregion

The northern portion of District 16 is encompasses by the southern extent of this subregion. The best developed snow bank vegetation occurs in this subregion. Mountain alder thickets are characteristic of alluvial soils in deep valleys. Many northern plant species occur in the forested valleys.

2.1.4.1.1.4. Western Newfoundland Ecoregion

This ecoregion just touches District16 and is characterized by a humid climate with a relatively longer frost-free period. It contains some of the most favourable sites for forest growth although there is considerable variation due to altitude and proximity to the coast. The dryopteris-hylocomium-balsam fir forest type is the zonal forest for this region. The zonal soils are nutrient rich humic podzols with a very dark podzolic B horizon due to humus enrichment. The absence of prolonged dry periods appears to have excluded fires from all but the coarsest textured soils. Consequently, balsam fir rather than black spruce is the dominant forest cover. Yellow birch is common and it displays its best growth in protected valleys below 200m elevation. This species also occurs in less vigorous forms in the Maritime Barrens and Avalon Forest Ecoregions, but it is absent at higher elevations and north of Deer Lake. Red maple is also most common and robust in this ecoregion.

As a general rule overstocking is a more common silvicultural problem than understocking in western Newfoundland. Localized regeneration failures can occur in forests with a very dense fern and herb stratum such as the rubus-balsam fir and the dryopteris-balsam fir forest types. On these types, hardwoods, particularly mountain maple on seepage slopes, can form semi-stable thickets. These thickets may eventually develop into hardwood forest types. The development of ericaceous heath after logging or fire is only observed on very small areas of coarse textured till. This is in stark contrast to central Newfoundland where succession to kalmia heath is a common occurrence. The Western Newfoundland Ecoregion is subdivided into six subregions.

Corner Brook Subregion

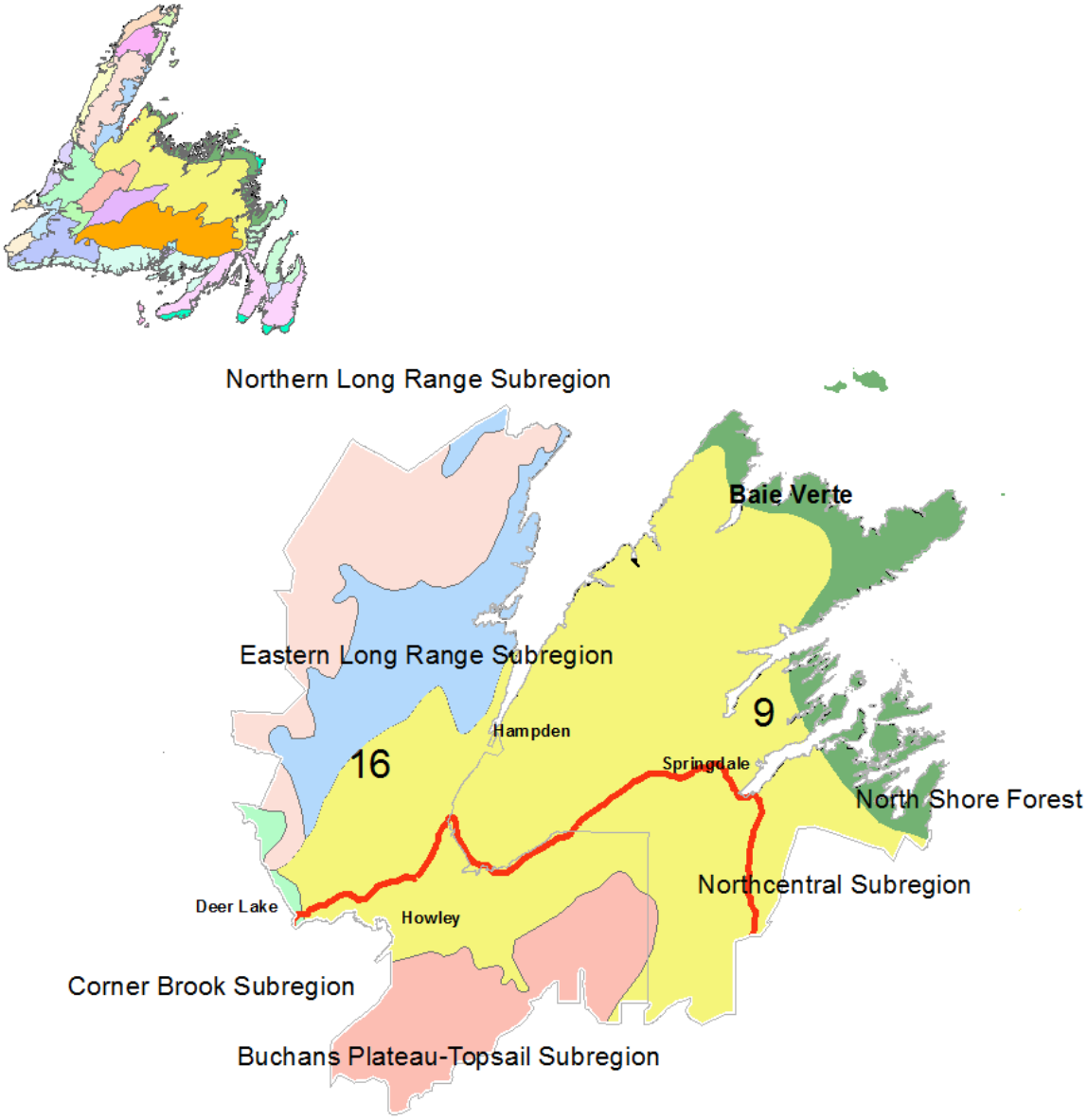
This subregion is characterized by hilly to undulating terrain from Bonne Bay to Stephenville and east to Grand Lake. The parent materials in this subregion are dominated by slates and limestone till. Areas with calcareous till are distinguished by the occurrence of light colored marl deposits around ponds and in valleys. The parent material consists of shallow, stony silt loam underlain by limestone bedrock or calcareous basal till. The rugged topography is dominated by the taxus-balsam fir and dryopteris-rhytidiadelphus-balsam fir forest types.

The hilly, non-calcareous terrain in this subregion is dominated by shallow loamy soils over shale bedrock. However, the shallowness of the till does not adversely affect forest growth since nutrient rich seepage waters are held in the rooting zone by bedrock or a fragipan layer. The steep topography is dominated by the dryopteris-balsam fir forest and supports some of the most productive stands in Newfoundland.

2.1.4.1.1.5. North Shore Forest Ecoregion

This ecoregion includes the coastal zone along the north side of the Island extending from the Bonavista Peninsula to the tip of the Baie Verte Peninsula. This ecoregion is mainly forested and black spruce stands are common. Increased wind exposure causes a decrease in the quality and height of the forest towards the coast therefore coastal headlands are dominated by barrens. Overall, vegetation is similar to the Central Newfoundland Ecoregion, however, white spruce is more abundant and aspen is less common.

The topography is irregular along the coast with many bays and inlets extending inland and is rolling to hilly. Elevations in this ecoregion are highest on the Baie Verte Peninsula reaching 315 m. The climate is the driest on the Island with warm coastal summers and cold winters. High summer temperatures can cause moisture deficiencies. The growing season is approximately 150 days and precipitation ranges from 900-1200 mm.



Map 1-3. Ecoregions/Subregions occurring throughout Zone 7.

Table 1- 1 Ecoregions/ Subregions within Zone 7

	Eco/Subregion	District 9		District 16		Zone 7 (D9 & 16)
Zone 7 **Eco/Subregions**	Area (ha) in Province	Total % Area Occupied in District	Relative % of Subregion in District	Total % Area Occupied in District	Relative % of Subregion in District	Relative % of Subregions in Zone
Western Newfoundland Ecoregion						
Corner Brook Subregion	515,637	83%	76%	2%	1%	77%
Section Sub-total	*515,637*					
Northern Peninsula Forest						
Eastern Long Range Subregion	268,058			29%	48%	48%
Section Sub-total	*268,058*					
North Shore Forest						
North Shore Forest	550,662	17%	14%			
Section Sub-total	550,662					
Long Range Barrens Ecoregion						
Buchans Plateau-Topsail Subregion	369,811			11%	14%	14%
Northern Long Range Subregion	689,562			26%	17%	17%
Section Sub-total	*1,059,373*					
Central Newfoundland Forest						
Northcentral Subregion	2,310,744			33%	6%	6%
Section Sub-total	*2,310,744*					
Grand Total	***4,704,474***					

2.1.4.2. Ecosystem Condition and Productivity

As with other parts of the Newfoundland and Labrador's boreal forest, those of Planning Zone 7 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.

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

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

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

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

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

The following sections will discuss each of these concepts in more detail as they relate to the ecosystems of Planning Zone 7. 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.

2.1.4.2.1. Productivity

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

The level of primary production is 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 7 has approximately 50 percent productive forest. As well, the relative proportion of site types is 10 percent good, 70 percent medium and 20 percent poor with a mean annual increment (MAI) of 2.6, 1.7, and, 0.8 m3/ha/yr respectively. The distribution of productive sites across the landscape and range of productivity within these sites is largely dependent on landscape patterns, climate, and soils.

The more productive areas of the zone occur in the lowlands. 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 16 and along the coast in District 9 the soils are shallower with bedrock at or near the surface. The terrain in much rougher and the growing season is shorter (130 as opposed to 160 days).

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

2.1.4.2.2. Resilience

Ecosystem resilience reflects the ability of the ecosystem to absorb change and disturbance while maintaining the same productive capacity and the same relationships among populations. Healthy forest ecosystems maintain their resilience and adapt to periodic disturbances. The renewal of boreal forest ecosystems often 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. An example is harvesting on the more fragile sites where steep slopes and shallow soil over bedrock increase the potential of site degradation beyond repair.

2.1.4.2.3. Stability

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

Species stability is the maintenance of viable populations or meta-populations of individual species. Structural stability is the stability of various aspects of ecosystem structure such as food web organization or species numbers. Process stability is the stability of processes such as primary productivity and nutrient cycling. To put stability in perspective, it must ensure that the system does not cross some threshold from which recovery to a former state is either impossible, (extinction) or occurs only after long time periods or with outside inputs (loss of topsoil) Some indicators of stability which can be monitored are: area of forest converted to non-forest use, area, percentage and representation of forest types in protected areas, percentage and extent of area by forest type and age class, and change and distribution and abundance of various fauna. These indicators can be measured and monitored to ensure stability is maintained and to evaluate the impact, if any, of forest activities on ecosystem stability.

2.1.4.2.4. Disturbance Regimes and Successional Patterns

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

2.1.4.2.4.1. *Harvesting*

Regeneration patterns in the black spruce type after harvesting is generally back to the black spruce type with a minor component of balsam fir and some white birch on the better sites. There is a higher component of black spruce regeneration in the Central and Long Range Barrens Ecoregions (CLRBE) than in the Western and Northern Ecoregions (WNE). There is substantial regeneration failure in this forest type with average not sufficiently restocked (NSR) rates at 25 percent in CLRBE and 45 percent in WNE. Another general trend is that the poorer the site quality the higher the NSR rate. These sites would be candidates for planting with black, white, or Norway spruce. An exception to this trend occurs when the pre harvest crown density is class 2 or denser. On these areas, black spruce layering is prevalent and is responsible for the majority of stocking. In some instances where balsam fir does regenerate on black spruce sites it becomes very chlorotic at a young age and is highly susceptible to attack from the balsam woolly adelgid.

In the balsam fir types, regeneration success back to balsam fir is much higher averaging 75 percent in CLRBE and 85 percent in WNE. Regeneration rates to balsam fir are higher on the poor sites and fall off somewhat as site quality increases. There is also some regeneration to black spruce and softwood hardwood mixed wood types with the former being more prevalent in the CLRBE. Regeneration failure is relative constant across all ecoregion types at 10 percent.

Regeneration pattern in the mixed wood types is generally back to mixed wood that is dominated by balsam fir and white birch. In the CLRBE there is a larger component of black spruce

regeneration after harvesting than in the WNE. 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 highest in poor sites and lowest on the better sites.

There are few pure hardwood stands in the zone. Harvesting of these sites has only recently been occurring with the development of a value added hardwood industry therefore regeneration patterns are unknown. Anecdotal evidence from domestic cutting in these types indicates that they will regenerate to mixed wood types dominated by balsam fir and white birch.

2.1.4.2.4.2. Fire

Since black spruce is a fire adapted species, it is not surprising that it is the most prolific regeneration species after fire across all forest types, site types and ecoregions within the zone. It regenerates as pure stands or in combination with white birch. Balsam fir is conspicuously absent after fir because most advanced regeneration in the under story is killed by the fire. Black spruce regeneration is somewhat correlated with the amount present in the pre fire stand. Generally, the higher the component of black spruce in the original stand, the higher the percentage of regeneration to black spruce. In mixed wood stands a higher component of white birch and sometimes trembling aspen is present after fire. Fire in pure hardwood stands can sometimes regenerate to trembling aspen in certain areas. Regeneration failure after fire is on average 20 percent across all forest types and is higher as sites get poorer.

2.1.4.2.4.3. *Insect*

Balsam fir is highly susceptible to insect attack from the hemlock looper, balsam woolly adelgid, balsam fir sawfly, and spruce budworm whereby 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.

Disturbance by insect kill in young balsam fir stands can cause succession to white spruce. Regeneration patterns in mixed wood types usually depend on the type of mixture. If black spruce is a component then it will persist and form part of the new stand. Otherwise balsam fir and balsam fir/hardwood mixtures regenerate after insect attack. Regeneration failure occurs approximately 20 percent of the time particularly if pure stands of immature balsam fir are killed.

2.1.4.3. Biodiversity

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

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, 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.

2.1.4.3.1. Species Diversity

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

2.1.4.3.2. Genetic Diversity

Genetic diversity describes the range of possible genetic characteristics found within and among different species. Hair and eye colour, weight and height, are examples of genetic diversity found in humans. Genetic diversity within species is the foundation of all biodiversity. Assessing genetic diversity does not mean tracking every gene in the zones forest. Responsible planning should design and implement measures which maintain or enhance viable populations of forest vegetation species and which use the genetic diversity of commercially important species to a maximum benefit. The genetic diversity of commercially important species can also be managed to increase

economic benefit from some portions of the landscape while allowing other portions to provide greater social and ecological values. Genetic diversity is the basis by which populations (flora and fauna) can adapt to changing environmental conditions.

2.1.4.3.3. Landscape Diversity

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

A forest interspersed with barrens, marshes, lakes and ponds provides for diversity across the landscape. Each ecoregion in the province should have representative areas protected which displays the diversity where such exists. These areas can serve as a benchmark from which to measure and guide management decisions. These representative areas protect the integrity of the ecoregion and are vital for guiding management actions. As benchmark areas, they will illustrate the multi-species mosaic that planning actions must maintain. One unique aspect of landscape diversity in Planning Zone 7 is the presence of an old growth forest in the northern part of District 16.

As stated, specific examples of on the ground actions in support of these concepts will be presented throughout the plan.

2.1.5. Forest Characterization

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

2.1.5.1. Land Classification

There are six broad categories that currently represent how the land within a forest management district is classified 1) Regulatory alienations, 2) Non-harvestable inventory types, 3) Water features, 4) Operational alienations, 5) Non-Timber Values and 6) Productive forest. The sixth category represents the harvestable landbase and is further subdivided into Core, & Operational.

Regulatory alienations are areas which have a legal restriction which prevents harvesting. Non-harvestable inventory types are areas such as bog or scrub forest. Water features are simply bodies of water (lakes, ponds, rivers..etc) Operational alienations are areas which cannot be harvested due to a physical impediment (i.e extreme steep slopes). Non-Timber Values represent areas in which harvesting is not permitted due to a use other than harvesting such as agriculture or aesthetics. In this case productive forest is any forested area that is not restricted from harvest and is capable of producing at least 60 m^3/ha of merchantable timber.

The total landbase for Zone 7 (Table 1-2, Figure 1-1) is approximately 1.3 million hectares and is subdivided into the 6 categories as follows:

1) Regulatory alienations 168,341 ha
2) Non-harvestable inventory types 495,401 ha
3) Water features 113,642 ha
4) Operational alienations 52,386 ha
5) Non-Timber Values 3,841 ha
6) Productive forest
    - Core 189,614 ha
    - Operational 275,396 ha

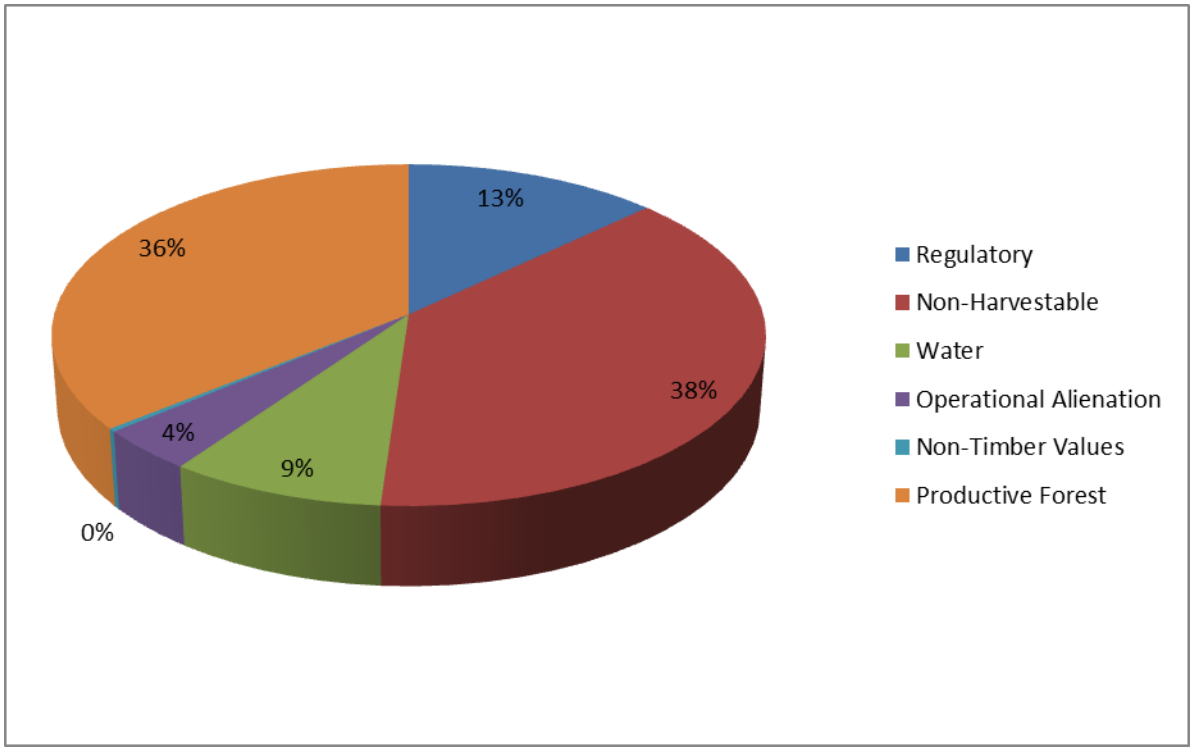
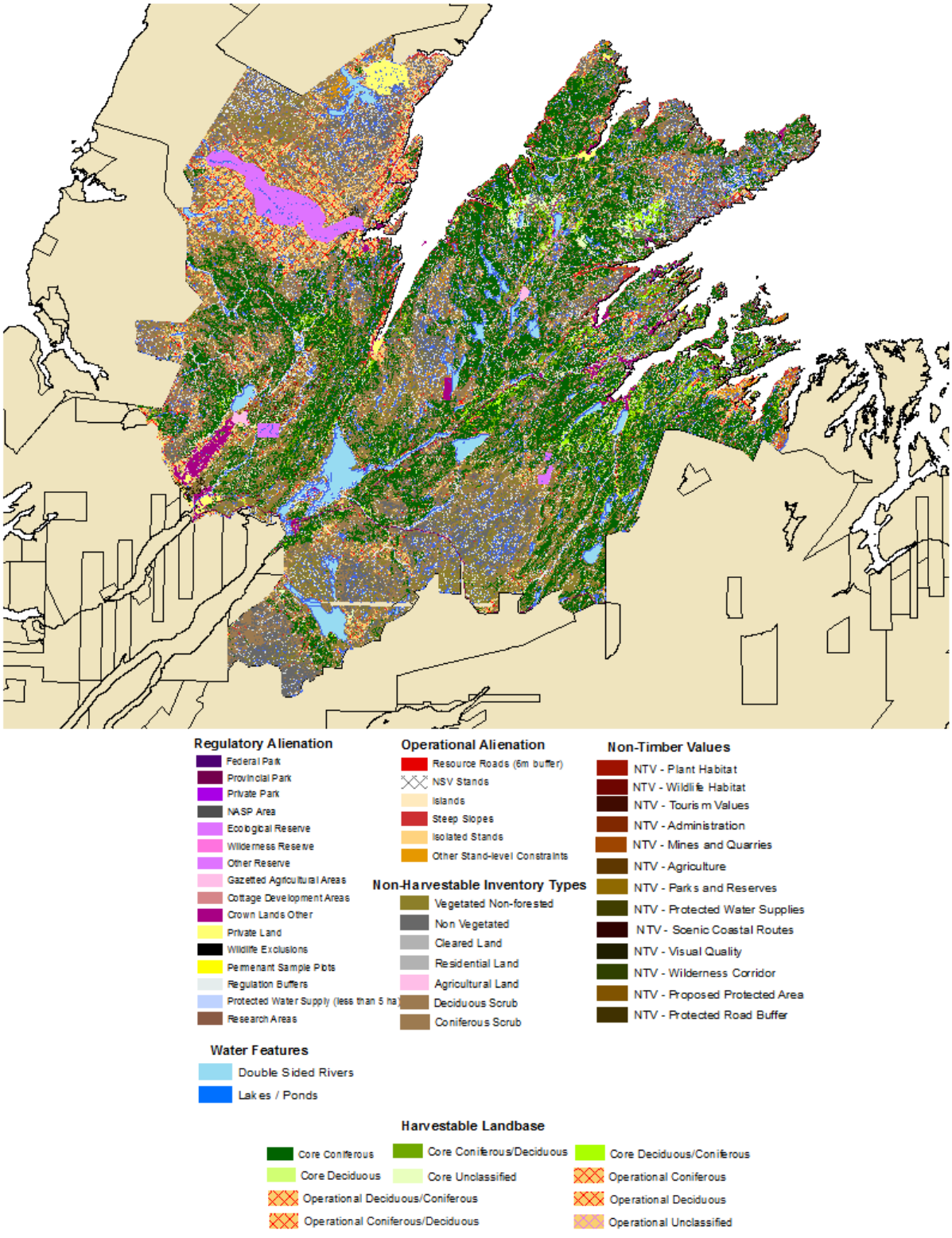


Figure 1- 1 Landbase Classification

Up until now the landbase descriptions, ecosystem description, discussion on biodiversity and general forest characterization have been at the Zone level. From this point forward information presented will specifically to CBPPLs tenure in FMDs 9 and 16.

Table 1- 2 Zone 7 Landbase Classification

Date:	6/12/2015	Zone 7					
	Landbase Classification	Forested Area (ha)	Non Forested (ha)	Forested Area (ha)	Non Forested (ha)	Total Area (ha)	% Of Total
1	**Regulatory Alienations**	Crown		Kruger			
1.a	***Parks***						
1.a.1	Federal	0.0	0.0	0.0	0.0	0.0	0.0%
1.a.2	Provincial	421.1	359.0	804.2	363.3	1,947.6	0.1%
1.a.3	Private	0.0	0.0	0.0	0.0	0.0	0.0%
1.a.4	Natural Areas System Plan	0.0	0.0	0.0	0.0	0.0	0.0%
1.b	***Reserves***						
1.b.1	Ecological	0.0	0.0	0.0	0.0	0.0	0.0%
1.b.2	Wilderness	0.0	0.0	0.0	0.0	0.0	0.0%
1.b.3	Others	18,963.6	1,556.6	809.9	310.2	21,640.3	1.7%
	Other						
1.c.1	Agricultural Areas	365.5	163.2	572.6	154.5	1,255.8	0.1%
1.d.1	Cottage Development Areas	264.5	143.1	434.0	65.1	906.7	0.1%
1.d.2	Crown Lands Other	7,796.3	3,863.5	1,623.3	1,051.3	14,334.5	1.1%
1.d.3	Private Land	3,418.9	1,604.3	4,693.3	1,373.1	11,089.7	0.9%
1.e.1	Wildlife Exclusions	0.0	0.0	0.0	0.0	0.0	0.0%
1.f.1	Permanent Sample Plots (PSP's)	117.6	7.9	226.6	9.7	361.8	0.0%
1.f.2	Regulation Buffers Water (30m)	40,255.6	20,157.6	40,033.5	16,353.4	116,800.0	9.0%
1.g.1	Protected Water Supply Areas	3.2	2.2	0.0	0.0	5.3	0.0%
1.h.1	Research Areas	0.0	0.0	0.0	0.0	0.0	0.0%
	Section Sub-total	*71,606.3*	*27,857.4*	*49,197.4*	*19,680.6*	*168,341.7*	*13.0%*
	Non-Harvestable						
2	**Inventory Types**						
2.a.1	Coniferous Scrub	132,951.9	0.0	144,400.9	0.0	277,352.8	21.4%
2.b.1	Deciduous Scrub	4,371.7	0.0	3,367.5	0.0	7,739.2	0.6%
2.c.1	Vegetated Non-forested	0.0	58,068.5	0.0	74,350.5	132,419.0	10.2%
2.d.1	Non Vegetated	0.0	51,365.0	0.0	24,469.0	75,834.0	5.8%
2.e.1	Cleared Land	0.0	643.8	0.0	344.5	988.2	0.1%
2.f.1	Residential Land	0.0	589.7	0.0	198.1	787.7	0.1%
2.g.1	Agricultural Land	0.0	207.4	0.0	73.1	280.4	0.0%
	Section Sub-total	*137,323.5*	*110,874.3*	*147,768.4*	*99,435.2*	*495,401.4*	*38.1%*
3	**Water Features**						
3.a	***Water Bodies***						
3.a.1	Lakes/Ponds	0.0	44,543.5	0.0	62,853.4	107,396.9	8.3%
3.a.2	Double Sided Rivers	0.0	2,920.8	0.0	3,324.9	6,245.7	0.5%
	Section Sub-total		*47,464.3*		*66,178.3*	*113,642.6*	*8.8%*
4	**Operational Alienations**						
4.a	***Roads***						
4.a.1	Right Of Way (Roads)	0.0	435.6	0.0	1,113.9	1,549.5	0.1%
4.a.2	Resource Roads (6m buffer)	775.0	31.2	1,299.1	40.7	2,146.1	0.2%
4.b	***Stand Level***						
4.b.1	NSV Stands	3,725.3	0.0	5,523.0		9,248.2	0.7%
4.b.2	Islands	226.2	0.0	14.3	0.0	240.5	0.0%
4.b.3	Steep Slopes	15,964.3	2,435.8	8,310.6	545.6	27,256.4	2.1%
4.b.4	Isolated Stands	4,205.4	0.0	0.5	0.0	4,205.8	0.3%
4.b.5	Other Stand-level Constraints	2,361.2	0.0	3,032.9	6.0	5,400.0	0.4%
4.b.6	Area Not Interpreted	0.0	2,340.0	0.0	0.0	2,340.0	
	Section Sub-total	*27,257.4*	*5,242.6*	*18,180.4*	*1,706.2*	*52,386.6*	*4.0%*
5	**Non-Timber Values**						
5.a.1	Plant Habitat	0.0	0.0	0.0	0.0	0.0	0.0%
5.b.1	Wildlife Habitat	0.7	17.3	675.1	796.6	1,489.6	0.1%
5.c.1	Tourism Values	0.0	0.0	0.0	0.0	0.0	0.0%
5.d.1	Administration	0.0	0.0	0.0	0.0	0.0	0.0%
5.e.1	Mines and Quaries	0.0	0.0	0.0	0.0	0.0	0.0%
5.f.1	Agriculture	0.0	0.0	0.0	0.0	0.0	0.0%
5.g.1	Parks and Reserves	0.0	0.0	0.0	0.0	0.0	0.0%
5.h.1	Protected Water Supplies	164.2	0.0	0.0	0.0	164.2	0.0%
5.i.1	Scenic Coastal Routes	14.3	0.0	0.0	0.0	14.3	0.0%
5.j.1	Visual Quality	1,547.2	6.7	608.2	11.3	2,173.5	0.2%
5.k.1	Wilderness Coridor	0.0	0.0	0.0	0.0	0.0	0.0%
5.l.1	Proposed Protected Area	0.0	0.0	0.0	0.0	0.0	0.0%
5.m.1	Protected Road Buffer	0.0	0.0	0.0	0.0	0.0	0.0%
	Section Sub-total	*1,726.5*	*24.0*	*1,283.2*	*807.9*	*3,841.6*	*0.3%*
6	**Harvestable Landbase**						
6.a.1	Core Coniferous	104,775.4	0.0	221,747.9	0.0	326,523.3	25.1%
6.a.2	Core Coniferous/Deciduous	15,340.5	0.0	16,257.3	0.0	31,597.8	2.4%
6.a.3	Core Deciduous/Coniferous	4,837.2	0.0	4,779.5	0.0	9,616.7	0.7%
6.a.4	Core Deciduous	1,429.4	0.0	1,922.1	0.0	3,351.5	0.3%
6.a.5	Core Unclassified	1,699.1	0.0	4,657.6	0.0	6,356.7	0.5%
	Section Sub-total	128,081.6		249,364.4		377,446.0	29.1%
6.b.1	Operational Coniferous	56,284.8	0.0	24,381.4	0.0	80,666.2	6.2%
6.b.2	Operational Coniferous/Deciduous	3,958.5	0.0	1,236.6	0.0	5,195.1	0.4%
6.b.3	Operational Deciduous/Coniferous	983.7	0.0	249.3	0.0	1,233.0	0.1%
6.b.4	Operational Deciduous	195.6	0.0	44.7	0.0	240.3	0.0%
6.b.5	Operational Unclassified	110.4	0.0	120.3	0.0	230.7	0.0%
	Section Sub-total	*61,533.0*		26,032.3		87,565.3	6.7%
	Section Sub-total	*189,614.6*		*275,396.7*		*465,011.3*	*35.8%*
	Grand-total	*427,528.3*	*191,462.6*	*491,826.1*	*187,808.2*	*1,298,625.2*	*100.0%*



Map 1-4. Landbase Classification Map – ZONE 7.

2.1.5.2. Forest Profile

2.1.5.2.1. Species Composition

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

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 73 percent of the working groups in District 16 and 67 percent in District 9 (Figure 1-2). Balsam fir can occur in pure stands or in association with one or more of black spruce, white spruce, white birch, trembling aspen, or larch in varying species compositions. The black spruce (bS) working group is the second most abundant accounting for 19 percent in Districts 16 and 9. As with balsam fir, black spruce can occur as pure stands or in association with other species listed above. Softwood hardwood working groups occupy six and 10 percent of the productive forest area in Districts 16 and 9 respectively. The remainder is a mix of hardwood dominated stand types.

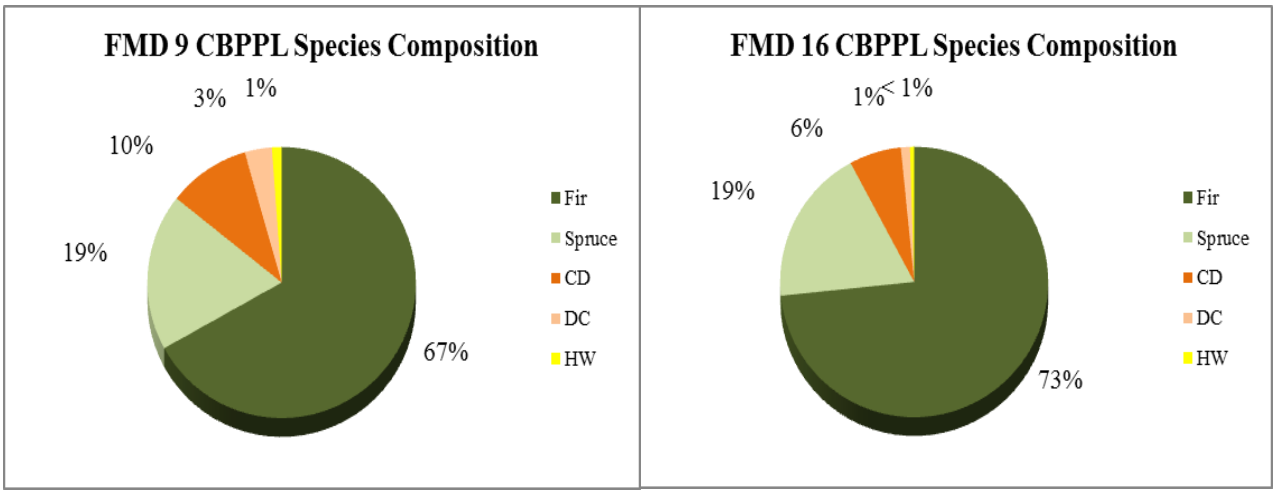


Figure 1- 2 Working group (species composition) by FMD

2.1.5.2.2. Age Class

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

Age (years)

0 - 20 regenerating

21 – 40 immature

41 – 60 semi-mature

61 – 80 mature

81 - 100 over mature

101 - 120 over mature

121 -140 over mature

141 – 160 over mature

161 + (actually represents uneven-aged stands)

The age class distribution for CBPPL tenure in Planning Zone 7, for the entire productive forest, is shown in figure 1-3 for both FMDs 9 & 16. In general terms, the more balanced the age class distribution in a district, the higher the potential for an even flow sustained harvest of timber, because continuous timber supply is limited by the age class with the lowest frequency of occurrence. A balanced age distribution in the forest would also allow for the highest biodiversity by making habitat available at all stages of development, with the equivalent proportions of the forest to moving from one stage of development to the next over time. This would result in an ongoing renewal of habitat.

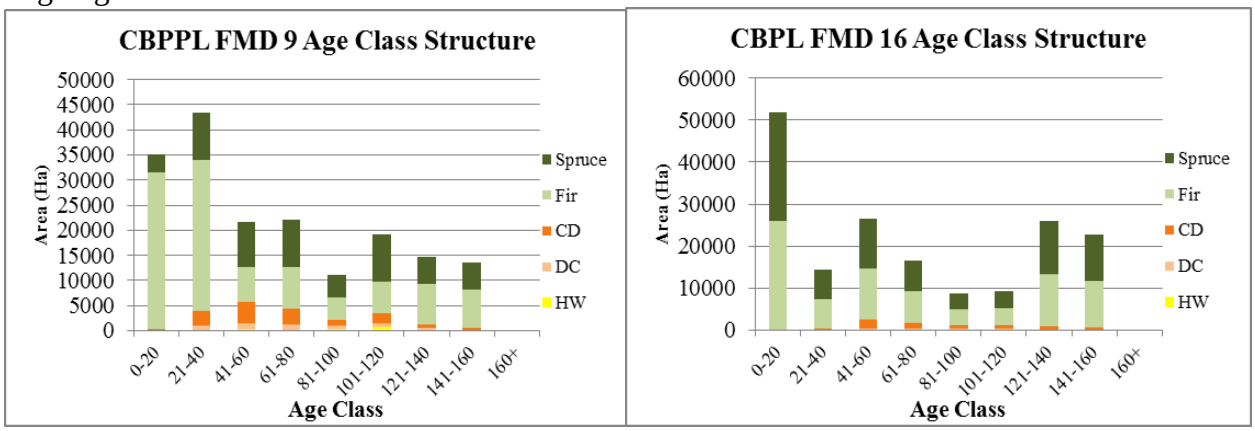


Figure 1- 3 Working group by Age Class by tenure .

It can be seen that both FMDs have an unbalanced age class structure with productive forest levels varying greatly between classes. This unbalanced age class structure limits the maxim sustainable harvest levels as the mature forest will have to be harvested before the immature stands can reach their peak yields. This is particularly evident in looking at the Core landbase which is the largest portion of the productive forest comprising the Zone 7 AAC for CBPPL (Figure 1-4).

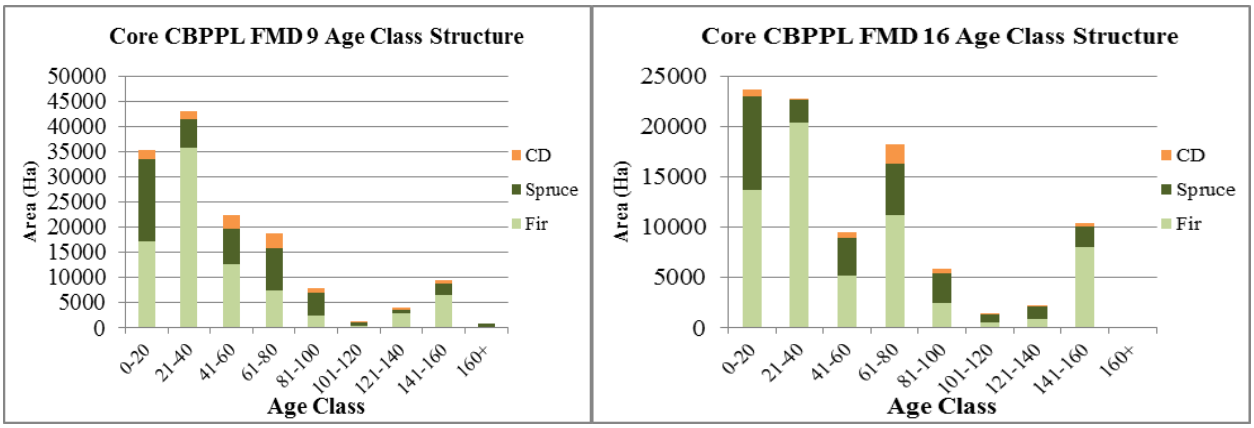


Figure 1- 4 Working group by Age Class for CBPPL Core Landbase

2.1.5.2.3. Site Class

The Forest Services Branch has identified four site classes that refer to the potential of a given site to produce timber. These are high, good, medium and poor. The classes are based on a number of factors, some of which are soil type, moisture content, slope, and fertility. Site class is determined through air photo interpretation supplemented with field checks. The classes indicate the volume of wood fiber that a site has the capability of producing under natural conditions by the time the trees reach their rotation age (which averages, generally, between 60 and 80 years depending on the species and the location). On average, good sites are capable of producing > 2.6 m3/ha/yr, medium sites 1.7 m3/ha/yr, and poor sites 0.8 m3/ha/yr. The following indicates the average potential in cubic meters per hectare for each site class at maturity (based on the provincial average).

Class m3 /ha

High 200+

Good 150

Medium 120

Poor 80

Since the occurrence of high site classes is so rare on the Island the Forest Service branch has combined the Good and High site types into the Good site type for the purpose of timber supply. The medium site class is by far the largest in the districts within CBPPL tenure in Planning Zone 3, holding approximately 72% of the total productive area found across FMDs 9 & 16. Figure 1-5 presents the site class information in graphic form to show the levels of site class in each district for CBPPL tenure.

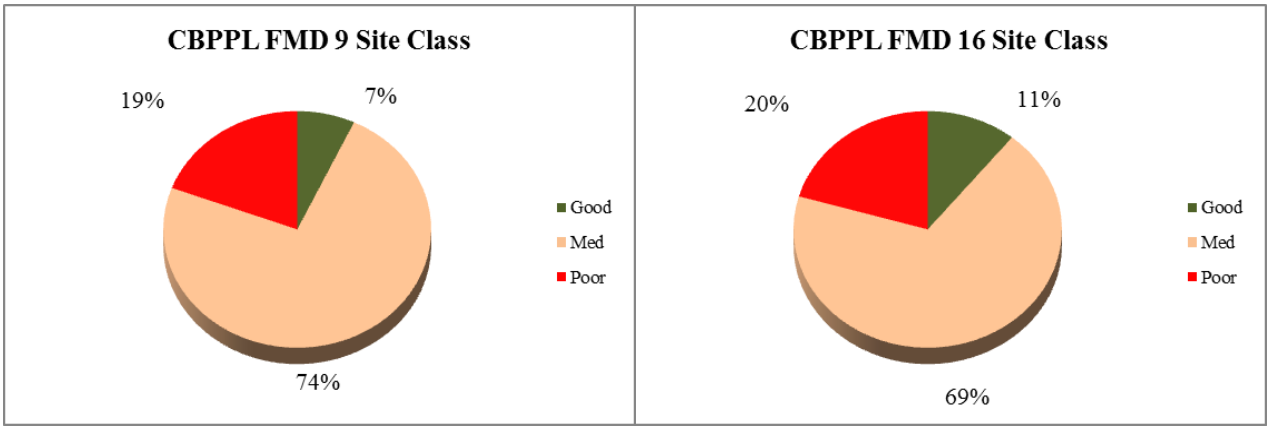


Figure 1- 5 Site class distribution by tenure and AAC class.

2.2. *Past Planning Activities*

2.2.1. *Harvesting*

2.2.1.1. *Commercial Activity*

Harvesting activities in this zone have been targeted towards satisfying the pulpwood requirements to the Pulp and Paper mill and to sawlog production for Burtons Cove Logging Ltd. The AAC in the zone hasn't been harvested to its full allocation due to its lower spruce content. However, a higher portion of AAC has been harvested in this Zone as compared to others due to its proximity to the pulp mail as well as the commercial sawmill in Hampden.

Table 1- 3 Commercial harvest summary table CBPPL FMD 9 (2012-2016)

Timeframe		Year	Core					Operational - Available				
			AAC	Harvested		Remaining		AAC	Harvested		Remaining	
				m3	*%*	*m3*	*%*		*m3*	*%*	*m3*	*%*
Annual	***Softwood***	1	155,800	128,240	82.31%	27,560	17.69%	17,300	0	0.00%	17,300	100.00%
		2	155,800	49,536	31.79%	106,264	68.21%	17,300	0	0.00%	17,300	100.00%
		3	155,800	89,301	57.32%	66,499	42.68%	17,300	240	1.39%	17,060	98.61%
		4	155,800	129,008	82.80%	26,792	17.20%	17,300	2,029	11.73%	15,271	88.27%
		5	155,800	165,467	106.20%	-9,667	-6.20%	17,300	567	3.28%	16,733	96.72%
5 Year	***Softwood Sub-total***		***779,000***	***561,552***	72.09%	217,448	27.91%	***86,500***	***2,836***	3.28%	***83,664***	96.72%
		Year	**Core**					**Operational - Available**				
			AAC	Harvested		Remaining		AAC	Harvested		Remaining	
				m3	*%*	*m3*	*%*		*m3*	*%*	*m3*	*%*
Annual	***Hardwood***	1	2,900	0	0.00%	2,900	100.00%	2,000	0	0.00%	2,000	100.00%
		2	2,900	0	0.00%	2,900	100.00%	2,000	0	0.00%	2,000	100.00%
		3	2,900	0	0.00%	2,900	100.00%	2,000	0	0.00%	2,000	100.00%
		4	2,900	0	0.00%	2,900	100.00%	2,000	0	0.00%	2,000	100.00%
		5	2,900	0	0.00%	2,900	100.00%	2,000	0	0.00%	2,000	100.00%
5 Year	***Hardwood Sub-total***		***10,000***	***0***	***0***	10,000	100.00%	***0***	***0***		***0***	

Table 1- 4 Commercial harvest summary table CBPPL FMD 16 (2012-2016)

	Year	Core					Operational - Available				
		AAC	Harvested		Remaining		AAC	Harvested		Remaining	
			m3	*%*	*m3*	*%*		*m3*	*%*	*m3*	*%*
Softwood	1	110,300	68,213	61.84%	42,087	38.16%	21,800	0	0.00%	21,800	100.00%
	2	110,300	67,519	61.21%	42,781	38.79%	21,800	0	0.00%	21,800	100.00%
	3	110,300	103,544	93.87%	6,756	6.13%	21,800	12	0.06%	21,788	99.94%
	4	110,300	66,142	59.97%	44,158	40.03%	21,800	1,275	5.85%	20,525	94.15%
	5	110,300	88,812	80.52%	21,488	19.48%	21,800	322	1.48%	21,478	98.52%
Softwood Sub-total		***551,500***	***394,230***	71.48%	157,270	28.52%	***109,000***	***1,609***	1.48%	***107,391***	98.52%
	Year	**Core**					**Operational - Available**				
		AAC	Harvested		Remaining		AAC	Harvested		Remaining	
			m3	*%*	*m3*	*%*		*m3*	*%*	*m3*	*%*
Hardwood	1	200	0	0.00%	200	100.00%	0	0	0.00%	0	100.00%
	2	200	0	0.00%	200	100.00%	0	0	0.00%	0	100.00%
	3	200	0	0.00%	200	100.00%	0	1,205	0.00%	-1,205	100.00%
	4	200	0	0.00%	200	100.00%	0	0	0.00%	0	100.00%
	5	200	0	0.00%	200	100.00%	0	301	0.00%	-301	100.00%
Hardwood Sub-total		***10,000***	***0***	***0***	10,000	100.00%	***0***	***1,506***		***-1,506***	100.00%

2.2.1.2. Domestic Activity

CBPPL doesn't manage its landbase for domestic harvesting with segregated blocks. Historically CBPPL issues several thousand domestic permits, in FMD 16, for the harvest of non-commercial species (hardwoods & larch), with Forestry Services administering FMD 9.

2.2.2. *Silviculture*

The levels of silviculture in Zone 7 were less than anticipated. Since the AACs in Zone 7 have been undercut for the previous period the levels of silviculture are accordingly lower.

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

Treatment Type	Area (ha)	
	Proposed	Treated
Pre Commercial Thinning	1680	102
Planting	2500	1640
Scarification	1900	800
Commercial Thinning	0	0
Cone Collection	0	0

2.2.3. *Forest Access*

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

Table 1- 6 Summary of forest access roads built 2012 to 2016.

Roads		
District	Proposed	Constructed (km)
9	113	22
16	34	7.5
	147	29.5

2.2.4. *Natural Disturbances*

2.2.4.1. *Fire*

Zone 7 has had a very infrequent fire history due to its relatively long winters and abundant precipitation. There were no significant fires during the last planning period.

2.2.4.2. *Insects*

There has been little insect activity in the Zone over the period 2012 to 2016.

3. Timber Supply Analysis

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

3.1. Methodology

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

Forest Modeling:

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

Baseline Constraints:

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

Table 1- 7 Provincial AAC classes

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

3.1.1. Guiding Principles and Policy Direction

The key underlying principles that guide this analysis are:
(i) the AAC must be sustainable;
(ii) the level of uncertainty (risk) associated with the AAC must be minimized

by using empirical information wherever possible;
(iii) there must be conformity between information and assumptions used in the analysis and actions and decisions taken on the ground;
(iv) the analysis must be consistent with other forest values and objectives; and
(v) the timber supply calculation must consider economic factors, not solely the physical supply of timber.

In concert with the policy of establishing sustainable timber harvest levels, Government policy requires that harvesting not exceed the established AAC's. Likewise, Governments policy is to optimize forest industry opportunities from the sustainable fiber supply. Government also requires consultation be conducted during the timber analysis. The forest industry was consulted directly throughout the process.

3.1.2. Factors Affecting Timber Supply

The forests of insular Newfoundland are very variable in terms of age distribution. Typically, there are significant amounts of mature/over-mature forest and regenerating forest, but limited intermediate age forests. This imbalance is not unusual in a boreal forest where cyclic catastrophic disturbances are common. Figure 4 illustrates this age class imbalance. The insufficient amount of intermediate age forest on the island is one of the most important factors influencing AAC's, therefore it is the basis for many of our forest management strategies. Essentially; we are employing a matrix of measures designed to fill the gap in our age structure, which include: an aggressive forest protection program, harvesting programs that attempt to exclusively target the oldest stands first, and thinning the regenerating forest so that it becomes operable at an earlier age. Another important aspect of the Province's forest posing a challenge to forest managers is the natural fragmentation of the resource. The Province's landscape is characterized by many ponds, bogs, rivers, streams, and rock outcrops resulting in relatively small pockets of timber. This makes the determination of an economic timber supply very challenging given that each stand has unique economic characteristics. Arguable the most important factor affecting present and future AAC's is the available productive landbase. However, this productive landbase available for forest activity is constantly being evaluated by the demands/requirements of other stakeholder values. Therefore, it is important that we manage relationships with other users to minimize loss to the forest landbase, while taking into account these other values. As well, to

mitigate losses to the productive landbase, we must continue to explore ways for growing more volume on the existing landbase.

In 2015, the Forest Service began another review of the provincial timber supply. Consistent with Department's vision, the analysis was structured to determine sustainable timber supplies while respecting a multitude of social, economic and environmental objectives. Timber supply, in this context, refers to the rate at which timber is made available for harvesting on a sustainable basis. The determination of supply (represented as AAC's) involved the use of computer models that forecast the sustainability of possible AAC levels. These models require three basic inputs. First, a description of the current state of the forest (forest characterization and availability), second, the growth rates associated with the current forest, and third, the management strategies applied to the forest. To arrive at these basic inputs require careful and detailed consideration of a broad range of both timber and non-timber values. More specifically, the following was considered in determining the sustainable timber supply.

3.1.2.1. Land Characterization

To get a current description of the forest resource (or stock), the Province has invested significant resources into creating and maintaining a Provincial Forest Inventory. Although the latest inventories used in the 2016 Wood Supply Analysis for this zone, the estimate of forest stock is kept current through an annual update program. This program accounts for all natural and man-made disturbances such as: fire, insects, harvesting, and any enhancement programs, including tree planting and pre-commercial thinning. Also, each stand in the forest inventory is updated to reflect any yield changes that may have occurred since the previous inventory update.

3.1.2.2. Land Availability

The updated Forest Inventory was reviewed and classified at the stand level on the basis of the availability of each stand for harvest. The classification system consists of two broad classes being available for the AAC calculation;

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

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

3.1.2.2.1. Non-Timber Related

Consideration of non-timber values has a direct impact on Provincial AAC's. It is obvious that as the amount of productive forest land available for timber management drops, so too will the AAC. With the current restrictions, the AAC landbase (area where harvesting operations can occur) is only 18 % of the total productive forest land base. On average, in any one year, less than 1% of the productive forest land base is influenced by harvesting operations.

3.1.2.2.2. No-Cut Buffer Zones

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

3.1.2.2.3. Pine Marten and Caribou Habitat

Habitat specialists are working in consultation with industry to study both species and ensure adequate habitat will be available for pine marten and caribou into the future. This work is examining the quantity and quality of habitat, as well as, the connectivity of habitat. With respect to Caribou, both the Forest Services Branch, Corner Brook Pulp and Paper and the Wildlife Division are working together to develop an adaptive management strategy.

3.1.2.2.4. Wildlife Corridors

As part of the evaluation process for harvesting plans, wildlife specialists sometimes recommend managed corridors to ensure various species of wildlife have sufficient cover to move around the landscape. These corridors are temporal in nature and generally have little impact on timber supply.

3.1.2.2.5. Protected Areas

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

3.1.2.2.6. Watersheds

For each of the forest management districts in Planning Zone 3, all of the public protected water supply areas and some of the larger watersheds (eg Gander River and Terra Nova River) were digitized and captured within the forest inventory. These watersheds were added to the database in order to address any concerns about forest management within these watersheds and to permit the Forest Service to report on proposed activities within these watersheds over time.

3.1.2.2.7. Operational Constraints

Areas that are inaccessible (surrounded by bogs or hills), timber on steep slopes, and low volume stands are removed from the AAC calculation up front. Also, significant adjustments are applied to the Provincial Forest Inventory for stands deemed operable in the timber analysis but left unharvested within operating areas. The reasons for this are linked to the character of Newfoundland's forests; low volume, steep slopes, rough terrain, and excessively wet ground conditions etc. Again, all these timber and non-timber related issues are applied directly in the AAC calculation to ensure harvest levels do not exceed the sustainable level. With the introduction of new values and the broader application of current values, the pressure on future AAC's will continue to increase.

3.1.2.2.8. Growth Forecasting

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

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

3.1.2.2.9. Management Strategies

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

3.1.2.2.10. Harvest Flow Constraints

An even-flow harvest constraint was used in the analysis to maximize the sustainable harvest level. This strategy produced the maximum even flow harvest but resulted in less than optimum economic use of the forest resource. If no even flow constraint is used and harvest levels are permitted to fluctuate in response to market value, the overall economic potential of the forest will increase. However, the lower economic potential is offset by stability in manufacturing plants and employment.

3.1.2.2.11. Planning Horizons

Given the Province's commitment to long term sustainability of our forest resource, timber supplies were projected 160 years (equivalent to two forest rotations) into the future to ensure

actions and strategies applied today will result in a sustainable forest in the future. Long term planning is fundamental in timber supply forecasting and ecosystem management as well.

3.1.2.2.12. Operable Growing Stock Buffer

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

3.1.2.2.13. Old Forest Targets

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

3.1.2.2.14. Operability Limits

Operability limits are the time windows in which forest management actions such as harvesting can be undertaken within forest stands. Stand growth development as measured in stand

merchantable timber volume and individual piece size of trees determine a stands readiness for harvest. In some young stands, one can have acceptable harvest volumes, but still have trees that are too small to harvest. In the wood supply analysis both stand volume and tree size were used to determine the earliest age when a stand could be initially harvested. In addition to determining the absolute earliest age a stand can be harvested, it was recognized that not all stands on the same site develop exactly the at the same rate. The ending operability limits or the last age in which a stand can be harvested before it becomes too old to harvest is solely determined on a minimum stand volume of between 60 to 80 m3/ha, after which that stand does not have enough volume to make it economical to harvest. It should be noted that while the operability limits define the extreme end points of when stands can be harvested, very few stands are ever harvested at these extreme points. In order to meet other non-timber objectives and in order to maximize the total volume of wood harvested the model schedules stands to harvest somewhere inside the operability limit window.

3.1.2.2.15. ***Silviculture***

Silviculture is one of the main forest management tools available to forest managers when they are analyzing the many different future forests that are generated using the wood supply modelling software. The silvicultural actions use in the 2016 analysis include; 1) precommercial thinning of balsam fir, black spruce, and softwood hardwood stands, and 2) full plant of any areas that do not regenerate naturally with either white spruce, black spruce, or Norway spruce. The planting levels for CBPPL tenure in districts 09 & 16, used in the analysis were 100 and 300 ha per year respectively with no precommercial thinning planned.

3.1.3. Forest Profile Dynamics

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

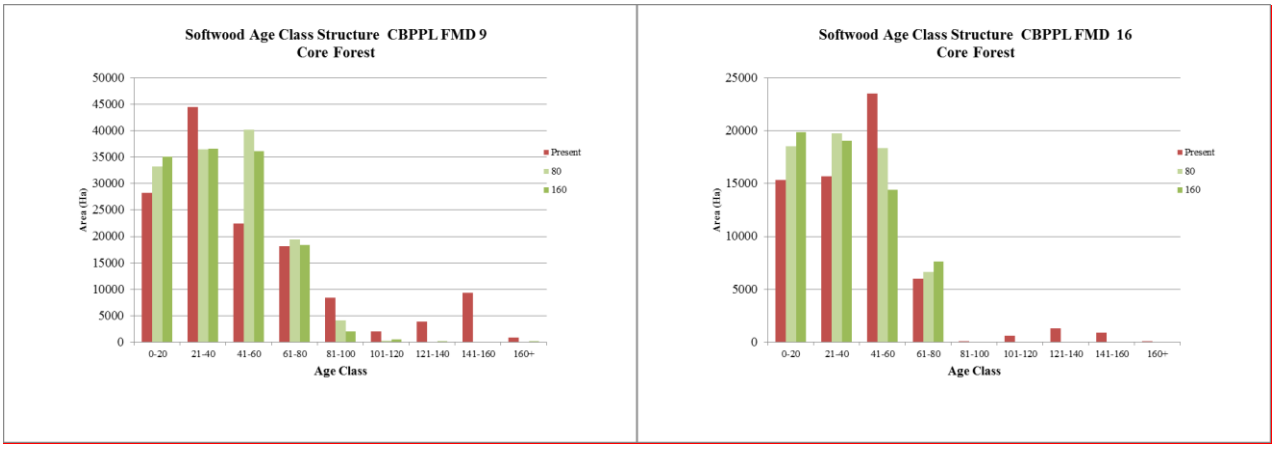


Figure 1- 6 Core Softwood Age Class Structure for Planning Horizon

The general trends for the age class structure at the end of each 80 year rotation ends to mimic the initial age class structure of present day, with minor variations. This isn't surprising as the management strategy of oldest first harvesting and even flow harvesting will facilitate this. To balance the ageclass structure it would be necessary to do varying amounts of silviculture coupled with an uneven harvest flow of wood. In FMD 9 the relative amounts of Spruce and Fir content remain fairly stable but should be monitored during stocking surveys. The species composition in FMD 16 shifts towards Spruce dominated stands from the fir dominated stands today. This is due the tendency to plant spruce after harvesting in this district. These are forecasts in the model and if through survey work it holds true and is an undesirable outcome then planting and/or crop selection thinning will need to be performed on these stands to ensure desired regeneration.

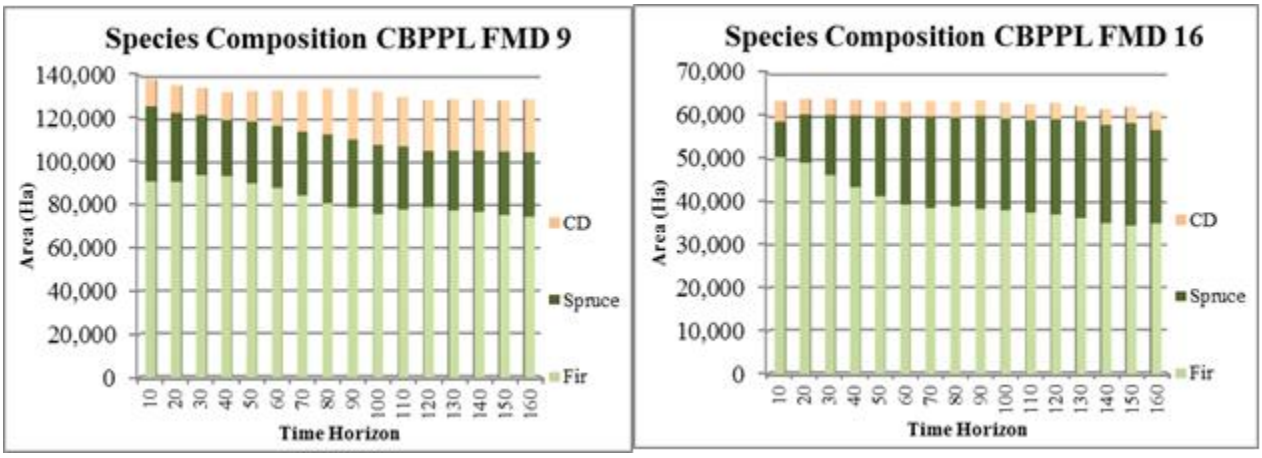


Figure 1- 7 Core Species Composition for Planning Horizon

3.1.4. AAC Adjustments

3.1.4.1. GMV Volume Adjustments

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

3.1.4.1.1. Natural Disturbances

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

3.1.4.1.2. Operational Losses (Predicted versus Actual Volumes)

Operational losses associated with stand level utilization and volume predictions are calculated based on data derived from commercial harvesting blocks (roughly 10% sample) occurring throughout the District over the previous five year period. Timber supply volume predictions are compared on a block by block basis against actual reported harvest volumes and a percentage difference, generally a reduction, is applied to the AAC to account for current and future operational losses. The Zone 7 operational loss is 17% for the 2016-2020 period.

3.1.4.2. Spatial Blocking Adjustments

Spatial blocking adjustments refer to the operational loss associated with the spatial scheduling. More specifically, the 20 year harvest schedule integration and the volume differences between the aspatial AAC and the spatially scheduled AAC. A major improvement that occurred in both the previous and the 2010 wood supply analysis is manual harvest scheduling. In 2001, the harvest scheduling was an automated process where the software picked the stands to be harvested over the 25 years based on user supplied criteria. The 2001 approach was an improvement over previously wood supply processes because there was no harvest scheduling completed. Basically, the software used cannot realistically know all the operational restrictions within a forest management district. By utilizing the spatial manual process, on the ground conditions that restrict harvesting are accounted for when a spatial harvest schedule is defined. The approach for 2016

was to use a 20 year harvest schedule using a 10 year harvest period. This was for two reasons; first to reduce modelling complexity at the aspatial level and secondly to align the amount of scheduled wood with the 2 times AAC allowed in a 5 year plan.

The proposed harvest schedule is then played back through the modeling software to evaluate its sustainability and determine if non-timber objectives are achieved. In most cases, the harvest scheduling exercise has to go through several iterations before an acceptable harvest schedule could be realized. The spatial arrangement of areas for timber harvesting is especially challenging in this province because of the natural fragmentation of our forests. This model provided forest planners with the ability to mimic realistic timber harvest schedules based on current practices and identify forest stands that are considered not as accessible for harvesting.

Manual harvest scheduling has several benefits. First, it fosters the long term sustainability of our AAC's by mimicking current harvest practices and accounting for actual on the ground conditions which delay or restrict harvesting of stands. Secondly, the mapped 20 year harvest schedules build credibility into the forest management process. Every stand that will be harvested over the next 20 years must already be in the second (20-40 years old) or third (41-60) age class, can be easily identified and highlighted on the harvest schedule maps. Being able to see the wood that will be harvested in the future will help reassure people the resource is being used in a responsible manner. Next, harvest scheduling will help integrate the management of other forest resource values into timber management planning. All forest values can be typed directly to discreet forest areas, providing the link allowing the many different forest values to be managed simultaneously. The forested areas needed for each resource can be mapped and potential conflicts can be addressed.

Finally, the harvest schedule maps developed for the wood supply analysis can be a starting point for the 5 year management planning process, especially the first period. The harvest schedule maps, if done correctly, can help reduce the work of the 5 year planning process. One point to note is that harvest scheduling is completed only for the Core landbase. The Operational AAC, for the most part, is opportunistic at best and is harvested only if extra effort is applied. It is not scheduled

because of the uncertainty of obtaining extra funding for access and harvesting. The Zone 7 blocking adjustment is 7.5% for the 2016-2020 period.

3.2. *AAC Results & Outputs*

The AACs for CBPPL tenure for Softwood in Zone 7 as a whole have increased by just over one percent. The Core softwood however has been increased by just under 6%. If the numbers are examined on a FMD basis CBPPL has actually made gains in both FMDs, but over the past 5 years the AACs have not been fully harvested. The operationally constrained AAC has gone down in both FMDs while the hardwood AACs have increased. The hardwood increase is due to the changes in sustainability parameters by the Crown.

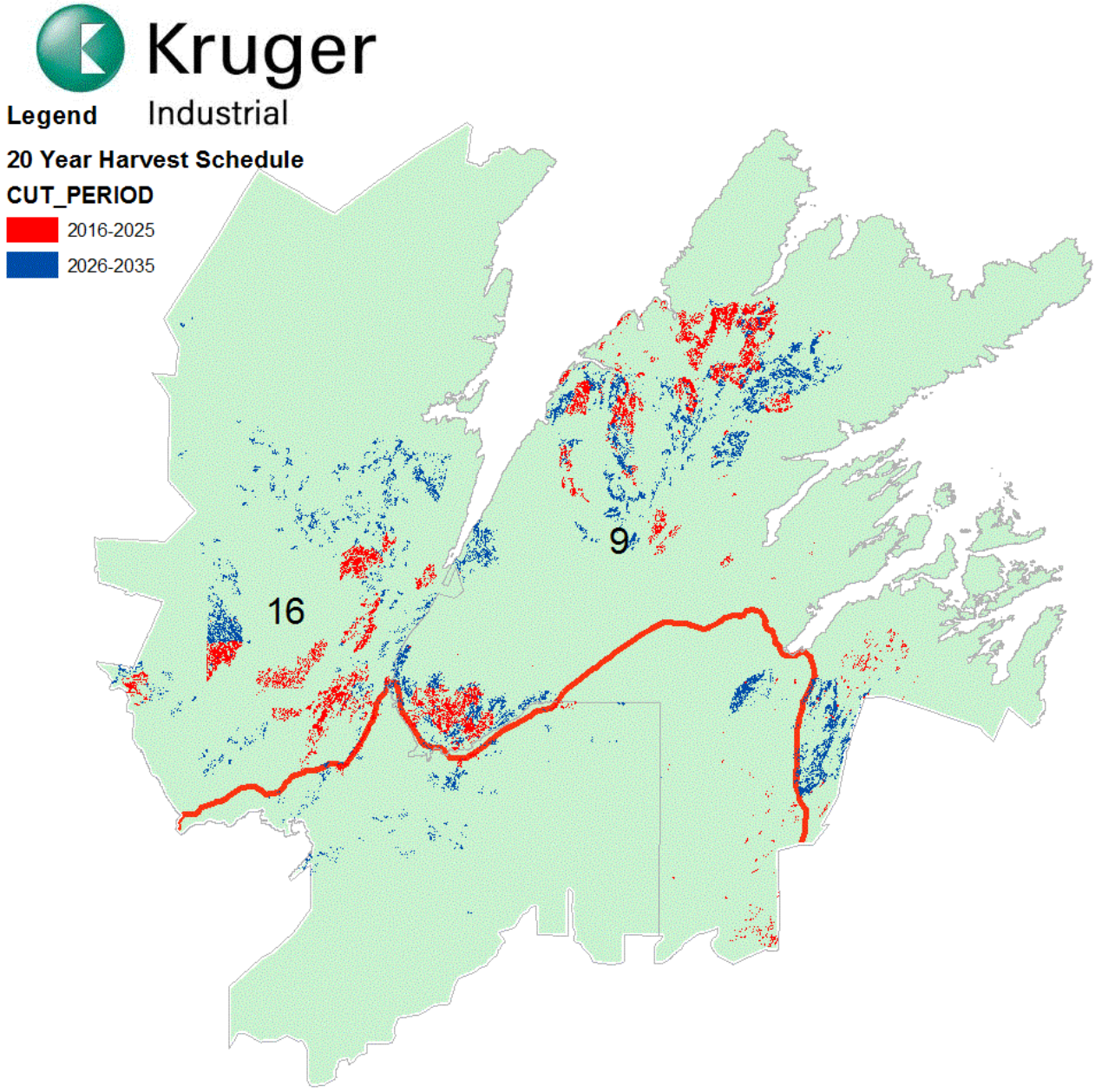
Table 1- 8 Annual Allowable Cut results 2011 through 2020.

Land Tenure		Zone	District #	Provincial Annual Allowable Cut (AAC) 2011-2015					
				Softwood Volume (m^3/yr)			Hardwood Volume (m3/yr)		
				Core	Oper Constrained	***Sub-total***	Core	OperConstrained	***Sub-total***
Kruger	***Island***	7	9	155,800	17,300	173,100	4,200	500	4,700
			16	110,300	21,800	132,100	1,400	100	1,500
			Sub-total	***266,100***	***39,100***	***305,200***	***5,600***	***600***	***6,200***

Land Tenure		Zone	District #	Provincial Annual Allowable Cut (AAC) 2016-2020					
				Softwood Volume (m^3/yr)			Hardwood Volume (m3/yr)		
				Core	Oper Constrained	***Sub-total***	Core	OperConstrained	***Sub-total***
Kruger	***Island***	7	9	161,600	7,600	169,200	5,000	0	5,000
			16	120,200	19,100	139,300	1,300	0	1,300
			Sub-total	***281,800***	***26,700***	***308,500***	***6,300***	***0***	***6,300***

3.2.1. *20 year Harvest Schedule*

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



Map 1-5. Harvest Schedule – ZONE 7.

3.2.2. *Harvest Profile*

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

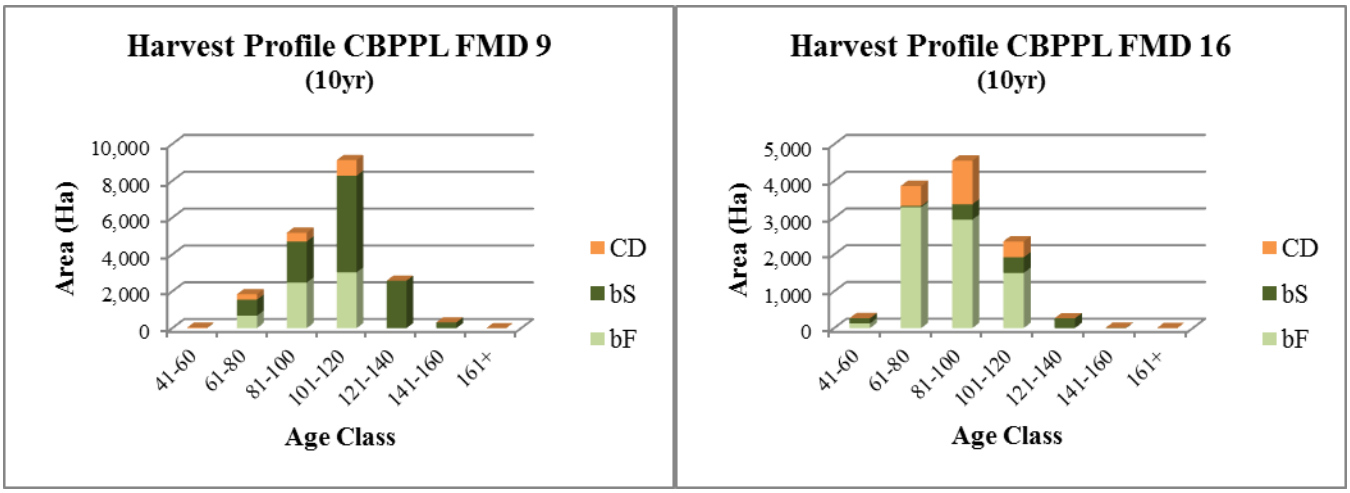


Figure 1- 8 Zone 7 Harvest profile

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

4. Resource Values

4.1. *Guiding Principles of Sustainability*

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

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

Political sustainability refers to goals and management objectives being applicable, administrable, and practical. These goals and objectives must maintain these qualities well into the future with the aid of public input and support. Social sustainability means fairness and equity to all stakeholders. Cultural sustainability is attained by applying Newfoundland's culture to the planning process. A forest management strategy cannot be successful without allowances within the strategy for traditional access and use of the land. For generations, many of Newfoundland's public had free range in our pristine wilderness, a fact that cannot be ignored when planning for the zone. All are key interlocking components and each must be maintained if sustainable development is to be achieved.

4.1.1. CBPPL Sustainable Forest Management (SFM) Plan Introduction

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

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

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

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

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

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

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

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

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

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

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

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

4.2. Values Structure

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

Other values such as water quality, parks and protected areas etc. provide for the protection of the forest ecosystems which can enhance the other values listed above. Many of the values in the zone were identified by this or previous or planning teams. Presentations of pertinent information on each value by knowledgeable individuals or groups provided stakeholders with relevant information to make informed decisions. Other values, while not specifically outlined by the planning team, are also identified and discussed to provide a more complete description of the range of values found in the zone. The following represents a framework for characterizing values in a clear and consistent manner. This approach consists of three components:

Characterization

- Description: Why the value is important, types of activities, intensity, spatial extent, employment, etc.

- Data in support: Statistical references.

Critical Elements

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

Guiding Principles

A guiding principle is defined as "a fixed or predetermined policy or mode of action".
These 'modes of action' would be implemented in the five year plan in the form of:
1. policies that should be in place to protect or enhance the resource value;
2. methods for negotiation or inclusion of other stakeholders in resolving potential conflicts;
3. special management provisions/strategies - such as buffer zone consideration, temporal operating periods, modified harvesting, or a best management policy; and/or
4. models and/or forecasting strategies to determine economic contribution, biodiversity impact, or community sustainability

Individual values were discussed both at the strategic and operational level. Strategic level information (characterization, critical elements, and guiding principles) are the focus of discussion in this section. They provide a mechanism to resolve conflicts that might arise throughout or after the five year planning process. Where possible, the physical location of the value on the landscape (operational level) was also identified during the discussion of values (appendix 6). This helps facilitate the preparation of the five year operating plan by identifying potential areas of conflicting use early into the process. In many instances, the Environmental Protection Guidelines (EPG's, Appendix 2) form the guiding principles for a value. Quite often the spatial extent or location of all values is not known (eg., raptor nests). Specific guidelines are still listed in order to provide a direction or course of action when and if these values are encountered.

4.2.1. Biotic Value

4.2.1.1. Big Game

4.2.1.1.1. Moose

Characterization:

Moose are not native to the island. Today, moose are distributed throughout the Island and the population is estimated to be about 125 - 140,000. Currently, moose are managed on an area/quota system in the province. The Island is divided into 50 management areas and license quotas are set annually for each area. Quotas are set based upon the management objective for each area (i.e., whether it is desired that the population increase, decrease or stabilize). Generally, if an area has too high of a moose population, managers will increase quotas to bring down the population in order to prevent damage to the habitat. However, if the habitat is in good condition, and the area could support more animals, future quotas may be increased. All or portions of moose management areas 3, 4, 12, 13, 14, 15 and 41 are located within the zone.

Critical Elements:

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

4.2.1.1.2. Caribou

Characterization:

Caribou is the only native ungulate species on the island. Biologists estimate that prior to the railway being built in 1898 the population on the Island was approximately 100,000 animals but by 1930 the population had declined to about 10,000 animals. Between 1980 and 2000 the number of caribou has increased considerably on the Island with a population estimated at 90-100,000 animals. In the past few years however populations have declined significantly, with Planning Zone 7 being no exception. All or portions of caribou management areas 62, 66, 69, 78, and 78 are located in the zone.

Critical Elements:

It is unclear how forestry activities in the immediate vicinity of calving areas during the calving period may have an impact on caribou populations. Recent studies and anecdotal information has indicated that harvesting restriction zone around caribou calving zones may be significantly larger than first thought. It has also been shown that as roads are constructed and access is improved into

remote areas, there is generally an increase in the number of animals which are killed due to road-kill and poaching.

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 but is crudely estimated to be about 6 - 10,000 animals (Christine Doucette, Pers. Comm.). All or portions of black bear management areas 3, 4, 12, 13, 14, 15 and 41 are located within the zone.

Critical Elements:

- den sites for winter hibernation;
- forest cover

Guiding Principles:

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

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

Environmental Protection Guidelines

Moose

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

Caribou

- to ensure the continued protection of these animals the following EPG's will be followed during forestry activities;
- in areas where caribou utilize lichens, a minimum amount of lichen forest must be maintained for caribou. (This amount is to be determined through consultation with Wildlife Division);
- harvesting and road construction will be minimized during the May 15 to July 30 calving period in operating areas adjacent to known calving areas;
- forest access roads, borrow pits and quarries shall avoid, where possible: known sensitive wildlife areas such as, calving grounds, post calving areas, caribou migration routes, caribou rutting areas and wintering areas.

Bear

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

4.2.1.2. Furbearers

Characterization:

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

Critical Elements:

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

Guiding Principles:

Fur Bearer Management Strategy:

Recommendations concerning the management of furbearer species are developedannually by the Wildlife Division, upon consultation with provincial trappers, Newfoundland and Labrador Trappers Association, general public, and departmental staff. Like the small game management plan, the fur management plan, reviews the status of each fur bearer species annually and addresses

the season dates and lengths, and if necessary closure of areas (or no open season). Management of all fur bearing species in the zone will continue to be managed through this process.

Environmental Protection Guidelines:

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

4.2.1.3. Rare and Endangered Species

4.2.1.3.1. Pine Marten

Characterization:

Before 1900, marten ranged over most of the forested areas on the island. Unfortunately, due to a variety of reasons, the population levels dropped where this species was listed to the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) as Endangered. Habitat loss, predation, disease and accidental trapping and snaring are thought to be primary reasons for marten population decline in Newfoundland. Marten still naturally occurs in three main areas on the island including: Main River watershed, Little Grand Lake and Red-Indian Lake areas. Additionally, marten also now exist at Terra Nova National Park (TNNP) and surrounding landscape. As well, in the Bay Du' Nord Wilderness Area around Lake St. John through a relocation effort by the Eastern Newfoundland Pine Marten Recovery Team. Representatives from TNNP, Forest Services Branch, Wildlife Division and CBPPL are represented as stakeholders of the recovery team. The purpose of this team is to set short-term and long-term population goals for the species in eastern Newfoundland and recommend ways which this may be accomplished. The Team has been established for some time now and has worked on the process of evaluating critical and recovery marten habitat and determining which forest activities can take place within these areas. Approximately, 16 marten have been relocated to these areas and the population estimate today is approximately 300. Once listed as Endangered, COSEWIC has now downgraded the marten listing to Threatened.

It is important marten habitat is protected in this area and some remnant stands of old growth (80+) forests remain throughout the zone. To accomplish this, a landscape approach to habitat management was initiated by the Forest Service in 1999. This involved working with stakeholders

to identify critical or potential marten habitat, locating possible corridors, and identifying areas which would not be cut in the near future. This initiative has been ongoing since that time.

Critical Elements:

- sufficient habitat to support a viable population of marten;
- areas of known marten populations remain closed to snaring and trapping

Guiding Principles:

The basic unit for evaluation will be home range size for male (30km^2) and female (15km^2). All forest types can be considered marten habitat if they meet the following requirements:

- sufficient habitat to support a viable population of marten;
- 70% or greater of that unit must be suitable habitat; - 40% or greater of the unit should have trees greater than or equal to 9.6m in height;
- The remaining portion of the 70% (30% or less) should have trees between 6.6 and 9.5m;
- 50% of the unit should be contiguous; stands will have to be within 50 m of an adjacent habitat to be considered contiguous.
- A qualifying stand will have to be within 150 m of another stand or habitat patch to be considered as habitat.
- minimum patch size equals 20 ha;
- basal area requirement equals 40 m^3/ha (~18 m^2);
- hardwood stands (insect kill, wind throw) will be considered where crown closure is greater than or equal to 30%;
- Softwood scrub that meets the minimum requirements (6.5 m) will be considered habitat.

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

habitat in the future. There is also ongoing research into a variety of aspects of marten dynamics through the Model Forest, Canadian Forest Service, and University of Maine. Recommendations resulting from any of these ongoing initiatives will be incorporated into harvesting prescriptions as required.

4.2.1.3.2. Rare Plants

Characterization:

Approximately 300 plant species, or about a quarter of all plant species on the island of Newfoundland, are considered to be rare and are found in 20 or fewer locations. Rare plants are often found in habitat types that are themselves rare or at least fairly restricted. While the limestone barrens of the Great Northern Peninsula are the best-known rare plant habitat, other habitats with high rare plant diversity exist in Zone 7 and other areas of the island.

Most of the rare plant species throughout Newfoundland are inhabitants of fairly open habitats, such as river gravels, salt marshes, wetlands, aquatic habitats and barrens; all areas where no forestry operations are practiced. The known rare plant distribution is very much a reflection of survey effort, which is mostly limited to a strip about a kilometre wide adjacent to major roads. Only a few botanists have ventured onto the forest resource roads, therefore most rare plant locations in Zone 7 likely remain undiscovered. Many areas of Districts 9 and 16 appear to be devoid of rare plants, but it is likely that they have never been visited by botanists. Many riparian areas have potential for rare plants, and could be impacted as stream crossings are constructed for new forestry roads.

Currently, in Zone 7, there are no listed Endangered, Threatened, or Vulnerable Species. However as rare plant sites are identified in areas selected for harvesting, mitigating measures will be developed in consultation with the Wildlife Division.

Critical Elements:

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

Guiding Principles:

- To ensure that rare and endangered plant species present in the zone do not become extinct 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. Red Crossbill

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

4.2.1.3.4. Waterfowl

4.2.1.3.4.1. 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 16, harlequins have been reported by the Canadian Wildlife Service (CWS) in the Upper Humber River (at a density of 0.051 females/km of river). Although no harlequins have been seen in the Main River area to date, it is thought the upper reaches of this river may contain suitable habitat.

Critical Elements:

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

Guiding Principles:

CWS recommend that a 100 metre buffer zone be left on any river where harlequins are found as well as, in the upper reaches of the Main River, which potentially could support breeding harlequins. On all other stretches of the Main River, a treed buffer of at least 30 metres 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 metre, no-cut, treed buffer will be maintained from the high watermark in waterfowl breeding, moulting, and staging areas.

4.2.1.3.4.2. Other Waterfowl

Characterization:

District 16 contains two very valuable areas for waterfowl in Newfoundland - the Upper Humber and Main River areas.

The Upper Humber Wetlands Complex has long been recognized to contain valuable breeding, nesting, brood-rearing, and/or staging habitat for a variety of waterfowl species. Surveys of the Upper Humber conducted by the Canadian Wildlife Service (CWS) in 1989 revealed that ring-necked duck was the most frequently observed waterfowl species, followed by black duck, common goldeneye, Canada goose, green-winged teal , blue-winged teal, northern pintail , and common merganser. Birchy Basin was found to be the most productive waterfowl area, followed by Neds Steady, Gales Bottom, and the Adies Pond area.

A Stewardship Agreement exists between the Provincial Government, CBPPL, and Ducks Unlimited Canada for the protection and enhancement of approximately 25,000 hectares of waterfowl habitat in this area. Enhancement activities carried out in the area included replacing the old dam at Birchy Basin with a newer water control structure equipped with a fishway in 1993. The water control structure now stabilizes water levels throughout the Basin and helps maintain an estimated 1,000 acres of critical waterfowl and salmon rearing habitat (Northland 1986).

The Main River area is also known to support a variety of waterfowl species. Black duck, green-winged teal, blue-winged teal, red-breasted mergansers, and goldeneye have been reported in the area. High concentrations of Canada geese have been reported in the Big Steady of Main River. The Big Steady is reported to be an important staging, breeding, brood-rearing, and molting area for the geese and other waterfowl species. It has been estimated that there is about 200 ha of suitable waterfowl habitat near the Big Steady and that the grasslands, southwest of Paradise Pool, are major concentration areas for the birds.

Critical Elements:

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

Guiding Principles:

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

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 7, water is used beneficially for numerous purposes. There are 34 communities within the zone which have water supplies. Thirty one of these supplies are protected under the

province's Protected Water Supply Program and the remaining three are categorized as unprotected although still monitored by the program. Recreational waters within this zone are used for activities such as fishing, boating and as a water supply source for numerous cabin owners. Industrially, waters within the zone are primarily used for hydroelectric production at Cat Arm, Deer Lake and Rattle Brook and for irrigation on agriculturally developed land, primarily in the Cormack and Green Bay areas with smaller hobby type farms dispersed throughout the zone.

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.

Domestic harvesting still provides fuelwood to heat many homes. Approximately 1500 domestic permits are issued on CBPPL limits in the zone. Commercial activity accounts for the majority of the harvest by the Crown in the zone. Commercial activities provide many jobs in harvesting, sawmilling, trucking, pulp and paper manufacturing and related spin off industries for local residents. There are in excess of 150 direct jobs created by the industry with an estimate of nearly twice that many in spin off industries.

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 $300 000 spent on silviculture in the zone each year creating more than 30 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 $1 000 000 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 calculated using the latest information while taking into account other resource values and conducting environmentally sound operations. This is achieved by

- maintenance or enhancement of productive land base
- planting of non-regenerating areas
- minimizing loss of land base to other users
- minimize losses to fire, insect and disease
- timely access road construction
- enhancement of younger age classes through thinning to correct age class imbalance
- 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 2 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 substantial agriculture industry in the zone, an industry with considerable potential to expand and provide increased economic benefits to the local area. Commercial agriculture is concentrated in Cormack, Reidville, Howley, Kings Point, Rattling Brook, and Green Bay and the agriculture products produced represent a significant portion of the total agriculture industry in the province. Most of the major farming activities in the province are represented in the zone. In the livestock sector, dairy, beef, sheep and fur contribute approximately $5.0 million total farm gate value to the provincial output. The crop industry which consists of vegetables, small fruit, forages, Christmas trees and greenhouses production contribute another half million dollars to the total provincial farm gate value.

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 Forestry and Agrifoods Agency.
- 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:

In Planning Zone 7 there is a diverse geological environment which hosts a wide variety of both metallic and industrial minerals including, but not restricted to; copper, nickel, lead, bitumen, granite, gneiss, marble, gold, asbestos, silver, iron, limestone molybdenum, uranium and thorium. There is also granite with dimension stone potential.

In District 16 alone there are over 800 mineral exploration claims staked and registered; the majority being for metallic mineral potential with expenditures in the hundreds of thousands. Exploration activities during this period consisted of prospecting, geological mapping, grid line-cutting, geochemical surveys, ground and airborne geophysical surveys, mechanized trenching and diamond drilling. In addition, there are a large number of active quarries in the zone which generate significant royalties. These figures are included to illustrate the significant contribution that mining has to the local and provincial economy.

Critical Elements:

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

Guiding Principles:

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

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.
- 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 can not be feasibly extracted using conventional means then timber shall be piled so that it may be extracted during winter months by snowmobiles.
- Mineral exploration 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
- When forest activities have been completed, road/bridge rehabilitation and decommissioning plans will be identified in the AOP and made available to the Mines branch at their request
- 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. To date there are 19 known archaeological sites within District 16 and over 90 in District 9.

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. Ferryland alone saw 16,500 visitors in 2000.

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.

Critical Elements:

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

While forestry activities can have adverse impacts on historic resources there are also beneficial effects. When impact assessments are carried out and new sites found, it adds to our understanding of Newfoundland and Labrador's heritage. When archaeological sites are discovered through impact assessments these resources are protected from damage or destruction and preserved.

Guiding Principles:

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

In order that known archaeological sites and potential unknown sites are protected from forestry activities buffer zones will be necessary in some areas whereas archaeological assessments may be required in others. Known archaeological sites must be avoided and buffers will be required around them. 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 side for the parks is not large enough to protect the full integrity of that ecosystem. Large-scale changes on the landscape surrounding parks can isolate the park ecologically creating an "island". Parks Canada must work with adjacent land managers in striving to achieve its mandate.

Biodiversity goes beyond the range of wildlife and plant species to include the range of habitats and landscapes. Loss of special habitats such as 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 eastern area of this zone borders on District 16. 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 within District 16, threaten this wilderness quality. The presence of the american 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. Recreational Trails

Characterization:

4.2.2.6.1. Newfoundland T'Railway

A large section of the Newfoundland T'Railway Provincial Park lies within the zone and has an impact on forestry operations. The former CNR right-of-way, which is 25 feet each side of the center line, is the main route for the T'Railway, with some minor deviations. It provides for an all season, multi-use recreation corridor developed and managed with community partners to maximize adventure tourism and recreational opportunities. The T'Railway is protected for the present and future enjoyment of the public, as part of a system of provincially designated parks and natural areas. The Provincial Parks Act provides the legislative framework for the administration and management of the T'Railway, which constitutes the Province's contribution to the Trans Canada Trail System. It is the largest provincial park in the Province with the most users. It is used primarily for snowmobiling, skiing, hiking, walking and all-terrain vehicle usage. Other new or historical uses such as commercial and domestic harvesting access, quarry and mining access and cottage access are also permitted with a special permit.

4.2.2.6.2. Other Trails

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

Critical Elements:

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

Guiding Principles

- coordination of activities with various other agencies responsible for land management outside the T'Railway corridor to ensure that the integrity of the park is maintained
- coordinate and build partnerships with other stakeholders and user groups such as communities, industry and recreational organizations for the long ter maintenance and development of the trails
- in an attempt to preserve the natural value of the T'Railway, other land management agencies are requested to maintain a 100 m buffer and to consider viewscapes in their harvesting and development plans. Buffers of varying widths have also been applied to other trails in the planning zone.

4.2.2.7. Parks and Protected Areas

Characterization:

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

There are many types of protected areas in the province. The Wilderness and Ecological Reserves Act enables the Province to establish the following; wilderness reserves (Component 1), ecological reserves (Component 2) and protected sites (Component 3). Component 1 reserves are defined using the critical habitat of high level, wide ranging species i.e. caribou. They generally cross ecoregion boundaries, protect complete systems and are large (> 1000 km²). Component 2 reserves protect representative samples of ecoregions (not included in Component 1 reserves) and are mid-sized (50-1000 km²). Component 3 reserves protect exceptional natural features, such as, rare species or areas of unusual biological richness and are generally small (< 50 km²). The benefits of

protected areas are to preserve biodiversity, provide areas for scientific research, provide opportunities for environmental education and provide standards against which the effects of development can be measured. Protected areas in the zone include: the T'Railway, Terra Nova National Park, Bay Du' Nord Wildnerness Area, and Notre Dame Junction, Dildo Run and Jonathon's Pond Provincial parks. As well, two candidate proposed ecological reserve areas, one for the Central Newfoundland Forest Ecoregion and one for the North Shore Forest Ecoregion currently have interim protection.

Critical Elements:

- preservation of biodiversity
- maintenance of protected area integrity
- maintain natural processes and features

Guiding Principles:

- the Province of Newfoundland's Natural Areas Systems Plan recommends that a minimum of 12% of the province's entire land base be protected.
- only allow traditional (hiking, berry picking, hunting etc.) activities, educational activities and scientific research within protected areas provided the integrity of the reserve is not compromised
- prohibit all forms of new development such as mining activity, hydroelectric projects, forestry activity, agriculture activity, roads and trails and cottages and new structures.
- where forestry operations are within one kilometre of provisional and ecological reserves, wilderness reserves or provincial parks, modified operations may be necessary

4.2.2.8. Outfitting

Characterization:

The outfitting industry has been an integral component of the tourism industry in Central Newfoundland 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 many outfitters operating within the boundaries of the zone that operate and maintain main and/or line camps. These operations provide seasonal employment for many local individuals.

An economic impact study conducted in 1995 by the Department of Industry, Trade and Technology suggests that a big game license has a net economic impact of $6864. By approximating this value at $7500 for 2011, it is possible to estimate the economic contributions of this industry: approximately 300 licenses * $7500 / license = $2.25 million. The many trout and salmon destinations in the zone also make fishing an important economic contributor.

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 impacted the viability of outfitting operations and as such, increasing numbers of operators are considering these opportunities. Diversification can lengthen seasons of operation, increase and lengthen employment, and reduce dependency on a single sector of the tourism industry. Pristine wilderness settings are necessary for many of these types of diversification.

Critical Elements:

Remote outfitting camps are dependent on their remoteness. 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.

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.

4.2.2.9. Recreation

Characterization:

The greater White Bay area 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. Non-timber recreational values are expected to play an increasing role in forest management practices.

Canoeing and kayaking on the Main and Indian Rivers, the Alexander Murray and many other hiking trails, numerous ski and snowmobile trails, and excellent hunting and fishing 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.

Accessibility

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

Viewscapes

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

Guiding Principles:

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

Wilderness

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.

Viewscape

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.

4.2.2.10. Tourism

Characterization:

The tourism industry in Newfoundland and Labrador is based on natural and cultural resources, where protection is important for the industry to survive and grow**.** The tourism industry in Newfoundland and Labrador has experienced significant growth since 1997. Tourism Industry has been contributing between $580 and $700 million annually to the provincial economy. Government tax revenue from tourism in 1998 was estimated to be $105 million. The worldwide growth of tourism at rate of 41 percent, the national growth of 25 percent and the provincially growth of 33 percent indicates tourism is Newfoundland and Labrador's best opportunity for economic diversification and growth.

There are many excellent tourist destinations in the zone. The Main River (designated as Canadian Heritage River), Gros Morne National Park, Fleur de Lys soapstone quarry (National Historic Site), Baie Verte self guided geology tours, and Deer Lake insectarium are examples of the more prominent tourist attractions.

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 viewshed issues where applicable in the zone. .

5. Mitigations

Stakeholder	Contact	FMD		ISSUES / CONCERNS RAISED DURING 2017-2021 PLAN DEVELOPMENT on CBPPL Timber Limits (Government Depts. and on-on-one consultations with known stakeholders) Forest Management District 09 & 16	Mitigation
Parks & Natural Areas	Jeri Graham	FMD 09, 16		Digital information highlighting the proposed harvest and primary road construction activities for the 2017 – 2021 plan were provided to the Department of Environment & Conservation late in 2015 for analysis. A subsequent review meeting on February 1, 2016 identified no concerns from the Parks & Natural Areas Division.	CBPPL will provide the Department of Environment & Conservation a copy of each year's Annual Operating Plan for review. Any issues or concerns arising from this review will be dealt with in a timely manner.
Wildlife Division	Kirsten Miller	FMD 09, 16		**K-16-44 – Taylors Brook**: Overlap with Stewardship Management Unit (Upper Humber Management Unit). This area was established in agreement between WD, CBPPL and Ducks Unlimited. As per the agreement, Stewardship Management Units are 'no loss' areas with no development. Digital information highlighting the proposed harvest and primary road construction activities for the 2017 – 2021 plan were provided to the Department of Environment & Conservation late in 2015 for analysis. A consultation meeting on February 1, 2016 was held with the Wildlife Division to initiate the development of corridors and no harvest zones to protect sensitive wildlife habitat in Fmd 09 and 16. A subsequent meeting on June 8 finalized this process. **K-09-16 – Lynx Pond, K-09-17 – Main Brook, K-09-23 – Dawes Pond, K-09-36 – Camp 34, K-16-35 – Davis Pond, K-16-38 – Sandy Lake, K-16-39 – Angle Pond, K-16-44 – Taylors Brook, K-16-47 – Adies River, K-16-49 – Gales Brook, and K-16-50 – Adies West:** These proposed harvest areas are within core / buffer caribou areas. Commercial harvest activities are to take place outside of the calving/post-calving period and maintain 30% of the overmature forest.	CBPPL removed the proposed harvest from within the Management Unit and agreed to a 50 meter buffer along its boundary. CBPPL has agreed to defer all harvesting for the duration of this planning period within the agreed upon sensitive wildlife zones. CBPPL will provide the Department of Environment & Conservation a copy of each year's Annual Operating Plan for review. Recommendations pertaining to harvest timing or maintaining 30% overmature within harvest blocks will be built into the operational plans.

Crown Lands		FMD 09, 16		**K-09-10 – Pine Pond, K-09-13 – Rambler West and K-09-35 – Southern Pond:** These areas overlap sections of the Town of Baie Verte's Municipal / Planning Area boundaries. **K-09-05 – Rice Mountain:** This area overlaps a section of the Town of Westport's Municipal / Planning Area boundaries. **K-16-03 – Faulkners Pond:** This area overlaps a sections of the Town of Hampden's Municipal / Planning Area boundaries. **K-16-40 – Birchy Narrows and K-16-45 – Sheffield Lake:** Overlaps with Cabin Development Areas. Contact with Peter Hearn (Land Management Division) resulted in identification of key locations on CBPPL Limits. **General Cabin Locations on CBPPL Limits:** CBPPL will continue to investigate the location of legal titles within operating areas prior to harvest. All efforts will be made to resolve identified conflicts.	Consultation with the Town of Baie Verte is required before any Forest Management activities can occur within the Town's boundaries. Consultation with the Town of Westport is required before any Forest Management activities can occur within the Town's boundaries. Consultation with the Town of Westport is required before any Forest Management activities can occur within the Town's boundaries. CBPPL will continue to monitor Cabin Development Areas prior to harvest and road building activities. All efforts will be made to reduce impacts. Ongoing
Mines & Energy		FMD 09, 16		Should future quarry or mineral resource developments or exploration programs (i.e. new quarry development, existing quarry expansion, new mine development, quarry materials exploration, mineral exploration) be considered by Forestry as having the potential to cause a significant impact on the forest resource and forest resource users, then Forestry should work closely with the Mines Branch and the proponent to ensure that mutual impacts are minimized. Other Forest Management Plans, in relation to mineral exploration, have stated that parties carrying out mineral exploration should "Make every attempt to extract timber harvested as part of exploration and development. If timber cannot be feasibly extracted using conventional means then timber shall be piled so that it may be extracted during winter months by snowmobiles." Many mineral exploration companies, having abided by this	CBPPL will adhere to the policies as outlined by the Forest Service and commits to working with Mines & Energy to ensure both sectors continue to operate as efficiently as possible. CBPPL will notify the Mines Branch of any road or bridge decommissioning prior to commencement.

				principle in the past, have stated that often the timber they have stacked is not harvested but rather remains untouched. In addition, the Mines Branch, for the past several years, has been advising mineral exploration companies to use any timber they may have to cut for the purposes of corduroy over soft ground (to prevent rutting) and site rehabilitation (e.g. scattering over disturbed sites, especially those having lost their original organic cover), and the Mines Branch is presently finalizing a draft set of 'Environmental Requirements and Recommendations for Mineral Exploration' which will encode practices such as these which minimize the environmental impact of mineral exploration. For these reasons, and in light of the referral process described below, the Mines Branch requests that the Forestry Services Branch reconsider the above statement. All applications for 'exploration approval' for exploration programs beyond basic prospecting and low-impact sampling are referred to the Forestry Services Branch (among other government agencies) and Forestry should continue to use these opportunities to communicate any project-specific concerns or requirements. Project-specific concerns and requirements are addressed in the conditions under which the exploration work is approved. As has been recognized in other Forest Management Plans, many forest access roads and bridges are used by other land users, among them parties carrying out mineral exploration or quarrying. The Mines Branch requests that it be forwarded plans to decommission roads or bridges as a matter of course to ensure that all road/bridge rehabilitation and decommissioning plans are reviewed to consider whether mineral exploration, quarrying, or mining may be affected.	
Qalipu First Nation	Jonathon Strickland	FMD 09, 16		Digital plan information was provided for review and comment.	No further consultation scheduled to date.
Outfitter	Roger Sheppard	FMD 09		Outfitter on Upper Indian Pond & Buck Lake– CBPPL sent an information package to all Outfitters located within or in close proximity to their Timber Limits, each package contained maps showing proposed harvest areas and road development proposals. Individual Outfitters were asked to submit concerns or issues regarding the new Five Year Plan (2017 – 2021).	No correspondence has been received to date. Information packages were sent on two different occasions.
Outfitter	Todd	FMD		Outfitter on Great Gull Lake – CBPPL sent an information package to all	No correspondence has been received to date.

	Wiseman	09		Outfitters located within or in close proximity to their Timber Limits, each package contained maps showing proposed harvest areas and road development proposals. Individual Outfitters were asked to submit concerns or issues regarding the new Five Year Plan (2017 – 2021).	Information packages were sent on two different occasions.
Outfitter	Cyril Pelley	FMD 09		Outfitter on Black Lake – Phone conversation, Mr. Pelley had no concerns with CBPPL harvest plan.	No further consultation scheduled to date.
Outfitter	Rod Stowe	FMD 16		Outfitter on Adies Lake – Met with Mr. Stowe to review plans. There was no conflict with proposed harvest plans around Lodge but concerned was raised regarding salmon spawning grounds at the mouth of Whites River.	CBPPL committed to explore the sensitivity of this area further. Plans are to meet with Salmon Preservation Association for Waters of NL (SPAWN) and have plans reviewed by DFO.
Outfitter	George Hatcher	FMD 16		Outfitter on Silver Mountain Lake – CBPPL sent an information package to all Outfitters located within or in close proximity to their Timber Limits, each package contained maps showing proposed harvest areas and road development proposals. Individual Outfitters were asked to submit concerns or issues regarding the new Five Year Plan (2017 – 2021).	No correspondence has been received to date. Information packages were sent on two different occasions.
Outfitter	Otto Roberts	FMD 16		Outfitter on Chain Lakes &Angus Lake – Met with Mr. Roberts on March 11, 2016 to review plans. Mr. Roberts had no issues regarding the harvest plan but requested that a bridge in the Birchy Narrows area be removed to reduce the impact on his operation.	CBPPL committed to removing the bridge once it has met all regeneration (silviculture) requirements as mandated by the Forest Service.
Outfitter	Roger Keough	FMD 16		Outfitter on Stephens Pond – Contact was made by phone, Mr. Keough had no concerns with the harvest plan.	No further consultation scheduled to date.
Outfitter	Lester Goobie	FMD 16		Outfitter on Alex Brook & Strattons Pond - CBPPL sent an information package to all Outfitters located within or in close proximity to their Timber Limits, each package contained maps showing proposed harvest areas and road development proposals. Individual Outfitters were asked to submit concerns or issues regarding the new Five Year Plan (2017 – 2021).	No correspondence has been received to date. Information packages were sent on two different occasions.
Outfitter	Ray Broughton	FMD 16		Outfitter on Sandy Lake – Contact was made by phone, Mr. Broughton had no concerns with the harvest plan.	No further consultation scheduled to date.
Outfitter	Fred Thorne	FMD 16		Outfitter on Eclipse Pond & Big Falls - Contact was made by phone, Mr. Thorne had no concerns with the harvest plan.	No further consultation scheduled to date.
Outfitter	Alex Crosbie / Keith Payne	FMD 16		Outfitter on Snowy Lake – met with Mr. Payne to review plans, there were no concerns with the harvest plans.	No further consultation scheduled to date.
Tourism	Paul Taylor	Fmd 09, 16		Digital information highlighting the proposed harvest and primary road construction activities for the 2017 – 2021 plan were provided to the	No further consultation scheduled to date.

				Department of Business, Tourism, culture and Rural Development late in 2015 for analysis. The location and identity of all Outfitters on CBPPL Timber Limits was provided to initiate consultation with each individual owner. Met with Paul Taylor on June 1, 2016 and provided a PDF copy of operating area maps for review. No additional issues or concerns were expressed at that time.	
NLOA	Cory Foster	FMD 09, 16		Requested assistance from Cory Foster (Executive Director – NL Outfitters Association) in contacting those Outfitters that had yet to return correspondence regarding the proposed Five Year Plan.	Cory sent correspondence to those Outfitters that are NLOA members requesting them to contact CBPPL.
NLSF	Bruce Nichols, Tom Humphrey	FMD 09, 16		Provided NL Snowmobile Federation direction to locate copy of CBPPL's Five Year Plan or opportunity to schedule a review meeting. Committed in writing to continue the annual fall issues review meeting between both parties.	Committed to continue annual fall review meeting. This process has been ongoing for several years and has resulted for example in CBPPL constructing new bypass trails in several locations to avoid conflicts, identifying and correcting safety concerns at snowmobile crossing sites and installing safety awareness signs at crossing sites.
SPAWN	Barry Elkins	FMD 09, 16		Provided Salmon Preservation Association for Waters NL (SPAWN) PDF maps of all operating areas for their internal review. Mr. Sweetland has requested a subsequent meeting to review the maps.	CBPPL is committed to meeting with SPAWN to better understand their issues and concerns. No meeting schedule to date.

6. *Public Consultation*

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

The stakeholder involvement process into the development of new five year operating plans in 2016 has changed from the historical process. Over the years, Managers have seen a reduction in public participation in many zones. In anticipation of capturing an increased public awareness, the District Ecosystem Managers have reached out to a number of known stakeholders in each planning zone during the winter/spring of 2016 as plans were being developed.
To support further public consultation, a process has begun of scheduling a number of "open house" sessions over the summer months. Each Zone will have a minimum of one , full open house session and any additional sessions within a zone will occur as required.

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

Zonal "opens house" sessions will commence mid-July and continue throughout the summer as required. These sessions will be located at strategic locations, and when fully identified, it is

anticipated another press release will be given to inform the public of location and time to visit and discuss any concerns / issues.

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

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

7. Management Goals, Objectives and Strategies

7.1. Harvesting

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

7.1.1. Commercial

Section 3 outlines in detail a general approach for the timber supply analysis and specific results and sensitivity analysis for the zone. The model used to calculate wood supply is a maximization model, outlining a specific course of action and timing of such actions to maximize timber production. The harvest schedule is an example, which indicates the specific forest stratums to be harvested, and an indication on the timing of such harvest. The districts must follow this schedule as closely as possible in order for the AAC to remain valid. In general, the oldest timber considered in worst condition and losing volume fastest is targeted as first harvest priority.

Younger stands that have been damaged by insects and disease may also receive high priority. Once managed stands are eligible for harvest, this priority may change in some cases to allow for a faster rotation on good sites that are silviculturally treated.

Currently, there is only 1 large integrated sawmill operating in the Zone which is Burtons Cove Logging Ltd. (BCLL). BCCL utilizes material harvested in its own operations as well as utilizing the saw log material from CBPPL harvested areas, and in turn sells pulp chips and sawmill residues to CBPPL.

Specific commercial strategies are as follows:

- Continue to encourage and promote growth in the sawmill industry through exchanges and transfers

7.1.2. Domestic

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

7.1.3. Hardwoods

The harvest of white birch occurs throughout the planning zone in close association with softwood harvest for saw logs, pulpwood and firewood. Hardwood utilization by CBPPL is limited to the issuance of several thousand domestic permits in FMD 16 to allow residents of the zone to harvest non-commercial species for home heating use. Forestry Services manages domestic & commercial firewood permitting for CBPPL in FMD 9.

7.1.4. Silviculture

Section 2.1.3.2.4 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. In recent years however, particularly in

District 16, there is concern about the type (species) of regeneration because of the increased presence of balsam woolly adelgid in the area. In these areas regeneration to balsam fir may not necessarily be acceptable on certain site types. As well, on certain sites in District 9, particularly in the Seal Bay area, balsam fir has been regenerating on black spruce sites and often forms the majority of available stocking. This regeneration is "off site" and often becomes chlorotic and stagnates at an early age. Prescriptions to deal with these problems will be presented in sections to follow.

7.1.4.1. 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. Due to the increasing presence of Balsam Woolly Adelgid in the zone, a greater percentage of the harvested disturbed sites are being scheduled for prescribe burning prior to planting. Planting, whether full planting or gap planting is done to ensure stocking of desired species is at acceptable levels.

Additionally treatment of sites with herbicides that have been overgrown with hardwoods and other herbaceous species 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 or white pine. There is also some gap planting required in the zone. This treatment is designed to increase the stocking on sites that have not regenerated to sufficient levels. Gap planting is done

with the same species as above, and, coupled with the natural regeneration already present on site result in a mixed softwood forest.

Where possible, seedlings are grown with seed from local seed sources. A seed orchard has been established at Pynns Brook to produce seed from plus trees collected throughout the Province. Plus trees are trees that normally demonstrate superior growth and physiological characteristics. The majority of the planting stock is now from improved seed collected from provincial seed orchards. 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, (eg. Japanese larch at Pynns Brook) however, it is not anticipated that they will form any substantive proportion of the planting program in the future, however CBPPL does not plant exotic species.

Surveys and anecdotal information indicate that hardwoods form a significant portion of stand composition after planting. This is especially true on scarified areas because scarification promotes hardwood establishment.

7.1.4.2. Forest Improvements

Forest improvement prescriptions are designed to treat established forest stands in an attempt to enhance development. These treatments usually involve thinning overstocked balsam fir stands at either a young age 10 -15 years (precommercial thinning), or an intermediate age 25 - 35 years (commercial thinning) or cleaning/maintenance of young plantations 10-15 years of balsam fir in growth. Precommercial thinning and plantation cleaning reduce density levels in overstocked areas in order to maximize volume increment and operability (piece size) in the shortest period of time. Trees removed are not of merchantable size and are left behind to return the nutrients to the site. In the planning zone, balsam fir is usually thinned to favor any spruce that may be in the stand. In this way a mixed softwood stand is produced (depending on the original density of spruce) which is more diverse and less susceptible to insect infestation. As well, any hardwood species that are not in direct competition with spruce or fir are left to increase the biodiversity of the stand. Commercial thinning activity is undertaken on older balsam fir stands and is designed to capture

mortality that would normally occur in the stand through self-thinning. The trees harvested are of commercial size and are extracted and utilized. The remaining trees are left to grow, free from competition and are harvested when mature. By salvaging this eminent mortality a higher yield can be obtained in these stands. As with precommercial thinning, spruce and hardwoods are left where possible to increase the stand diversity. This treatment has hardly been used in the zone. Both types of thinning and will produce large diameter stems in a shorter time period which should increase the percentage of merchantable volume in stands that is suitable for saw log material. Specific silviculture strategies include:

- Ensure regeneration of areas disturbed by harvest, insect, wind and fire to prevent loss of and/or increase the future productive forestland base
- Use thinning/cleaning techniques in young stands to increase stand development, reduce rotation age, and improve stand quality through removal of aphid attacked balsam fir regeneration and increase the percentage of saw logs in stands
- Where possible, promote species mix, particularly with spruce and hardwoods to reduce susceptibility to insect attack and increase biological diversity
- Where possible, use seedlings grown from local seed sources to protect genetic diversity
- Ensure levels of planting and thinning used in the wood supply analysis are achieved
- Work towards pre harvest planning to identify areas with potential balsam woolly adelgid problems so that alternate silvicultural prescriptions can be promptly employed
- Continue development and implementation of silvicultural strategies designed to regenerate existing white birch dominated stands to white birch where applicable, as well as strategies designed to develop the white birch component of managed stands

7.1.5. Forest Access Roads

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

As a general principle from both an environmental and cost perspective, the minimal amount of road required to effectively harvest available timber will be built. As well, roads are constructed to standards (e.g. width of right-of-way and driving surface etc.) that are the minimum required to access the timber in a safe and effective manner. Forwarding distances are maximized to the economic limit to minimize the amount of road constructed. These principles ensure the loss of productive land base and environmental disturbance are minimized. In sensitive and wet areas, winter harvesting and road construction are encouraged, to minimize environmental disturbance. In many instances, forest access roads "open up" new areas which are then subject to cabin development. Forest roads also provide access to remote areas where outfitting businesses operate. This generally leads to competition for hunting areas between local and "sport" hunters and may detract from the "remote" designation of the lodge. In such instances cabin development should be controlled to limit local access. As well, road decommissioning may also be considered, depending on cost and mitigation of conflicting uses for a particular road.

The nature of the current wood supply, particularly FMD's 9 and 16, is that harvestable areas or stands are becoming smaller and more dispersed. Achievement of allocated harvest is contingent on accessing these areas and stands. Therefore, more road infrastructure is required to access this timber. Specific strategies include:

- Where possible, build winter roads to access sensitive and wet areas
- Minimize amount of road built by maximizing forwarding distances
- Use minimum road standard to safely and effectively match the logging chance
- Work with appropriate agencies (crown lands) to control cabin development
- Where possible, consider road decommissioning in areas of concern for other values (e.g. near remote outfitting lodges, PPWSA's)

7.1.6. Forest Protection

7.1.6.1. Insect and Disease

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 and balsam fir sawfly were building in the early 2000's and resulted in a treatment program in 2002 and 2003. Since that time the populations of these insects have been in decline. The balsam woolly adelgid seem to be moving eastward into District 16 in increasing proportions causing growth problems in young balsam fir stands.

As outlined in the harvesting and timber supply analysis sections our 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
- use species conversion techniques, where possible, to convert adelgid susceptible balsam fir to other less susceptible species
- in conjunction with Provincial and Federal initiatives, use pertinent and approved biological and chemical insecticides such as BTK, Mimic, Neemix4.5 and NeabNPV (virus)
- in cooperation with Provincial insect and inventory divisions, monitor and measure adelgid infested stands to help refine yield curves to be used in the next timber supply analysis

7.1.6.2. 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 portions of District 9 has had a higher frequency. 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 vigour.

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

7.1.6.3. Wind Throw

Wind throw or blow down occurs in stands that are old and decrepit or in stands that have been predisposed by some other disturbance such as insects and disease. Blow down can also be increased in high-risk stands when unnatural edges are left on cutovers such as in the case buffers. To minimize the effects of blow down, stands will be managed to promote health and vigor mainly through silvicultural treatments and protection from insects.

Specific strategies include:

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

7.1.7. Information and Education

Information and education is important to providing for more active and effective participation in the forest management planning process. Through interaction with various user groups and the general public, we gain a better understanding of each other's values and positions. Information about a stakeholder's values and the location on the landscape provides a better ability to mitigate

any potential negative impacts of harvesting activity on these values. For example, learning where a cabin is located can help planners when selecting areas for harvest and provide a contact to discuss impacts and mitigations. Public Planning team meetings provide a good exchange of information and ideas about a particular piece of land base. It is through such forums that information can be shared that provides a basis for more effective and informed participation. As a Forest Industry, other such vehicles for information and education, which will be actively pursued, include:

- Field trips (e.g. Crown and paper company woodlands tours, mill tours)
- School visits
- Open houses
- Commercial operator environmental training programs
- Information meetings
- Training courses
- Seminars
- General day-to-day contact

8. Proposed Activities

8.1.1. Harvesting

This section will outline all forest activities that will occur on CBPPL Limits in District 9 & 16 from 2017-2021. More specifically, all proposed harvesting, silviculture and access road construction activities as well as environmental protection measures, activities inside protected water supply areas, surveys, and information and education initiatives will be presented and discussed in detail.

To present a more comprehensive overview of proposed activities on the entire district an overview map is presented in Appendix 2. Maps of individual operating areas and summary sheets are also presented in Appendix 2. The summary sheets give a brief description of each area, the type of activities that will occur and any issues raised and mitigative measures employed.

8.1.1.1. Commercial

The timber scheduled for commercial harvest in the district is overmature with some small pockets of mature dispersed throughout. This proposed harvest approximates the harvest schedule that was used to determine the AAC in Section 3. The allocated operating area and associated harvest volumes represent as much as two times the actual proposed harvest (Table 1-6). The purpose of

including more volume than is actually proposed is to allow for operational flexibility and inventory deviations within operating areas without having to constantly amend the plan.

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

Operating Area					Volume Harvested (m^3)			
					Softwood			
Number	Name	Tenure	Area (ha)	Number of Permits	Core	Operational Constrainted	Sub-total	Non AAC wood
K-09-01	Gull Pond	CBPP	66		4860			
K-09-05	Rice Mountain	CBPP	711		63206			
K-09-08	Tommys Arm	CBPP	1868		129968			
K-09-10	Pine Pond	CBPP	435.5		37686			
K-09-13	Rambler West	CBPP	1767		131421			
K-09-16	Lynx Pond	CBPP	1399		148614			
K-09-17	Main Brook	CBPP	638		61746			
K-09-23	Dawes Pond	CBPP	194.5		17830			
K-09-27	Black Lake	CBPP	234		26294			
K-09-30	East Pond	CBPP	73.5		8390			
K-09-35	Southern Pond	CBPP	761		75561			
K-09-36	Camp 34	CBPP	658.5		52984			
K-09-37	West Pond	CBPP	543		36586			
Sub-Total			**9349**		**795146**			

Table 1- 10 Proposed commercial harvest activity FMD 16 2017-2021

Operating Area					Volume Harvested (m^3)			
					Softwood			
Number	Name	Tenure	Area (ha)	Number of Permits	Core	Operational Constrainted	Sub-total	Non AAC wood
K-16-03	Faulkners Pond	CBPP	228.5		25895			
K-16-35	Davis Pond	CBPP	351		36522			
K-16-38	Sandy Lake	CBPP	1447		128678			
K-16-39	Angle Pond	CBPP	241		27394			
K-16-40	Birchy Narrows	CBPP	66.5		6611			
K-16-44	Taylors Brook	CBPP	1354		105704			
K-16-45	Shefield lake	CBPP	105.5		7164			
K-16-47	Adies River	CBPP	715		67672			
K-16-49	Gales Brook	CBPP	451.5		36395			
K-16-50	Adies West	CBPP	1235		122798			
Sub-Total			**6195**		**564835**			

8.1.1.2. Domestic

CBPPL doesn't manage its landbase for domestic harvesting with segregated blocks. Historically CBPPL issues several thousand domestic permits, in FMD 16, for the harvest of non-commercial species (hardwoods & larch), with Forestry Services administering FMD 9.

8.1.1.3. Silviculture

There are two silviculture prescriptions scheduled for the next five years; planting/gap planting including site preparation where required, and pre commercial thinning. Planting is designed to return a site to a minimum stocking level with the desired species, mainly spruce. There is full planting when there is complete natural regeneration failure and gap planting when a site has some desired regeneration but not enough to meet minimum stocking standards. Precommercial thinning is prescribed to reduce the density on overstocked regeneration so that growth can be concentrated on the remaining crop trees and thus reduce the time to harvest.

Potential silvicultural treatment areas need to undergo reconnaissance and or intensive surveys to determine the severity of attack of this insect. These surveys will be conducted during this five

year period but until they are completed, specific locations and treatment amounts cannot be identified.

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

Table 1- 11 Proposed Silviculture Zone 7 2017-2021

Treatment	FMD	Area (ha)
Precommercial Thinning	9	0
	16	500
Sub-Total		**500**
Planting	9	1000
	16	1000
Sub-Total		**2000**
Site Prep	9	1000
	16	1200
Sub-Total		**2200**
Herbicide	9	150
	16	150
Sub-Total		**300**
Grand-Total		**5000**

8.1.2. *Forest Access Roads & Water*

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

Table 1- 12 Proposed primary access road const. and water crossings 2017-2021 FMD 9

Operating Area		Construction/ Reconstruction	Length (km)	Water Crossings	
Name	Number			Culvert	Bridge
Rice Mountain	K-09-05	Construction	6.1	2	1
Tommys Arm	K-09-08	Construction	17.73	3	0
Pine Pond	K-09-10	Construction	7.4	3	0
Rambler West	K-09-13	Construction	9.15	2	1
Rambler West	K-09-13	Reconstruction	10	4	0
Lynx Pond	K-09-16	Construction	2.71	0	0
Main Brook	K-09-17	Construction	8.55	2	0
Pasture Block	K-09-27	Construction	19.1	6	0
Camp 34	K-09-36	Construction	6.3	5	0
Camp 34	K-09-36	Reconstruction	8	1	1
		Sub-total	**95.04**	**28**	**123.04**

Table 1- 13 Proposed primary access road const. and water crossings 2017-2021 FMD 16

Operating Area		Construction/ Reconstruction	Length (km)	Water Crossings	
Name	Number			Culvert	Bridge
Adies River	K-16-47	Construction	5.6	4	
Gales Brook	K-16-49	Reconstruction	9	5	1
Adies West	K-16-50	Reconstruction	6.2	3	1
Adies West	K-16-50	Construction	10	6	
		Sub-total	**30.8**	**18**	**2**

8.1.3. Forest Protection

Identify forest protection measures planned, as outlined below:

8.1.3.1. Fire

Wildfire has not been prevalent in the district in the past number of years and as a result there have been 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.

8.1.3.2. Insects and Disease

Monitoring and protection programs for insects and disease is done are coordinated by 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.

8.1.3.3. Wind Throw

Wind throw is not a major concern on CBPPL limits for FMDs 9 and 16. Where wind throw may occur CBPPL will utilize the strategies outlined in section 7.1.6.3 of this plan.

8.1.3.4. Surveys

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

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

*8.1.4. **Activities in Protected Public Water Supply Areas***

For harvesting operations inside PPWSA's, wider buffers will be used and the pertinent EPG's will be attached to any permits issued for these areas. There will be continuous monitoring inside these areas and buffers will be flagged to ensure compliance with the guidelines. In addition, a Certificate of Approval under Section 10 of the Environment Act must be obtained before any domestic harvesting commences inside the PPWSA.

Table 1- 14 Activities in PWSA

Operating Area	FMD	Area
Rice Mountain	9	131
Pine Pond	9	536
Southern Pond	9	3,178
Faulkners Pond	16	574
Sub-total		***4,419***

8.1.5. Information and Education

CBPPL in conjunction with Forestry Services will continue to attempt to educate the general public to ensure meaningful and effective consultation and input can be attained. This will be accomplished through fieldtrips and meetings, school presentations, open houses, meetings and National Forest Week activities.

8.2. Plan Administration

8.2.1. Monitoring

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

8.2.1.1. Operational Level

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

8.2.1.2. Planning Level

The strategic planning section at forestry services monitors the implementation of this Five Year Operating Plan for this zone. This is a crucial role, as many implementation commitments are stated in the plan. The primary function of the planning section is to monitor plan implementation for consistency with commitments in the plan though approval of the Annual Operating Plans derived from this plan and review of the past annual reports associated with each year's activities. The section will identify concerns with plan implementation provide recommendations for plan changes and establish protocol for concerns reported to them. Additional meetings between CBPPL, Strategic Planning and/or relevant stakeholders may be required to review amendments or provide recommendations should changes be required as a result of a catastrophic event such as fire which may precipitate changes to the plan.

*8.2.2. **Amendments***

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

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

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

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

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

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

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

Appendix 1

Environmental Protection Guidelines

Appendix 2

Operating Area Maps

Commercial harvesting activity throughout the Planning Zone

DEPARTMENT OF NATURAL RESOURCES

FORESTRY SERVICES BRANCH

2015 ENVIRONMENTAL PROTECTION GUIDELINES

FOR FORESTRY OPERATIONS IN NEWFOUNDLAND AND LABRADOR

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FORWORD

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

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

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

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

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

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

1.0 HARVESTING GUIDELINES

1.1 Planning of Operations

1.1.1 Permits Required

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

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

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

1.1.2 Consultation Required

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

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

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

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

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

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

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

1.1.3 Planning

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

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

1.1.4 Nutrient Poor Sites

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

1.2 Conduct of Operations

1.2.1 Minimizing Erosion and Disturbance

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

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

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

4. In areas prone to erosion and silting:

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

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

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

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

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

(i) have stable approaches

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

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

1.2.2 Archaeological Find

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

1.2.3 Timing of Operations

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

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

1.2.4 Leaving Buffers and Wildlife Trees

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

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

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

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

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

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

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

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

1.2.5 Petroleum Products

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

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

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

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

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

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

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

1.2.6 Clean Up of Site

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

2.0 FOREST ACCESS ROADS GUIDELINES

2.1 Planning of Roads

2.1.1 Permits Required

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

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

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

2.1.2 Areas to Avoid

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

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

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

2.1.3 Waterbody Crossings

Waterbody crossings shall:

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

2.1.4 Burrow Pits and Quarries

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

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

2.1.5 Wildlife Values

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

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

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

2.1.6 Road Access

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

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

2.1.7 Decommissioning Roads

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

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

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

2.2 Construction and Decommissioning of Roads

2.2.1 Road Construction

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

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

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

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

2.2.2 Pits and Quarry Activity

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

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

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

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

2.2.3 Working near Waterbodies and In-stream Work

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

2.2.4 Archaeological Find

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

2.2.5 Petroleum Products

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

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

2.2.6 Winter Roads

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

2.2.7 Decommissioning Roads

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

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

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

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

3.0 SILVICULTURAL GUIDELINES

3.1 Planning of Silviculture

3.1.1 Permits Required

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

3.2 Conduct of Silviculture Operations

3.2.1 Preventing Erosion

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

3.2.2 Protection of Waterbodies

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

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

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

3.2.3 Placement of Windrows

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

3.2.4 Trees Left for Wildlife and Other Values

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

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

3.2.5 Timing of Silviculture

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

3.2.6 Archaeological Find

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

3.2.7 Fuels and Petroleum Products

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

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

3.2.8 Scarification Method

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

3.2.9 Choice of Species to Plant

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

4.0 FOREST PROTECTION GUIDELINES

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

4.1.1 Regulation of Pesticides

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

4.1.2 Licenses Required

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

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

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

4.2 Conduct of Operations

4.2.1 Pesticides Use

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

5.0 GUIDELINES FOR FORESTRY OPERATIONS WITHIN PROTECTED PUBLIC WATER SUPPLY AREAS

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

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

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

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

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

5.1 Conduct of Operations

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

5.1.1 Map of the Operating Area

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

5.1.2 Prevention of Erosion

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

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

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

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

5.1.3 Buffer Zones

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

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

Any deviations will require approval from Water Resources Management Division.

5.1.4 Petroleum Products

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

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

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

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

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

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

5.1.5 Structures Prohibited in Water Supply Areas

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

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

5.1.6 Reporting Water Quality Problems

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

APPENDIX I: RELEVANT LINKS

Applications:

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

Impacted Sites:

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

Federal Legislation Links:

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

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

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

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

Provincial Legislation Links:

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

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

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

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

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

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

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