

INTRODUCTION

This Five Year Operating Plan is one of the first of its type that reflects the new legislated planning requirements of the Newfoundland Forest Service. In the past, there were five major planning documents; Provincial Sustainable Forest Management Strategy, District Strategy Document, Five Year Operating Plan, Annual Operating Plan, and Annual Report. This new planning framework has eliminated the District Strategy Document, however, its former contents are now split between the Provincial Sustainable Forest Management Strategy and the Five Year Operating Plan. Sections that are Provincial in scope such as carbon, global warming and criteria and indicators are now housed in the Provincial Sustainable Forest Management Strategy while sections that are more descriptive or depict local conditions such as values, forest characterization and ecosystem description are moved to the Five Year Operating Plan. Linkages between strategies from the Provincial Sustainable Forest Management Strategy and on the ground activities in the Five Year Operating Plan will be provided where applicable.

Another major change is the creation of eight planning zones on the Island which are based loosely on ecoregion location. Districts that share common ecoregion characteristics are combined to form these zones. Districts 9 and 16 are combined to form Planning Zone 7. The requirement for submission to the Newfoundland Forest Service and for environmental assessment is one Five Year Operating Plan for each owner in each zone. The past requirement was one Five Year Operating Plan by each owner in each district. In this zone there will be three separate submissions by the Crown, Corner Brook Pulp and Paper Limited, and Abitibi Consolidated Incorporated. 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 7 or the zone. Planning teams for this zone are located in Deer Lake for District 16 and Springdale for District 9. Planning team format and structure will be discussed in a later section.

This document will try to fully integrate presentation of information and discussion for Crown Land in the zone, where possible. This will be done by combining statistics and other information from each district and reporting for the zone. Tables and figures will be constructed

such that information for individual districts will be available if a breakout is required however. Discussion and information will be presented separately for each district where warranted based on unique and distinct differences in scope and content. The more descriptive sections of this plan will be generic in nature and give information for all ownerships in the zone as well as some broad comparative statistics. In this way the reader will get a better overview of the entire zone in the context of all ownerships and not just Crown Land.

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

Section 1 Description of the Land Base

1.1 General

1.1.1 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 with a depot in Sops Arm while District 9 is administered from Springdale with depots in Baie Verte and Millertown.

1.1.2 History

The natural resources of the zone have played a major role in the well being of the residents. Since the earliest settlement, the forest and fish resources were the mainstay of the economy. Generally, settlement occurred around the coastal areas where the fishery was prevalent. Initially the forest was used as a source of fuelwood as well as construction materials for houses and fishery related items (stages, lobster pots, boats etc.). Sawmills developed to supply the local demand for lumber and construction timber and there was a small export market for pulpwood. In the 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 mills in Corner Brook and Grand Falls. As well, there are three major sawmills in Deer Lake, Hampden, and Baie Verte that produce lumber for both the local and export market.

1.1.3 Ownership

There are three major ownerships in the zone; Crown, Corner Brook Pulp and Paper Limited (CBPPL) and Abitibi Consolidated Incorporated (ACI) (Figure 2). Crown land accounts for 34 percent of the area and is located around the extremities of the zone near the coast, around the

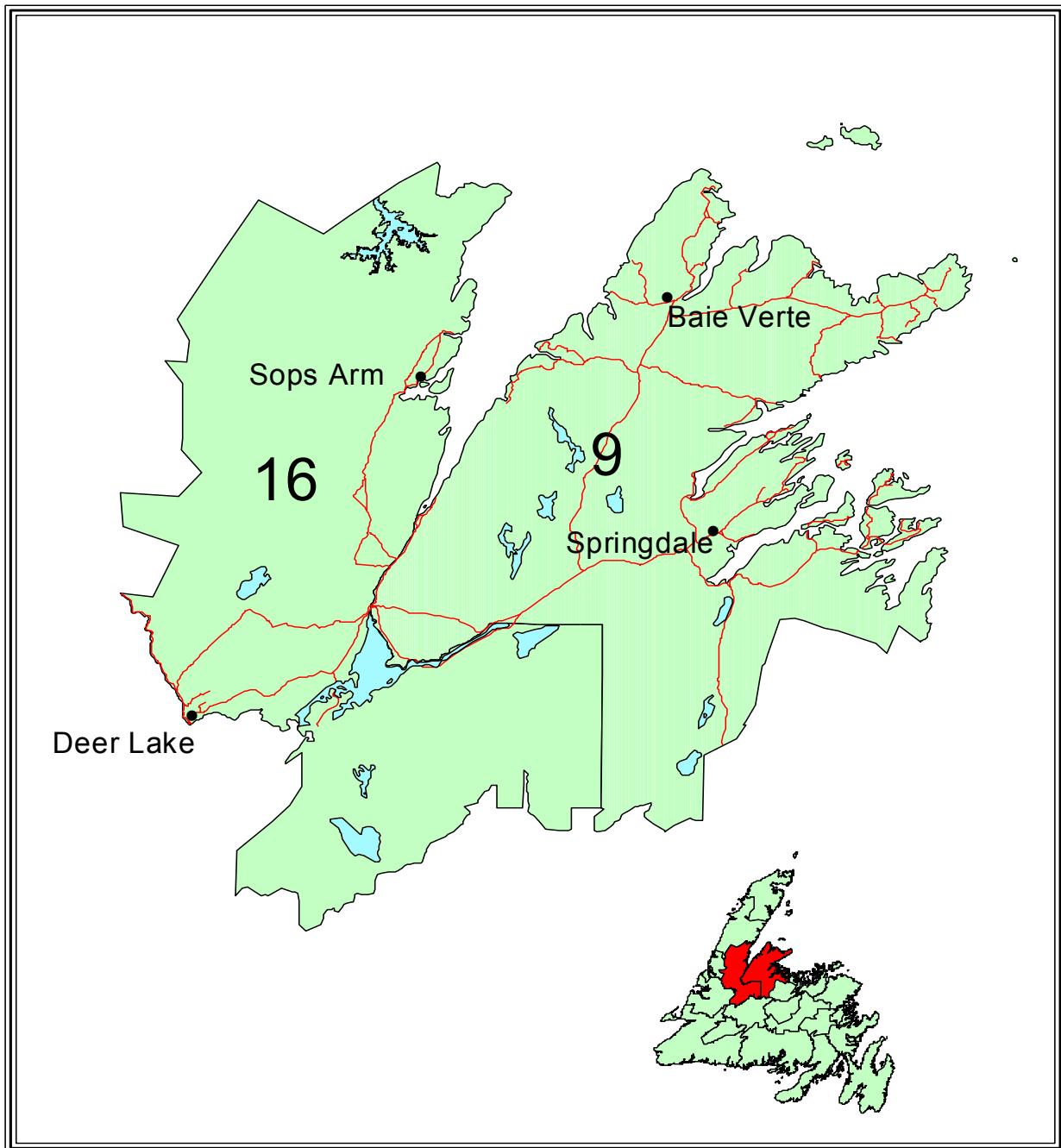


Figure 1. Location of Planning Zone 7.

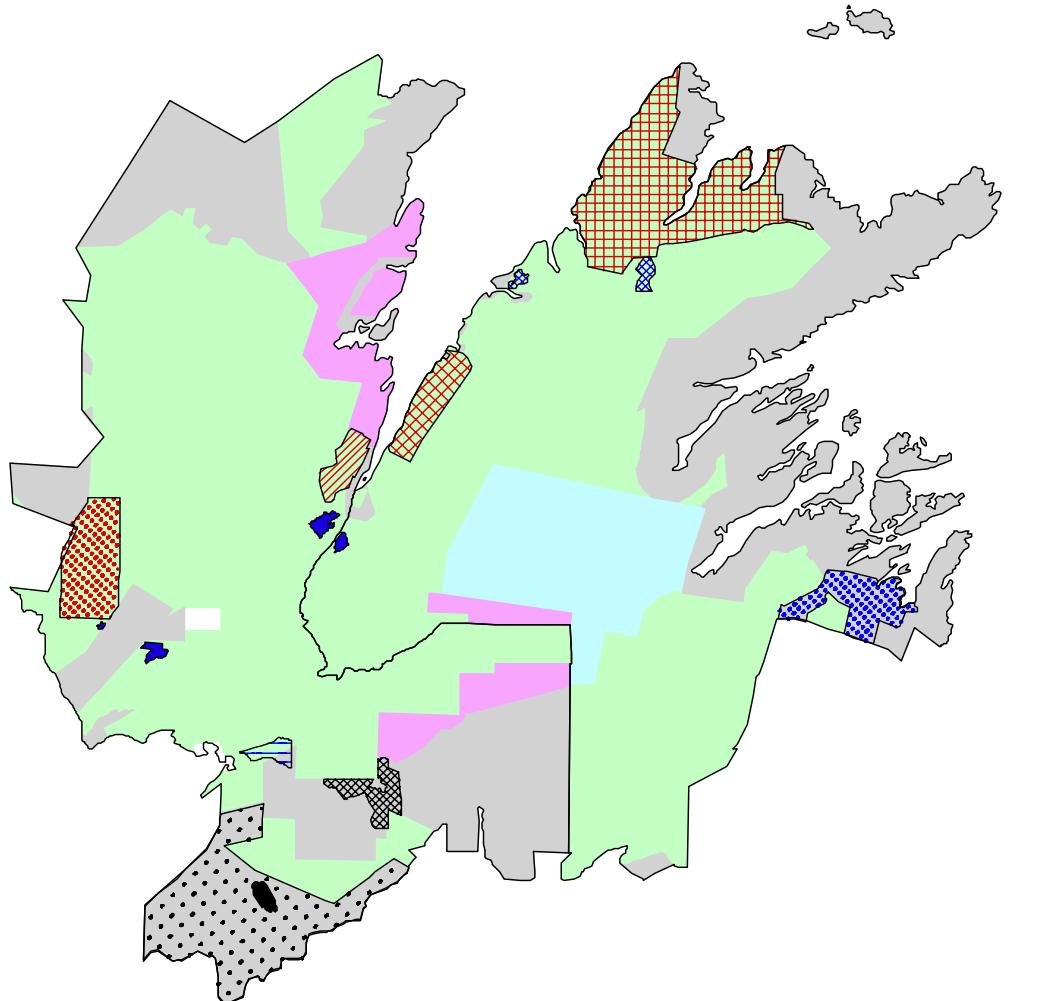
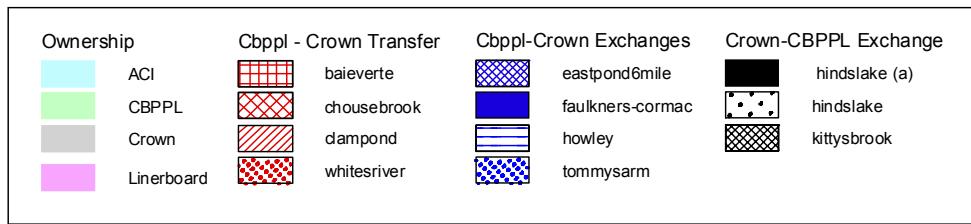


Figure 2. Ownership map of Planning Zone 7 showing transfers and exchanges

Buchans Plateau, and near the Long Range Mountains. The major holder of timber rights is CBPPL which accounts for 58 percent of all land holdings. The timber holdings are in the form of long term licenses that are not due to expire until 2037. Abitibi Consolidated accounts for eight percent of the ownership in the zone and its holding is in the form of a license. The Labrador Linerboard licenses, formerly held by ACI, which are mainly located in District 16, expired in 2004. These areas will be treated as Crown Land for this plan. The other ACI license, located in District 9, is due to expire in 2010.

Within these ownerships there have been a number of exchanges and transfers between the Crown and CBPPL that are mutually beneficial to both parties (Table 1) (Figure 2). There are transfers at White's River, Chouse Brook, and Baie Verte which provide a sawlog supply for

Table 1 Exchanges and transfers in Planning Zone 7

District	Location	Type	Expiry Date	AAC Drain
16	Whites River	CBPPL to Crown Transfer	07/04/31	CBPPL
16	Howley	CBPPL to Crown Exchange	11/04/31	Crown
16	Hinds Lake	Crown to CBPPL Exchange (cord for cord)	none	CBPPL
16	Hinds Lake (a)	Crown to CBPPL Exchange	11/04/31	CBPPL
16	Kitty's Brook	Crown to CBPPL Exchange	11/04/16	CBPPL (Class 3)
16	Faulkners/Cormack	CBPPL to Crown Exchange	11/04/16	CBPPL
9	Chouse Brook	CBPPL to Crown Transfer	07/04/31	CBPPL
9	Tommy's Arm	Crown to CBPPL Exchange (cord for cord)	none	Crown
9	Baie Verte	CBPPL to Crown Transfer	07/03/31	CBPPL
9	East Pond/ Six Mile Valley	CBPPL to Crown Exchange	11/04/16	CBPPL

Deer Lake, Hampden, and Baie Verte sawmillers respectively. These areas represent poorer logging chances and all pulpwood and chips flow to CBPPL. The Crown has exchanged an area near Hinds Lake for an area near Howley which will ensure a supply of domestic timber for the residents of that community. As well, there is an exchange of areas near Faulkners/Cormack and East Pond/Six Mile Valley for Kittys Brook which ensures a supply of sawlogs for sawmills in Hampden, Deer Lake and Baie Verte. There are cord for cord exchanges whereby CBPPL harvests timber near Tommys Arm and the Crown harvests in District 18 near Roddickton and, Hind's Lake is exchanged for timber in other districts. There is also a transfer from CBPPL to Crown near Clam Pond in District 16 that is currently being negotiated (shown on Figure 2).

1.2 Physical

1.2.1 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.

1.2.2 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.

1.2.3 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.

1.2.4 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 °C, and July mean temperatures range from over 15.5°C in the valleys to less than 13°C in the mountains. The frost-free period averages 110 days at lower elevations. The growing season (mean daily temperature above 6°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.

1.3 Ecosystems

1.3.1 Forest Ecosystems

An ecosystem is a community of interacting and interdependent plants, animals and microorganisms, together with the physical environment within which they exist. 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.

1.3.2. Ecoregions and Subregions

Damman 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 in both Districts.

1.3.2.1 The 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

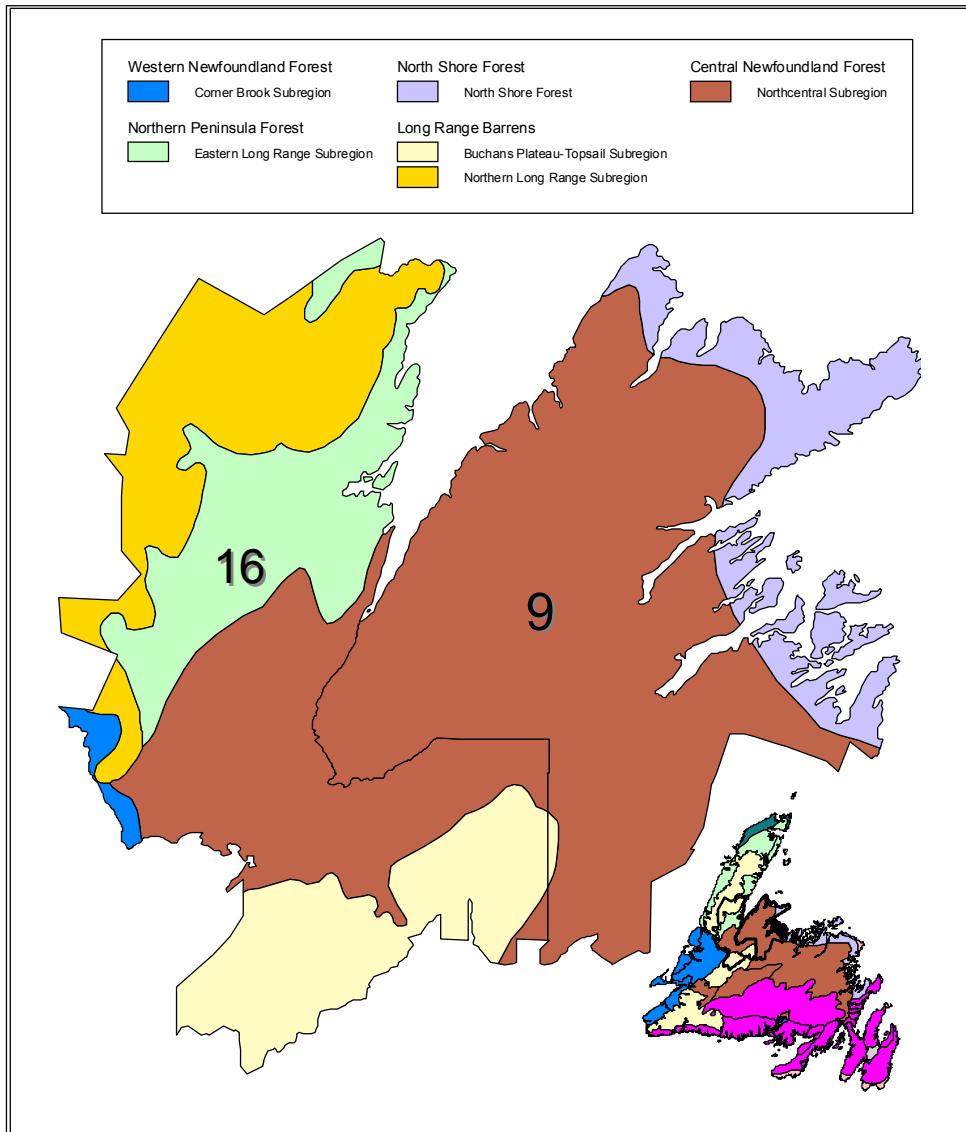


Figure 3 Ecoregions and subregions of Planning Zone 7.

Table 2. Percentage of ecoregions and subregions in Planning Zone 7.

Name of Ecoregion and Subregion	Total Area in Province (ha)	Percentage of Total Area in Districts			Relative Percentage of Ecoregion and Subregion in Districts		
		9	16	Total	9	16	Combined
Western Newfoundland Forest Corner Brook Subregion	515637	0	13	13	0	9	5
Northern Peninsula Forest Eastern Long Range Subregion	268059	0	56	56	0	23	11
North Shore Forest	550622	19	0	19	11	0	8
Long Range Barrens Buchans Plateau-Topsail Subregion	369811	<1	38	38	1	19	11
	689562	0	24	24	0	23	12
Central Newfoundland Forest North Central Subregion	2310742	22	9	31	82	31	53

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 pleurostium-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.

1.3.2.1.1 North Central Subregion

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

1.3.2.2 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.

1.3.2.2.1 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.

1.3.2.3 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.

1.3.2.3.1 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 "Krummholtz" or tuckmoor dominate the landscape. Small patches of forest occur in some sheltered valleys.

1.3.2.3.2 Northern Long Range Subregion

The northern portion of District 16 is encompassed 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.

1.3.2.4 Western Newfoundland Ecoregion

This ecoregion just touches District 16 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.

1.3.2.4.1 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*-*rhytidadelphus*-*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.

1.3.2.5 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.

1.4 Ecosystem Dynamics

1.4.1 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.

1.4.1.1 Productivity

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

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

Overall, the landscape in Planning Zone 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 is 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.

1.4.1.2 Resilience

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

1.4.1.3 Stability

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

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

Some indicators of stability which can be monitored are: area of forest converted to non-forest use, area, percentage and representation of forest types in protected areas, percentage and extent of area by forest type and age class, and change in distribution and abundance of various fauna.

These indicators can be measured and monitored to ensure stability is maintained and to evaluate the impact, if any, of forest activities on ecosystem stability.

1.4.1.4 Disturbance Regimes and Successional Patterns

There are four main driving forces that cause disturbance in the boreal forest. As stated in section 1.4.5, harvesting accounts for the majority of disturbance in the zone and occurs on a regular and consistent basis. Fire and insect damage are the other two major disturbances and occur on a more irregular or cyclic basis. With the exception of a major atypical windstorm, wind throw usually occurs after a stand is weakened by some other agent like insects. For this reason successional patterns after insect damage and wind throw will be discussed together. The following is a brief synopsis of successional patterns after each major disturbance type by forest type, site type, and ecoregion.

1.4.1.4.1 Harvesting

Regeneration patterns in the black spruce type after harvesting is generally back to the black spruce type with a minor component of balsam fir and some white birch on the better sites. There is a higher 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.

1.4.1.4.2 Fire

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

1.4.1.4.3 Insect

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

1.4.2 Biodiversity

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

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

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

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

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

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

1.4.2.1 Species Diversity

Species diversity describes the overall range of species in a given area or ecosystem. Species are groups of animals, plants, and micro organisms capable of producing fertile offspring. An example would be all breeds of domesticated dogs are of the same species, while dogs and cats

are members of different species. Species extinction is the most dramatic and recognizable form of reduced biodiversity; habitat loss the most drastic in terms of far reaching effect. The prevention of species extinction is a key factor in the conservation of biodiversity. Changes in species population levels indicate the potential for serious changes in ecosystem integrity.

1.4.2.2 Genetic Diversity

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

1.4.2.3 Landscape Diversity

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

A forest interspersed with barrens, marshes, lakes and ponds provides for diversity across the landscape. Each ecoregion in the province should have representative areas protected which displays the diversity where such exists. 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.

1.4.2.3.1 Old Growth Forests

Old growth forests are valued for their contributions to society in the sense of heritage, culture, aesthetics, and spirituality. Old-growth forests may be defined from both a process and a structural point of view. From a process perspective, old-growth forests are defined as forests whose disturbance regime is dominated by gap dynamics. The process of gap dynamics is characterized by small- or micro-scale disturbance (usually $< 200 \text{ m}^2$) of the mature forest canopy. Trees die standing, snap off or are blown down, creating a hole in the canopy. The death of a single stem or a few stems releases available growing space (increased light, water and nutrient levels). In time, this growing space is occupied by tree regeneration, usually a result of released advance regeneration or recruitment from buried or dispersed seed propagules.

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

The structure of the boreal forest is generally affected by large-scale, stand initiating events such as fire, insect and wind disturbances. Wildfire is paramount in controlling the dynamics of the drier, continental boreal forests of western Canada and Alaska. In Newfoundland, fire tends to be important in the forests of central Newfoundland, characterized as it is by a continental climate.

When viewed from the perspective of forest-level disturbance, it may be stated that old-growth forests are common in areas not prone to recurrent or periodic stand replacing disturbance from fire, insects or wind. In situations where stand-initiating events are rare, then old-growth will tend to dominate. The disturbance forces which would naturally recycle mature forests are absent and therefore forests will tend to grow to the old-growth stage. Old-growth forests are thus composed entirely of trees which have developed in the absence of stand replacing disturbance.

Old-growth fir-spruce forests will self-perpetuate through small-scale gap dynamics in the absence of large-scale disturbance. The dominant disturbance regime is fungal related as root and butt rots become the primary agents of tree death. Trees weakened by root and butt rots are susceptible to stem breakage and wind throw. Thus, disturbance in old-growth forests occurs on a single tree or multiple tree level with an upper limit of approximately 200 m² for the majority of gaps. Established advance regeneration is able to respond to the increased growing space afforded by the death of one or several canopy trees and will release into the canopy. Such micro-scale disturbance occurring randomly throughout the forest produces a situation of long-term forest continuity and structurally complex stands.

Old-growth conditions in the Canadian boreal forest are rare or uncommon. This is understandable given the ubiquity of landscape-level fires and recurrent insect outbreaks. As well, logging is becoming an increasingly significant disturbance factor in the boreal forests. Theoretically, boreal forests not disturbed by fire, insect or wind disturbance for long periods of time will revert to multi-cohort, self-perpetuating, gap-driven forests. This is particularly true in the boreal forests of eastern Canada, especially those forests which experience significant oceanic influence and an absence of landscape-level fires and insect epidemics.

Old-growth balsam fir-spruce forests occur in Management District 16, principally in the Main River watershed. These forests exhibit all the classic characteristics attributed to old-growth forests. Balsam fir, black spruce and white spruce all possess the ability to germinate under a closed canopy, to persist as a seedling bank (advance regeneration) for decades, often in a

suppressed state, and to respond to increases in light and soil nutrient levels associated with the death of canopy trees. Regional climatic factors create the shortest growing season for any forested ecoregion on the Island. The short, cool growing season has probably been instrumental in minimizing the outbreak of forest fires and insect epidemics. The lack of large-scale, stand-replacing disturbance for long periods of time (how long we do not know) combined with the ability of fir and spruce to act as small-gap specialists have created ideal conditions for the development of old-growth boreal forests.

The occurrence of old-growth forests on the Island of Newfoundland is unknown. Except for the old-growth research conducted in the upper Main River watershed, empirical definitions of old-growth according to forest types and edaphic conditions are not available. Furthermore, the frequency of natural forest disturbances and their role in shaping landscape level forest composition and structure of the Island's forests are little understood. However, given our general knowledge of the historic occurrence of fire, insect and wind disturbance in Newfoundland's forests, as well as recognition of a century of logging activity across the Island, it is reasonable to assume that primary old-growth forests on the Island are not common. Therefore, the extant old-growth forests in District 16 represent important landscape-level biodiversity for the Island of Newfoundland.

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

1.5 Forest Characterization

1.5.1 Land Classification

Table 3 displays the land classification broken down by ownership and district for Planning Zone 7. The total mapped land area in the zone is approximately 1.2 million hectares. There is also around 30000 hectares in District 16 that is not mapped but will be during the next inventory cycle. There are four basic categories that currently represent how the land is classified; productive, non productive, non-forest and fresh water. The ratios across ownerships in each district are fairly consistent with some minor variations. Individual break outs by district and owner are shown in Table 3. Figures 4 and 5 displays the relative percentages of each major land class category in each district with all ownerships combined.

In general, District 9 has 55 percent of its total land area in the productive forest category while District 16 has 38 percent. The higher the percentage of productive forest generally means that the forest is more contiguous and not as fragmented by bog, scrub and water. This has implications for harvesting and road building costs which are generally higher when the forest is more fragmented. Another point is that the Forest Service is now classifying scrub by site, height and density class as new inventories are completed. This information will be invaluable in determining which scrub area are marginally productive or can meet some other non-timber objective.

1.5.2 Age Class

Individual tree ages in a stand can all be the same after fire or planting however, in most cases the ages vary. Foresters describe ages in terms of age classes which generally encompass 20 years. The age classes present in the zone are regenerating (age class 1, 0-20 years), immature (age class 2, 21-40 years), semi-mature (age class 3, 41-60 years), mature (age class 4, 61-80 years), and over mature (age class 5, 81-100 years), (age class 6, 100-120 years), (age class 7, 120+ years). The combined age class distribution in each district for the entire productive forest is shown in Figures 6 and 7. In general terms, the more balanced the age class distribution in a district, the higher the potential even flow sustained yield of timber can be because continuous timber supply is limited by the age class with the lowest area. The age class structure for District

Table 3 Land classification by district and ownership in hectares for Planning Zone 7.

Land Class	Ownership						Total		
	Crown		CBPPL		ACI				
	9	16	9	16	9	16	9	16	Total
disturbed	3059	4843	7575	7743	2140	0	12674	14448	27122
age class 1	23783	11866	51597	30369	11502	0	86882	42235	129117
age class 2	15504	6286	28541	15450	15834	0	59879	21736	81615
age class 3	8743	3441	26748	19999	5904	0	41395	23440	64835
age class 4	9151	3501	12657	14252	1511	0	23319	17753	41072
age class 5	24197	5368	20137	10362	2251	0	46585	15730	62315
age class 6	13123	17890	17285	19252	4197	0	34605	37142	71747
age class 7	6386	16845	22959	41959	3991	0	33336	58804	92140
Total Productive	103785	70041	187497	159396	47230	0	338711	229437	568148
softwood scrub	39702	89431	72093	124633	13001	0	124796	214062	338858
hardwood scrub	1426	510	2743	2475	627	0	4797	2985	7782
Total Non-Productive	41128	89941	74836	127108	13629	0	129593	217049	346642
rock barren	12098	7356	5552	3676	213	0	17863	11033	28896
soil barren	2751	18834	9325	6742	703	0	12780	25581	38361
bog	10329	31754	48814	37191	8252	0	67395	68944	136339
cleared land	1013	1085	1324	1228	581	0	2918	2313	5231
agriculture land	178	1477	79	389	177	0	434	1866	2300
residential	1593	519	459	448	106	0	2157	967	3124
right of ways	162	225	518	1057	340	0	1020	1282	2302
miscellaneous	33	189	66	227	11	0	110	416	426
Total Non-Forested	28156	61443	66138	50958	10384	0	104678	112401	217079
Fresh Water	12477	16910	28488	26490	6202	0	47171	43355	90526
Total All Classes	185747	237790	356959	363951	77448	0	620153	602241	1222394

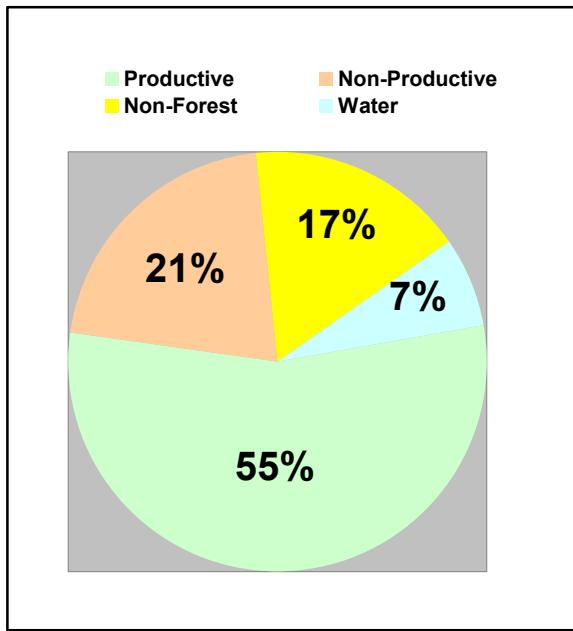


Figure 4 Land class breakout for all ownerships in District 9

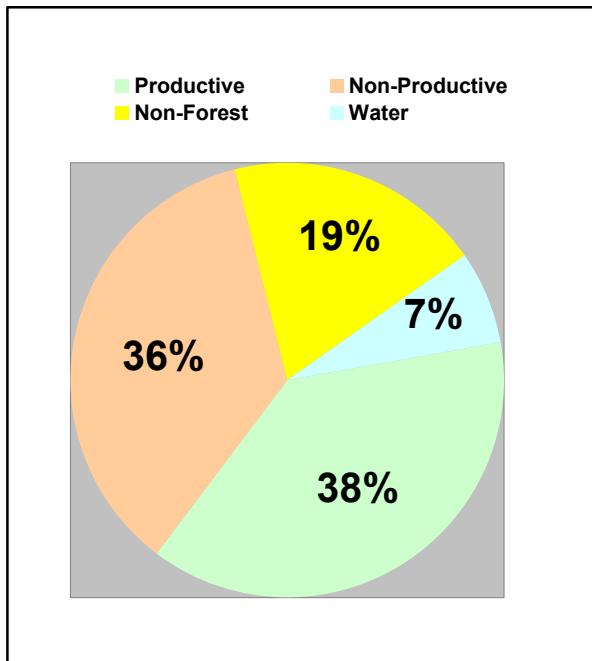


Figure 5 Land class breakout for all ownerships in District 16

9 have an abundance of area in the younger age classes with a slight dip at age class 4. All the other age classes are relatively balanced at 40 000 ha. The age class structure for District 16 is typical of that of the island with an abundance of area in the young and old age classes with a dip in the intermediate age classes. The age class structures for both districts are skewed toward CBPPL because that owner controls 58 percent of the area. Age class structures by owner and district will be discussed in more detail in each pertinent five year plan. The age class structures for Crown land in Districts 9 and 16 as well as strategies to rectify any imbalances or impacts on wood supply of poorly structured age classes will be presented in Section 3 of this plan.

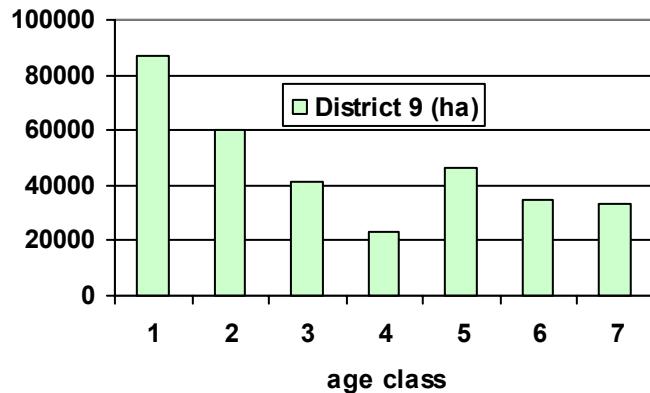


Figure 6 Age class distribution for all ownerships in District 9

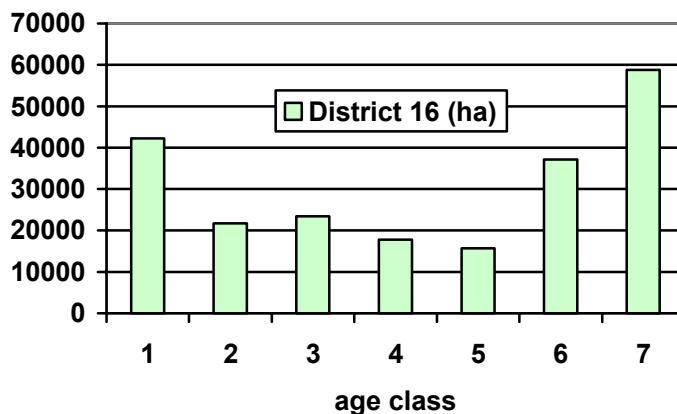


Figure 7 Age class distribution for all ownerships in District 16

1.5.3 Site Class

The productive forest in the zone is further sub-divided along a gradient of productivity ranging from poor to high site class. The site class is determined through air photo interpretation supplemented with field checks and is based primarily on the sites ability to produce timber. Site capability is determined on a number of factors some of which include soil fertility, moisture regime and geographic (slope) position. Generally the balsam fir and softwood hardwood working groups occupy the better sites in the zone. The black spruce working groups dominate the very dry and very wet areas that are of poorer site quality.

The distribution of area of all ownerships combined by site class for each district is shown in Figures 8 and 9. This percentage distribution holds relatively true for individual ownerships with the exception of District 9 whereby the Crown has a higher proportion of poor sites and ACI has a higher proportion of goods sites. On average, good sites are capable of producing > 2.6 m³/ha/yr, medium sites 1.7 m³/ha/yr, and poor sites 0.8 m³/ha/yr.

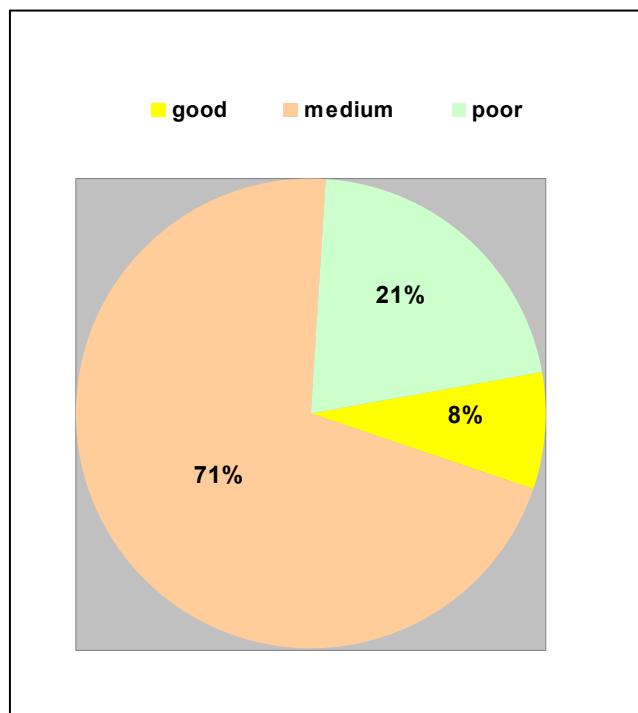


Figure 8 Site class breakdown for all ownerships in District 9

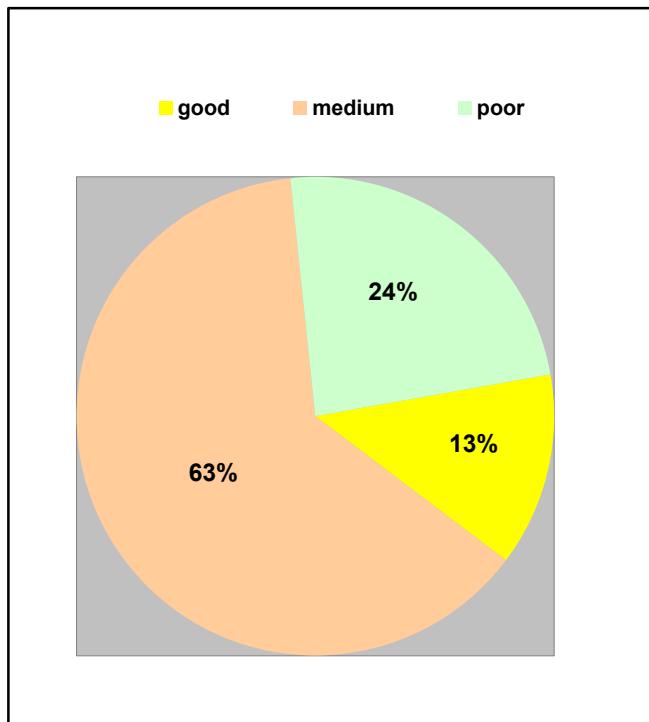


Figure 9 Site class breakdown for all ownerships in District 16

1.5.4 Species and Working Group

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

In the zone, the softwood working groups dominate accounting for over 90 percent of the productive forest. Balsam fir (bF) is by far the most prolific accounting for 60 percent of the working groups in District 16 and 46 percent in District 9 (Figures 10 and 11). 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 26 and 33 percent in Districts 16 and 9

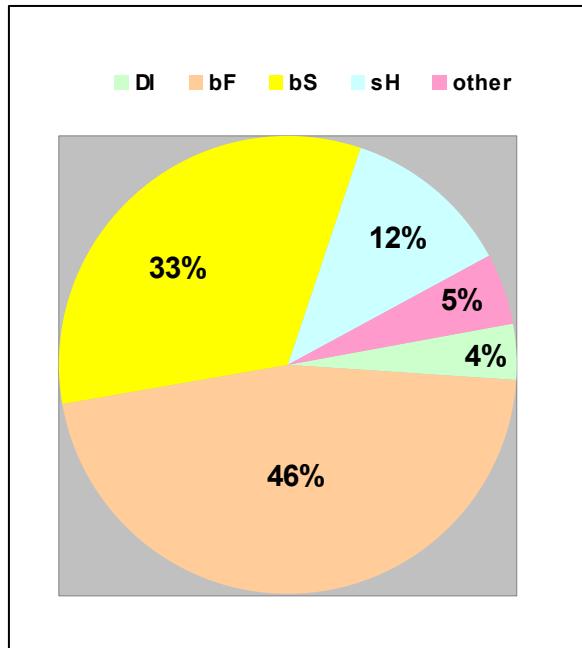


Figure 10 Working group breakdown for all ownerships in District 9

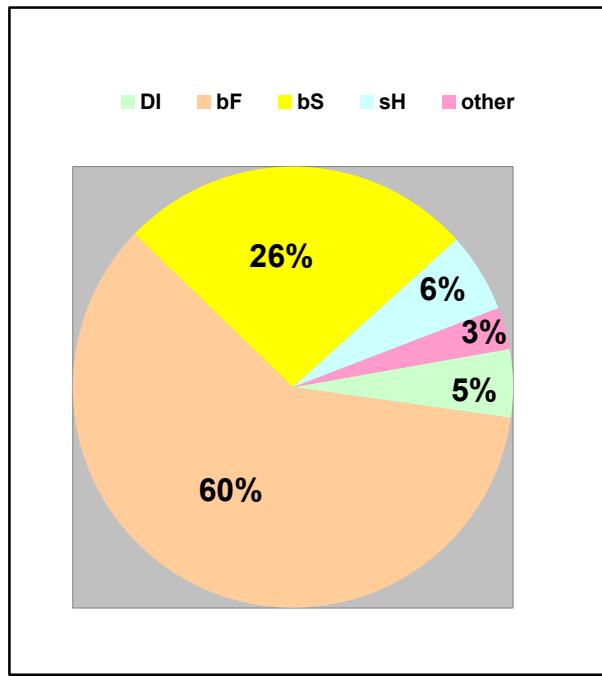


Figure 11 Working group breakdown for all ownerships in District 16

respectively. 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 12 percent of the

productive forest area in Districts 16 and 9 respectively. This working group occurs as varying mixtures of fir, spruce, birch and aspen. The hardwood softwood (hS), and white birch (wB), trembling aspen (tA), white spruce (wS) and jack pine (jP) working groups occupy less than five percent of the productive forest in both districts. Approximately five percent of the productive forest is classed as disturbed (DI). Disturbances include harvesting, which accounts for most of the total, insect damage, fire, wind throw, and flooding. The relative percentages hold true for all ownerships in both districts.

1.5.5 Forest Disturbances

In the past 20-25 years approximately 143 000 ha have been disturbed by some means in the zone which represents 25 percent of the total productive forest. Harvesting has accounted for the largest portion of this disturbance at approximately 127 000 ha. Insect damage has occurred on over 5 000 ha with 10 percent in light (0-25 percent mortality), 5 percent in moderate (26-50 percent mortality), 5 percent in severe (51 -75 percent mortality) and 80 percent in extreme (76+percent mortality). Fire has disturbed over 11 000 ha, mainly in District 9 in the late 1980's and early 1990's. There has been a slight amount of mortality due to blow down. This usually occurs after another disturbance (like insect damage) has weakened a stand.

The main forest insects which have affected forests in the zone are the hemlock looper (1949, 1961, 1962, 1969, 1986-88, 1995, 1996), the spruce budworm (1956, 1978-80 to present at lower levels), the balsam woolly adelgid (1963, 1970-present) and the birch casebearer (1970-present). To aid in the control of the hemlock looper, a chemical spray program was initiated in 1969. Since then the aerial application of insecticides has been used regularly as a management tool to control insect pests of balsam fir. In more recent years chemical insecticide use has been dropped in favour of the more environmentally benign bacillus thurengiensis (bT), a naturally occurring, biological control agent. Despite the use of insecticides, the hemlock looper, spruce budworm, and balsam fir sawfly continue to pose a significant threat to the forests of the zone due to the dominance of balsam fir. New infestations are likely to develop over the next 20 years. The balsam woolly adelgid also poses a threat to balsam fir. The dynamics of this insect and its

potential impact on the forests, particularly in District 16, will be discussed a later section on silviculture prescriptions.

Section 2 Past Activities

2.1 District 9

2.1.1 Overview

As stated in the introduction, there has been a change in the planning process and requirements for the province by combining ownerships for certain districts into planning zones. To do this it was necessary to change the start and end dates of some existing five year plans so that they could be synchronized for the new planning process. The five year plan for District 9 was extended by 1.75 years to facilitate this change therefore reporting of past activities will be for a seven year period.

There was significant activity in District 9 from 2000 to 2007. There was over 500 000m³ harvested on Crown Land and on land transferred or exchanged from Corner Brook Pulp and Paper. Harvest on Crown Land was distributed throughout the district and occurred both commercially and domestically. Harvest on CBPPL limits occurred near Baie Verte, Six Mile Valley and East Pond. Also included in the commercial harvest is Chouse Brook which is administered by District 16 and Tommy's Arm which was harvested by CBPPL through a cord for cord exchange.

In addition there was approximately 45 000 m³ of aspen and birch harvested for both commercial and domestic purposes.

There were 665 hectares silviculturally treated, 43.8 km of access roads build and approximately 40 000 hectares treated with insecticide.

In 2004, a small portion of the former Labrador Linerboard license in the southern portion of the district (Figure 2) reverted to the Crown and for the time being, will be managed by the Crown.

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

2.1.2 Harvesting

Table 4 summarizes the total harvest administered by Crown in District 9 and compares it to the AAC for the seven year period which encompasses three different AAC periods. There is no comparison with AAC for areas harvested on CBPPL limits because it represents only a small portion of their AAC in District 9. This comparison will be made in the five year plans by CBPPL.

There was a slight under harvest of the AAC's on Crown in both Class 1 and Class 3 areas. An explanation of Class 1 and Class 3 landbases can be found in section 3.4.2. The main reason is the fragmentation of the forest and the difficult logging chances for commercial operations on Crown Land. A substantial portion (32 percent) of the total harvest administered by District 9 occurred on CBPPL transfers or exchanges.

2.1.2.1 Commercial

There was approximately 340 000 m³ of softwood harvested commercially in District 9 in the last plan period which represents approximately two thirds of the harvest. This total represents a ratio of 56% pulpwood:44% sawlogs. Approximately 54 percent of this harvest occurred on Crown Land with the balance on CBPPL limits. In addition, there was over 10 000 m³ of hardwood harvested at 5 percent sawlogs, 45 percent pulp wood and 50 percent fuelwood.

Table 4 Summary of softwood harvest in District 9 by Crown for 2000 to 2007

AAC Source	Harvest Type	Product			AAC (for 7 years)	
		Pulpwood	Sawlogs	Fuelwood		
Crown Class 1	Commercial	106461	74119	0	180580	
	Domestic	0	8028	38398	46426	
	Total	106461	82147	38398	227006	
Crown Class 3	Commercial	0	0	0	0	
	Domestic	0	30906	90874	121780	
	Total	0	30906	90874	121780	
CBPPL Class 1	Commercial	84888	74316	0	159204	n/a
	Domestic	0	0	0	0	
	Total	84888	74316	0	159204	
District Total	Commercial	189349	148435	0	339784	n/a
	Domestic	0	38934	129272	168206	
	Total	189349	187369	129272	507990	

Note: table includes estimates for 2006-2007

All of the pulpwood was trembling aspen while most of the sawlogs and fuelwood were white birch.

2.1.2.2 Domestic

There was over 168 000 m³ of softwood harvested domestically in District 9 at a ratio of 25% sawlogs:75% fuelwood. Most of the harvest occurs on Class 3 land (75 percent) which represents the poorer logging chances. In addition, approximately 35 000 m³ of hardwood was harvested during the period. There is a slightly upwards trend in domestic cutting due to the increase in home heating fuel. It is expected that the domestic demand will level out at 2500 permits/year.

2.1.3 Silviculture

Table 5 summarizes the completed silviculture treatments for the past seven years as compared to those proposed. The precommercial thinning program was significantly reduced

Table 5 Summary of silviculture treatments on Crown land in District 9 from 2000 to 2007

Treatment Type	Area Proposed (ha) (5 year total)	Area Completed (ha)(5 year total)
Pre Commercial Thinning	993	360
Planting	0	305

in favour of a more aggressive planting program. The switch to gap or fill planting is becoming more popular because it increases stocking on the marginally stocked areas and increases the spruce content which is less susceptible to insect attack and is better suited to sites that were previously occupied by spruce but partially regenerated to fir.

2.1.4 Road Construction

Table 6 summarizes the roads built during the period and compared to those proposed. There were 43.8 built during the period to access commercial timber. Of these, 16.8 km of primary road was built by the Crown and 27 km of operational road was build by commercial operators.

Table 6 Summary of access roads built on Crown Land in District 9 from 2000 to 2007

Roads Proposed (km)(5 year)	Roads Built (km)(5 year)
82.5	43.8

2.1.5 Natural Disturbance

2.1.5.1 Fire

District 9 has had a cyclic fire history with years of few, small fires and years of major fires. Over the past seven years there have been few fires with only 24 being recorded. There was only 1.7 ha of productive forest burnt which indicates a very aggressive and effective fire protection effort.

2.1.5.2 Insect

There has been little insect activity in the district over the past 7 years. There have been approximately 1700 ha defoliated by the hemlock looper mainly in 2001 and 2004. There was a small treatment program of approximately 40000 ha with bacillus thurengiensis (bT) in 2002 and 2003 as a result of the infestation in 2001. Populations of this insect are being closely monitored since a large portion of the district is comprised of highly susceptible balsam fir.

2.2.6 District 16

2.2.1 Overview

There has been significant activity by the Crown in District 16 from 2002 to 2007. There was nearly 150 000 m³ of timber harvested on unalienated Crown land, areas transferred and/or exchanged with CBPPL, and on Labrador Linerboard licenses. The latter represents only a small portion of the harvest since these licenses expired in 2004. These licenses located in the Sops Arm/Jacksons Arm/Sheffield Lake areas will, for the time being, be managed by the Crown. The Chouse Brook operation in District 9 located on areas transferred by CBPPL to Crown is administered by District 16 due to the close proximity to Sops Arm but all reporting on past operations are included in the District 9 totals for past activities. There were a total of 1073 ha silviculturally treated, 41.8 km of access road built or re-constructed, and 37 300 ha treated for insects in the last planning period.

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

2.2.2 Harvesting

Table 7 summarizes the total harvest administered by Crown in District 16 and compares it to the AAC for the five year period. There is no comparison with AAC for areas harvested on CBPPL or Linerboard limits because it represents only a small portion of those respective AAC's. This comparison will be made in the five year plan by CBPPL.

There was significant under harvesting of the AAC's on Crown in both Class 1 and Class 3 areas. The main reason is the fragmentation of the forest and the difficult logging chances for commercial operations on Crown land. A significant portion (52 percent) of the total harvest administered by District 16 occurred on CBPPL or Labrador Linerboard licenses.

Table 7 Summary of harvest in District 16 by Crown for 2002 to 2007

AAC Source	Harvest Type	Product			Total	AAC (for 5 years)
		Pulpwood	Sawlogs	Fuelwood		
Crown Class 1	Commercial	3590	1242	254	5086	
	Domestic	0	15815	11698	27513	
	Total	3590	17057	11952	32599	67600
Crown Class 3	Commercial	18250	17558	0	35808	
	Domestic	0	987	987	1974	
	Total	18250	18545	987	37782	61000
CBPPL Class 1	Commercial	44093	33256	0	77349	n/a
	Domestic	0	0	0	0	
	Total	44093	33256	0	77349	
Linerboard Class 1	Commercial	0	594	5	599	n/a
	Domestic	0	0	0	0	
	Total	0	594	5	599	
District Total	Commercial	65993	52650	259	118842	n/a
	Domestic	0	16802	12685	29487	
	Total	65993	69452	12944	148329	

Note: table includes estimates for 2006-2007

2.2.2.1 Commercial

There was a total of approximately 119 000 m³ harvested commercially with represents 80 percent of the total harvest in the district. This harvest is approximately 55 percent pulpwood and 45 percent sawlogs. Over two thirds of this commercial harvest occurred on CBPPL and

Linerboard licenses. The majority of the Crown Class 3 harvest occurred near Patrick's Pond and was administered by District 9.

2.2.2.2 Domestic

As noted, there are few communities located in District 16 and there is easy access to birch on company limits therefore domestic harvesting accounts for only 20 percent of the harvest on Crown land. The easy access to birch on company limits is the main reason that there is a 60:40 ratio of sawlogs:fuelwood harvested on Crown land.

2.2.3 Silviculture

Table 8 summarizes the completed silviculture treatments for the past five years as compared to those proposed. There were an overall total of 1150 ha proposed and 1073 ha completed in the past five years. There is a major difference in the treatment type of proposed versus completed however, with significantly more planting and significantly less pre commercial thinning completed. The main reason is due the increased presence of balsam woolly adelgid as previously discussed. Treatments on certain sites has shifted from treating balsam fir by thinning to doing more planting to white and black spruce immediately after harvest in an attempt to change the species composition more to spruce and thus decreasing the future susceptibility to adelgid. There were 50 ha of herbicide completed that was not listed in the five year plan. This was done as site preparation to rid a site of competing vegetation before planting. This trend toward site preparation and planting on sites susceptible to adelgid will continue in this five year plan.

2.2.4 Road Construction

Table 9 provides a comparison of roads proposed in the previous five year plan with those actually built. Out of 58 km proposed for new construction, only 17.3 were actually built while

Table 8 Summary of silviculture treatments on Crown land in District 16 from 2002 to 2007

Treatment Type	Area Proposed (ha)(5 year total)	Area Completed (ha)(5 year total)
Pre Commercial Thinning	1100	495
Planting	50	528
Herbicide	0	50

24.5 were re-constructed. Most of the roads were constructed in the areas transferred from CBPPL in Chouse Brook and Whites River. The main reason why less roads were actually built than were proposed is because there was significantly less timber (mainly commercial in the Whites River area) harvested than was proposed.

Table 9 Summary of access roads built on Crown Land in District 16 from 2002 to 2007

Roads Proposed (km) (5 year)	Roads Built (km) (5 year)	
	Construction	Re-construction
58	17.3	24.5

2.2.5 Natural Disturbance

2.2.5.1 Fire

District 16 does not have a very active fire history due to its long winters with abundant precipitation. In fact there were only two fires recorded in the last five years which burnt 1.5 ha of productive forest.

2.2.5.2. Insect

There has been moderate insect activity in District 16 in the last five years. There were over 25 000 ha defoliated (mainly in 2001) and a subsequent treatment of 20000 ha in 2002 and another 17600 ha in 2003 with bacillus thurengiensis (bT). Populations of this insect have been reduced since that time. As well, the balsam fir sawfly is spreading eastward into the district from District 15. While only 400 ha have been defoliated in 2004, this insect will be closely monitored because of potential growth losses from continued severe defoliation.

The balsam woolly adelgid population and distribution has been increasing in the District in recent years. If it continues to spread, the presence of this insect will have a major influence on the silviculture treatments in the future. Treatments will move toward stand conversion, after harvest, of highly susceptible balsam fir to spruce.

Section 3 Timber Supply Analysis

3.1 Introduction

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

3.2 Guiding Principles and Policy Direction

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

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

3.3 Factors Affecting Timber Supply

The forests of insular Newfoundland are very variable in terms of age distribution. Typically, there are significant amounts of mature/over-mature forest and regenerating forest, and limited intermediate aged forests. This imbalance is not unusual in a boreal forest where cyclic catastrophic disturbances are common. Figure 7 illustrates this age class imbalance.

The insufficient amount of intermediate age forest on the island is one of the most important factors influencing AAC's therefore it is the basis for many of our forest management strategies. Essentially, we are employing a matrix of measures designed to fill the gap in our age structure. These range from an aggressive forest protection program to keep the mature and over-mature stands alive as long as possible so that they can be harvested before they collapse naturally,

harvesting programs that attempt to exclusively target the oldest stands first in order to minimize the harvesting pressure on the naturally weak intermediate age classes, and thinning of the regenerating forest so that it becomes operable at an earlier age.

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

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

3.4 Timber Supply Analysis

In 2003, the Forest Service began another review of the provincial timber supply which was completed in March of 2006. Consistent with Department's vision, the analysis was structured to determine sustainable timber supplies while respecting a multitude of social, economic and environmental objectives. Timber supply, in this context, refers to the rate at which timber is made available for harvesting on a sustainable basis.

The determination of supply (represented as AAC's) involved the use of computer models that forecast the sustainability of possible AAC levels. These models require three basic inputs. First, a description of the current state of the forest (forest characterization and availability), second, the growth rates associated with the current forest, and third, the management strategies applied to the forest. To arrive at these basic inputs requires careful and detailed consideration

of a broad range of both timber and non-timber values. More specifically, the following was considered in determining the sustainable timber supply.

3.4.1 Forest Characterization

To get a current description of the forest resource (or stock), the Province has invested significant resources into creating and maintaining a Provincial Forest Inventory. District 9 has a new forest inventory and although the last inventory for District 16 was done in 1995, the estimate of forest stock is kept current through an update program which is conducted each year to account for all natural and man-made disturbances such as fire, insects, and harvesting, and any enhancement programs such as tree planting and pre-commercial thinning. Also, each stand in the forest inventory is updated to reflect any yield changes that may have occurred since the previous inventory update.

3.4.2 Land Availability

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

3.4.2.1 Non-Timber Related

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

base. In any one year, less than 1% of the productive forest land base is influenced by harvesting operations.

3.4.2.1.1 No-Cut Buffer Zones

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

3.4.2.1.2 Pine Marten and Caribou Habitat

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

3.4.2.1.3 Wildlife Corridors

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

3.4.2.1.4 Protected Areas

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

3.4.2.1.5 Watersheds

For each Forest Management District several of the major watersheds were digitized and captured within the forest inventory. These watersheds were added to the database in order to address any concerns about forest management within these watersheds and to permit the Forest Service to report on proposed activities within the watershed over time. This is in line with Value 3.1, Water, of the Soil and Water Element of Criterion 1, Biodiversity, in the *Provincial Sustainable Forest Management Strategy*.

3.4.2.2 Timber Related

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

3.4.2.2.1 Insect/Fire/Disease Losses

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

3.4.2.2.2 Logging Losses

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

3.4.2.2.3 Operational Constraints

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

Newfoundland's forests; low volume, steep slopes, rough terrain, and excessively wet ground conditions etc..

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

3.4.3 Growth Forecasting

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

Yield curves are a key element in a wood supply analysis. In fact, the validity, or "usefulness", of the wood supply analysis is determined by the truth, or "correctness", of the yield forecasts. While there is no way of predicting with certainty how stands will actually grow in the future, care must be taken to ensure that the yield projections used are realistic and reasonable. Respecting the sensitivity and importance of these forecasts, the Newfoundland Forest Service has directed a large portion of its resources and time into developing realistic yield curves. Two growth models were used, one for projecting stand development under natural conditions and the other for projecting growth under managed (i.e., silviculturally enhanced) conditions. Tree and stand development data generated from the Forest Service's Forest Inventory Program were used to make stand growth predictions. These projections were then checked against empirical data

from thousands of temporary plots established throughout the Island. If the projections varied from the real life evidence, the curves were adjusted to make them more accurate.

In this analysis, yield curves were developed on an ecoregion basis. As well, special yield curve sets were developed for defined geographic areas with demonstrated uniqueness. These included areas where chronic insect activity is ongoing and areas that have unique growth characteristic such as the Main River watershed.

3.4.4 Management Strategies

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

3.4.4.1 Harvest Flow Constraints

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

3.4.4.2 Spatial Analysis

A major improvement in this wood supply analysis is the introduction of manual harvest scheduling. In 2001, the harvest scheduling was an automated process where the software

picked the stands to be harvested over the 25 years based on user supplied criteria. While, the 2001 approach was an improvement over previous wood supply analysis were no harvest scheduling was done, the software used cannot realistically know all the operational restrictions within a forest management district. In the manual process used, the on the ground conditions that restrict harvesting are accounted for when a spatial harvest schedule is defined. The proposed harvest schedule is then played back through the modeling software to see if it is sustainable and see if non-timber objectives are met. In most case, this harvest scheduling has to go through several cycles before an acceptable harvest schedule could be found. The spatial arrangement of areas for timber harvesting is especially challenging in this province because of the natural fragmentation of our forests. This model provided forest planners with the ability to mimic realistic timber harvest schedules based on current practices and to identify other forest stands that are not as accessible for harvesting.

Manual harvest scheduling has several major benefits. First, it fosters the long term sustainability of our AAC's by mimicking current harvest practices and accounting for actual on the ground conditions that delay or restrict the harvesting of stands. These restrictions which were previously unaccounted for, have made our past AAC's higher than was realistically sustainable. Secondly, the mapped 25 year harvest schedules build credibility into the forest management process. A common misconception is that the Province is running out of wood and soon will not be able to support existing forest industries. Every stand that will be harvested over the next 25 years must already be in the second (20-40 years old) or third (41-60) age class and can be easily identity and highlighted on the harvest schedule maps. Being able to see the wood that will be harvested in the future will help reassure people that the resource is being used in a responsible manner. Next, harvest scheduling will help integrate the management of other forest resource values into timber management planning. All forest values can be typed directly to discreet forest areas, and these forest areas can be the link that allows the many different forest values to be managed simultaneously. The forested areas needed for each resource can be mapped and potential conflicts can be addressed before they become an issue. Finally, the harvest schedule maps developed for the wood supply analysis can be a starting point for the 5 year planning process, especially the first two periods. The harvest schedule maps, if done

correctly, can help reduce the work of the 5 year planning process. One point to note is that harvest scheduling is only done for the Class 1 land base. The Class 3 AAC, for the most part, is opportunistic at best and is harvested only if extra effort is applied. It is not scheduled because of the uncertainty of obtaining extra funding for access and harvesting.

3.4.4.3 Planning Horizons

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

3.4.4.4 Operable Growing Stock Buffer

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

3.4.4.5 Old Forest Targets

Consistent with 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. This was designed to provide a

course filter approach to maintaining representative forest structure. It ensures the presence of certain amounts of old forest across the landscape into the future. With advances in modeling, this target can now be tracked across a district rather than a single ownership. This has resulted in this strategy being less restrictive than the last analysis. As well, an attempt has made to connect these areas across the landscape for the first 25 years in the form of 81+ corridors. This is in line with Value 1.1, Representative Landscapes, of the Ecosystem Diversity Element of Criterion 1, Biodiversity, in the *Provincial Sustainable Forest Management Strategy*.

3.4.4.6 Operability Limits

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

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

3.4.4.7 Silviculture

Silviculture is one of the main forest management tools available to forest managers when they are analyzing the many different future forests that are generated using the wood supply modeling software. The silvicultural actions used in the 2006 analysis include; 1) precommercial thinning of balsam fir, black spruce, and softwood hardwood stands, 2) full plant of any areas that do not regenerate naturally with either white spruce, black spruce, or Norway spruce, and 3) gap planting of either black spruce or balsam fir stands with either white spruce or black spruce. Gap plant is the filling of “holes” within stands that have inadequate natural regeneration of either balsam fir or black spruce.

3.5 Inventory Adjustments

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

3.5.1 Fire

An estimate of productive area loss as a result of fire was based on an analysis of the historical fire statistics maintained by DNR. The fire deduction for Districts 9 and 16 is 0.6 and 0.0 percent respectively.

3.5.2 Insects

An aerial mortality survey was completed on areas with historically high insect infestations. This information along with a GIS analysis of areas salvaged enabled DNR to determine the amount of productive area lost to insect mortality each year. These numbers were in turn reviewed by district managers and adjustments were made for local conditions. The insect deduction for both District 9 and 16 is 3.0 percent.

3.5.3 Timber Utilization

Information for this adjustment was derived from a series of intensive on-the-ground surveys which measured the amount of wood remaining on cutovers following harvesting. This wood was comprised of solid merchantable wood (logging losses) and wood with inherent cull (butt/heart rot). Surveys were conducted province wide and on all tenures over a five year period. Information was analyzed by harvesting system and season. The utilization deduction for Districts 9 and 16 is 8.8 and 8.5 percent respectively.

3.5.4 Stand Remnants

Following harvesting operations, small fragments of stands often are left for a variety of reasons (operational constraints, low volume stands, terrain conditions). These often result in the inability of the operator to achieve volumes predicted by the computer models. A series of surveys were conducted across the province and the results analyzed to determine the amount of productive area attributed to remnants. The stand remnant deduction for Districts 9 and 16 is 8.9 and 9.5 percent respectively.

The total inventory adjustment for District 9 and 16 is 20 and 21 percent respectively.

3.6 Results

3.6.1 District 9

Table 10 summarizes the result of the timber supply analysis for District 9. There are four major differences between the AAC's for District 9 from 2001 to 2006. First, in this analysis the land base was separated into domestic and commercial because of the relatively high proportion of domestic harvest. There was a separate AAC calculated for domestic and commercial on Class 3 land with Class 1 being solely reserved for commercial. Second, the Class 3 AAC was calculated by the same method as the Class 1 AAC. The Class 3 AAC for the 2001 analysis was done using a simple area to volume ratio. Third, there is a hardwood AAC calculated based on the same methodology with rudimentary yield curves for white birch. And finally, a separate AAC was calculated for the small portion of Labrador Linerboard license that reverted to the Crown in 2004.

The net AAC for Class 1 land is 25 300 m³ which is down significantly from the net AAC of 40 200 m³ in 2001. Reasons for this decline are the change of land base from Class 1 to Class 3 and the effects of harvest scheduling (difference between aspatial gross and spatial gross).

Conversely, the Class 3 AAC has increased from 19 000 m³ in 2001 to 36 100 m³ in 2006. Although one obvious reason is the change in land base from Class 1 to Class 3, it is probably unfair to compare these AAC's because of the different methods of calculation. The overall AAC (on paper) has increased from 59 200 m³ to 61 400 m³. It is questionable if all the Class 3 can be harvested however.

The hardwood AAC for District 9 is 2 610 m³ for Class 1 which is similar to the 2001 number when the area to volume ratio method was used, and 6 840 m³ for Class 3. Although no empirical data is available, an inventory adjustment of 5 percent was used because it is anticipated that there will be little loss due to the high value for fuelwood.

Table 10 Annual Allowable Cut results for Crown Land District 9.

	Aspatial Gross (m ³)	Spatial Gross (m ³)	Spatial Net (m ³)
Crown Class 1 Softwood			
Commercial	40330	31685	25300
Total Class 1	40330	31685	25300
Crown Class 3 Softwood			
Commercial	13344	13344	10700
Domestic	31788	31788	25400
Total Class 3	45132	45132	36100
Crown Hardwood			
Class 1	3284	3284	2610
Class 3	8569	8569	6840
Total	11853	11853	9450
Linerboard Softwood			
Class 1	2322	805	640
Class 3	86	86	60
Total Linerboard	2408	891	700

The softwood AAC on Labrador Linerboard is 640 m³ and 60 m³ for Class 1 and Class 3 landbase respectively. This land base represents a very small area in District 9 (Figure 2) and there are no comparative figures since this is the first time it has been calculated.

3.6.1.1 Sensitivity Analysis

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

The silviculture targets used were 50 hectares of planting and 50 hectares of thinning. While doing maximum silviculture would give an increase in AAC, operational and monetary constraints render this option unrealistic. Similarly, increased yield would give a higher AAC, but current yield curves have been constructed using the best available data so a further increase in unwarranted. Lowering the operability limits would also increase the AAC. This would represent a significant and unwarranted risk however, if stands situated at the lower end of operability are not operationally ready when queued for harvest.

The 81+ target was not constraining for this analysis. The 15 percent target was maintained or exceeded for the full analysis period. The harvest scheduling was the most constraining objective. This is due mainly to the natural fragmentation of our forest and to the limitations in baseline data when describing the forest. This limitation is due to the way we describe the forest into 20 year age classes and the way the model uses 5 year age classes. A major initiative is required for the 2011 analysis to describe the forest into 5 year age and condition classes particularly at the lower operability limits.

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

3.6.1.2 Forest Composition and Structure Change

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

Figure 14 shows the change in total forest age on Crown land in District 9 by 20 year age classes for the simulation period. The age distribution in all classes is well distributed throughout the three comparison periods during the simulation. There are shifts in age classes from period to period as a result of natural progression as stands age, however, overall representation is balanced. The 81+ forest target ensures that the forest will be well represented in all age classes through time.

There is insignificant change in the balsam fir, black spruce, softwood hardwood, and hardwood softwood working groups as a result of forest management activities on Crown Land for the next 25 years. There is an approximate 25 percent decrease in the balsam fir working and corresponding 25 percent increase in the black spruce working group at the end of the simulation period however. The major reason for this is that the planting program is geared toward spruce. This change takes place slowly however because we are only planting 50 hectares per year. There is also a decrease in the hardwood dominated stands at the end of the simulation period. This change must be monitored and corrective action taken if we are to continue to move into the management of hardwoods and preserve species diversity.

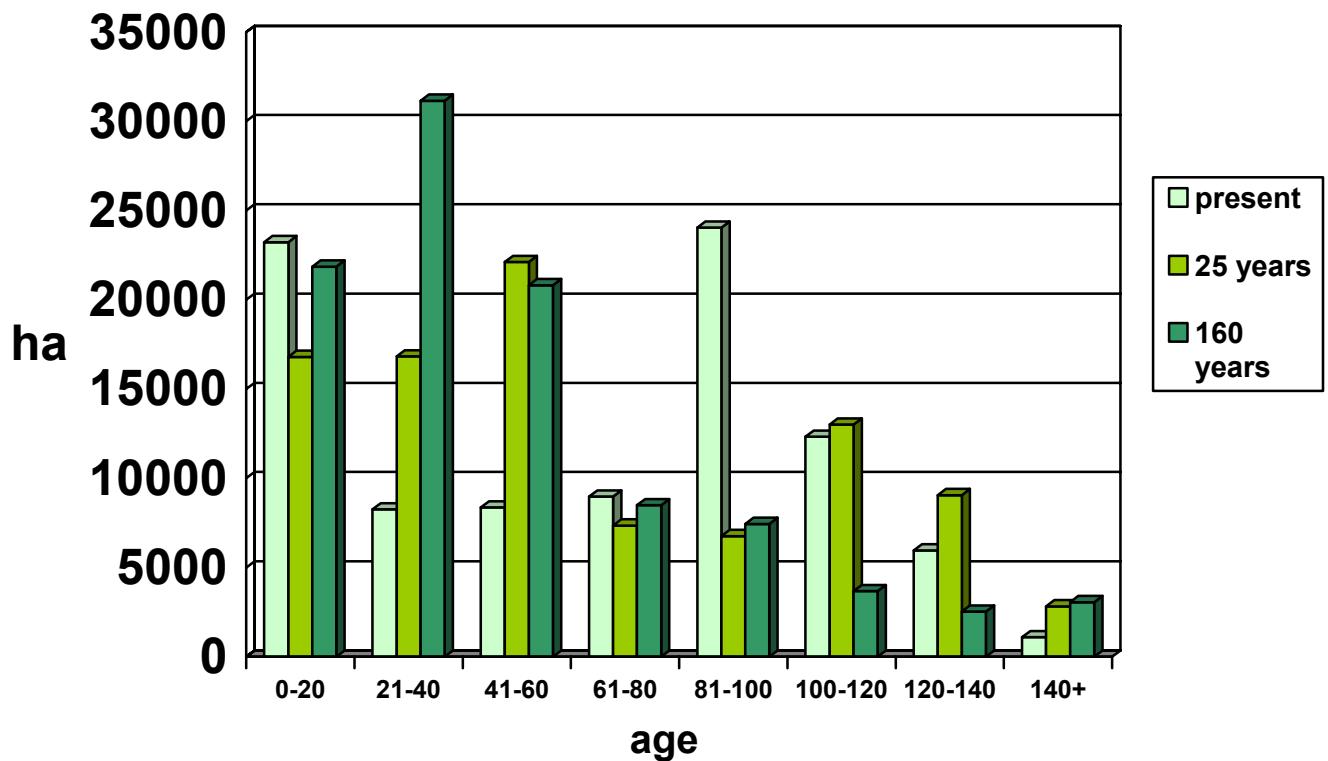


Figure 12 Change in age class structure in on Crown Land District 9 for the 160 year simulation period.

3.6.2 District 16

Table 11 summarizes the result of the timber supply analysis for District 16. The Class 1 AAC on Crown land has decreased from 14 900 m³ in 2001 to 10 400 m³ in 2006. The main reason for the decrease is shift in land base from Class 1 to Class 3 and the effects of harvest scheduling due to the fragmentation of the land base (difference between aspatial gross and spatial gross).. Conversely, the Class 3 AAC has increased from 11 000 m³ in 2001 to 14 300 m³ for this analysis. The overall AAC has decreased from 25 900 m³ to 24 700 m³. There is no breakout of the land base into commercial and domestic as in District 9 because the low population base

minimizes domestic activity on Crown Land. There is a new hardwood AAC of approximately 2 500 m³ for Class 1 and Class 3 areas.

Table 11 Annual Allowable Cut results for Crown Land District 16.

	Aspatial Gross (m ³)	Spatial Gross (m ³)	Spatial Net (m ³)
Crown Softwood			
Class 1	14023	13285	10400
Class 3	18106	18106	14300
Total Crown	32129	31391	24700
Crown Hardwood			
Class 1	1448	1448	1130
Class 3	1701	1701	1330
Total	3149	3149	2460
Linerboard Softwood			
Class 1	16507	15425	12100
Class 3	10416	10416	8200
Total Linerboard	26923	25841	20300
Linerboard Hardwood			
Class 1	1576	1576	1240
Class 3	1038	1038	810
Total Linerboard	2614	2614	2050

The softwood AAC on Class 1 land on the Linerboard Licenses has decreased from 17 400 in 2001 (when it was managed by ACI) to 12 100 m³ in 2006. Again harvest scheduling and land base changes are the main reasons. The Class 3 AAC on Linerboard Licenses has increased from 4 000 m³ in 2006 to 8, 200 in 2006. The overall AAC has decreased from 21 400m³ to 20 300 m³. There is a hardwood AAC of approximately 2 000m³ for Class 1 and Class 3 areas.

3.6.2.1 Sensitivity Analysis

The sensitivity analysis for District 16 is the same as that listed in section 3.6.1.1 for District 9 with the same results. The silvicultural inputs for planting and thinning are 25/10 for Crown Land and 43/63 for Linerboard.

3.6.2.2 Forest Composition and Structure Change

Figure 15 shows the change in total forest age on Crown land in District 16 by 20 year age classes for the simulation period. The age distribution in all classes is well distributed throughout the three comparison periods during the simulation. There are shifts in age classes from period to period as a result of natural progression as stands age, however, overall representation is balanced. The 81+ forest target ensures that the forest will be well represented in all age classes through time. Of particular note is the decrease in the area in the 81-100, 100-120, and 120-140 age classes and increase in the 140+ age class at the end of the simulation period. This is a result of the alienation Class 3 stands in the Main River not being harvested and tracking along their yield curves. There is a special set of yield curves developed for the Main River area which reflect the unique nature of the gap replacement forest as described in section 1.5.2.3.1. These curve “flat line” in volume after 140 years and continue on in perpetuity which simulates the forest of the area that never breaks up. Normally, after stands are harvested they are regenerated and revert back to the first age class.

As with Crown Land in District 9, there is very little change in area of all working groups over the first 25 years of the simulation period. There is however an approximate 25 percent increase in the balsam fir working group and a corresponding decrease in black spruce at the end of the simulation period. This is particularly worrisome given the ever increasing presence of balsam woolly adelgid mentioned earlier. This trend will need to be monitored and perhaps a more aggressive planting program with spruce is needed to mitigate this shift and if we are to preserve species diversity.

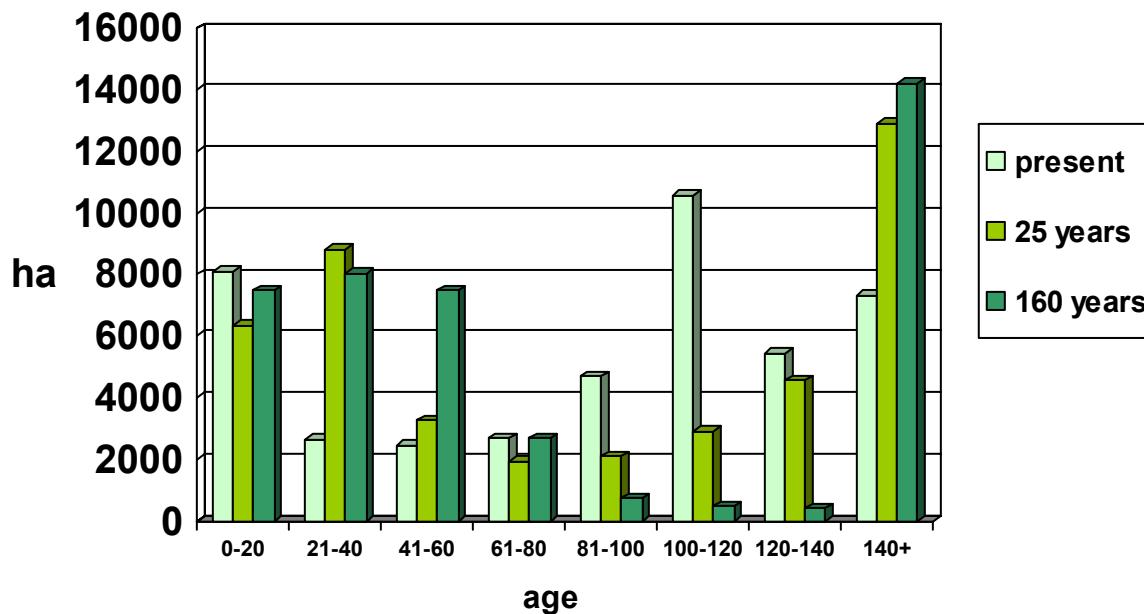


Figure 13 Change in age class structure on Crown Land in District 16 for the 160 year simulation period.

Section 4 Values

4.1 Guiding Principles of Sustainability

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

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

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

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

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

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

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

4.2 Value Description

The forest ecosystems of the zone provide a wide range of values to different individuals and groups. These include consumptive values such as timber products, hunting, trapping, sport fishing, and berry picking, and non-consumptive values like skiing,

snowmobiling, hiking, and bird watching. Also, there are intrinsic and intangible values such as a feeling of wilderness and peace which some people describe as spiritual.

Although difficult to spatially describe or quantitatively measure, these spiritual values are considered to be a product or an accumulation of all values. Other values such as water quality, parks and protected areas etc. provide for the protection of the forest ecosystems which can enhance the other values listed above.

Many of the values in the zone were identified by this or previous 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 ambience, road access, etc.)

Guiding Principles

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

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

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

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

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

4.2.1 Biotic Values

4.2.1.1 Big Game

4.2.1.1.1 Moose

Characterization:

Moose are not native to the island. A pair was introduced to Gander Bay in 1878 and two pairs were introduced to Howley in 1904. 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. 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 seral stages of a forest and generally do well in areas after harvesting.

4.2.1.1.2 Caribou

Characterization:

Caribou is the only native ungulate species on the island. Biologists estimate that prior to the railway being built in 1898 the population on the Island was approximately 100,000 animals but by 1930 the population had declined to about 2,000 animals. Between 1980 and 2000 the number of caribou has increased considerably on the Island with a population estimated at 70,000+ animals. In the past few years however populations have declined significantly with Planning Zone 7 being no exception. Portions of caribou management areas 62, 66, 69, 78, and 78 are located in the zone.

Critical Elements:

Given that there is limited information about the distribution, movements, and habits of caribou in the zone, it is hard to determine what impact timber harvesting will have on these animals. Past studies have shown that forestry activities in the immediate vicinity of calving areas during

the calving period have an impact on caribou populations. Recent studies and anecdotal information has indicated that the harvesting restriction zone around caribou calving zones may be significantly larger 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. The abundance and distribution of arboreal lichens has also been shown to impact caribou populations.

4.2.1.1.3 Black Bear

Characterization:

The black bear is native to the Island and is found in forested areas. Currently, the number of black bears occurring on the Island is not known (due to difficulty in conducting a census) but is crudely estimated to about 6 - 10,000 animals. 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 Inland Fish and Wildlife Division (IFWD) of the Department of Tourism Culture and Recreation. This process takes into consideration information provided by the public and wildlife and forestry staff. Each year the IFWD reviews all relevant data, such as recent census work, information provided on license returns, and jawbone or skull data and makes decisions on types and numbers of licenses of each species in each management area. Management of big game in the zone will continue to be addressed through this process.

Environmental Protection Guidelines

Moose

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

Caribou

To ensure the continued protection of these animals the following EPG's will be followed during forestry activities:

- In areas where caribou utilize lichens, a minimum amount of lichen forest must be maintained for caribou. (This amount is to be determined through consultation with IFWD);
- Harvesting and road construction should be minimized during the May 15 to July 30 calving period.
- Forest access roads, borrow pits and quarries shall avoid: known sensitive wildlife areas such as, calving grounds, post calving areas, caribou migration routes, caribou rutting areas and wintering areas.

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

Bear

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

4.2.1.2 Furbearers

Characterization:

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

Critical Elements:

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

Guiding Principles:

Fur Bearer Management Strategy:

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

Environmental Protection Guidelines:

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

4.2.1.3 Endangered Species

4.2.1.3.1 Pine Marten

Characterization:

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

thought to be the primary reasons for the marten population decline in Newfoundland.

Since the initiation of the live-trapping program, it has been revealed that the Main River watershed is a high-density marten area (on the island) and densities are comparable to those found in the Little Grand Lake and Red-Indian Lake areas. Marten have also been recorded in isolated pockets of District 9. Based on this information, it is important that marten habitat be protected in these areas. Furthermore, it is important that some remnant stands of old growth (80+) forests be left throughout the zone and provision made to have connectivity (i.e., unbroken corridors of forest) between such stands. To accomplish this, a landscape approach to habitat management was initiated by the Forest Service in 1999. This involved working with stakeholders to identify critical or potential marten habitat, locating possible corridors, and identifying areas which would not be cut in the near future. This initiative has been ongoing since that time. To identify all factors affecting marten survival, stakeholders from the Forest Service, IFWD and the paper companies sit on a recovery team for Newfoundland marten. The purpose of this team is to set short-term and long-term population goals for the species, and to recommend ways in which they may be accomplished. The Team is now in the process of identifying critical and recovery marten habitat and determining which forest activities can take place within these areas.

Critical Elements:

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

Guiding Principles:

The basic unit for evaluation will be home range size for male (30km^2) and female (15km^2).

All forest types can be considered marten habitat if they meet the following requirements:

- sufficient habitat to support a viable population of marten;
- core marten area in Main River (i.e., the marten study area) remain closed to snaring and trapping
- 70% or greater of that unit must be suitable habitat;

- 40% or greater of the unit should have trees greater than or equal to 9.6m in height;
- The remaining portion of the 70% (30% or less) should have trees between 6.6 and 9.5m;
- 50% of the unit should be contiguous; Stands will have to be within 50 m of an adjacent habitat to be considered contiguous.
- A qualifying stand will have to be within 150 m of another stand or habitat patch to be considered as habitat.
- minimum patch size equals 20 ha;
- basal area requirement equals 40 m³/ha (~18 m²);
- hardwood stands (insect kill, wind throw) will be considered where crown closure is greater than or equal to 30%;
- Softwood scrub that meet the minimum requirements (6.5 m) will be considered habitat. Where height is not known, softwood scrub within 50 m and adjacent to a qualifying stand is considered as habitat

As stated, critical and recovery pine marten habitat is being or has been identified. The development and evolution of the marten habitat suitability model in recent years has been a useful tool in identifying potential marten habitat and evaluating impacts of harvesting on this habitat and resultant changes to population levels. Continued development and refinement of this model will provide more a reliable means of evaluating impacts of harvesting on marten habitat in the future. Pine marten is also being evaluated as part of an ongoing biodiversity assessment project (BAP). The Forest Service is a cooperative partner in this project and progress is closely monitored. There is also ongoing research into a variety of aspects of marten dynamics through the Model Forest, Canadian Forest Service, and University of Maine. Recommendations resulting from any of these ongoing initiatives will be incorporated into harvesting prescriptions as required.

4.2.1.3.2 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

recently 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.

4.2.1.3.3 Other Species

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

4.2.1.4 Water Resources

Characterization:

The protection of water resources has emerged as a major issue in recent years both nationally and provincially. Events such as the E.coli 0157 outbreak in Walkerton, Ontario, our own Triahlomethane (THM) controversy, and numerous incidents of giradiasis in community water

supplies have heightened public awareness on water issues. While much of the current focus is directed toward drinking water, it is also recognized that an equal importance must be attached to waters which have other beneficial uses. Human impacts both locally and globally have the potential to impair water for future uses.

In Planning Zone 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. The zone supports an annual allowable cut (AAC) on Crown land of 71 550 m³ in District 9 and 49 510 m³ in District 16.

Domestic harvesting still provides fuelwood to heat many homes and sawlog material for residential house construction in the zone. In fact, the latter domestic use is one of the reasons why this Province has the highest rate of home ownership in the country. There are approximately 2000 permits issued on Crown land in District 9 and 400 permits in District 16. Approximately 1500 domestic permits are issued on CBPPL limits in the zone as well. Commercial activity accounts for over 69 percent of all harvest by the Crown in the zone. There are on average 30 000 m³ of timber harvested commercially for sawlogs and 38 000 m³

harvested for pulpwood in District 9. In District 16 there are 13 000 m³ of timber harvested for sawlogs and 10 000 m³ harvested for pulpwood each year. Commercial activities provide many jobs in harvesting, sawmilling, trucking, pulp and paper manufacturing and related spin off industries for local residents. There are in excess of 180 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 \$500 000 is spent by the Crown to construct forest access roads each year in the zone.

Protection of the forest from various disturbances is also a major characteristic of resource management. Because of the long insect history in the zone, protection through integrated pest management techniques is an important activity. While fire has not been a major disturbance, protection is still critical since a large fire can potentially be devastating. Protection of other resource values through modification of activities and enforcement is also important.

Critical Elements:

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

- maintenance or enhancement of productive land base
- planting of non-regenerating areas

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

Guiding Principles:

- enforcement of forestry act, regulations, guidelines and policies
- minimize loss of productive land base through spatial and temporal compromises and continuous dialogue with other resource users
- education (staff, public, operators)
- aggressively conduct silviculture, access road, and protection activities
- implement best management practices. The *Environmental Protection Guidelines for Ecologically Based Forest Resource Management* outline courses of action and mitigative measures for forest activities. These EPG's are outlined in their entirety in Appendix 1 with some highlighted subject areas listed below.
 - garbage disposal
 - fuel storage
 - mineral soil exposure
 - buffer requirements
 - road and bridge construction
 - silviculture and harvesting activities

4.2.2.2 Agriculture

Characterization:

There is 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 District 9:

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

4.2.2.3 Mining

Characterization:

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 855 mineral exploration claims staked and registered. Of these claims, 785 have been staked for their metallic mineral potential and 70 have been staked for their industrial and dimension stone potential. Expenditure between 1998 and 2001 total \$509,473.43 for metallic mineral exploration and \$39,216.81 for industrial mineral and dimension stone exploration. 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:

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

Guiding Principles:

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

- Every attempt will be made to extract timber harvested as part of mining 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.
- Infractions by mining companies will be dealt with through warnings and/or charges as necessary.
- Non-compliance with exploration permits will be passed to the District Manager and then 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.

Each year archaeology projects provide many seasonal jobs, i.e. Ferryland employs approximately 50 people each year. Many of these people are successful in obtaining employment in archaeology and conservation for longer periods of time. By calling for archaeological impact assessments on projects which have potential to negatively impact historic resources the PAO is providing jobs for consulting archaeologists in the province. New businesses are created as a result of archaeological projects. These businesses include bed and breakfasts, boat tours, restaurants and gift shops.

Critical Elements:

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

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 aside for the parks is not large enough to protect the full integrity of that ecosystem. Large-scale changes on the landscape surrounding parks can isolate the park ecologically creating an "island". Parks Canada must work with adjacent land managers in striving to achieve its mandate.

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

While ecological integrity has prominence regarding the management of national parks, legislation and policy dictate broader responsibilities for national parks. These include providing opportunities for Canadians and others to have high-quality experiences in a natural setting. Currently, 61 percent of GMNP is classified as Zone II - Wilderness. The 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 endangered Newfoundland pine marten has been noted in the northern and southern areas of the park. Those sighted in the south are not closely connected with a core population and are likely "dispersers" from either the Little Grand Lake/Red Indian Lake or Main River populations. Habitat connectivity with these other core populations may be critical to long term survival of marten in GMNP.

Critical Elements:

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

Guiding Principles:

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

- maintain species composition as well as the age structure and ecological functions of the various forest-types across the landscape over the long term.
- maintain proportion of interior forest (mature forest >250 m from an "edge")

- maintain landscape connections between the park and the surrounding landscape. This would require effective, permeable movement zones between populations and/or critical habitats.
- manage and operate according to the precautionary principle, particularly as it relates to species at risk.
- ensure landscape characteristics are maintained that allow marten to achieve their habitat requirements at the landscape scale. This could mean ensuring forest management practices allow for a continuous distribution of marten habitat and home ranges to the park boundary. A conservative approach that preserves future options should be adopted until the marten guidelines are fully developed.

4.2.2.6 Newfoundland T’Railway

Characterization:

A large section of the Newfoundland T’Railway Provincial Park lies in 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 the system of provincially designated parks and natural areas. The Provincial Parks Act provides the legislative framework for the administration and management of the T’Railway.

The T’Railway constitutes the Province’s contribution to the Trans Canada Trail System. It is the largest provincial park in the Province with the most users. It is used primarily for snowmobiling, skiing, hiking, walking and all terrain vehicle usage. Other new or historical uses such as commercial and domestic harvesting, quarry and mining access and cabin access are also permitted with a special permit

Critical Elements:

- protection of the historical landscape integrity of the T’Railway corridor
- preservation of the scenic quality along the corridor

- control of land usage adjacent to the T'Railway

Guiding Principles

- coordination of activities with various other agencies responsible for land management outside the T'Railway corridor to ensure that the integrity of the park is maintained
- coordinate and build partnerships with other stakeholders and user groups such as communities, industry and recreational organizations for the long term maintenance and development of the T'Railway
- in an attempt to preserve the natural value of the T'Railway, other land management agencies are requested to maintain a 100 m buffer along the right of way and to consider viewscapes in their harvesting and development plans.
- where access is required from the T'railway, all roads shall be 100 meters away from the track before a landing or turnaround is constructed.
- a one hundred meter no harvest zone shall be maintained from the center of the T'railway.
- where feasible, harvesting using the T'railway shall be from May to December to avoid conflict with other user groups.

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.

Protected areas in the province are of many types. The *Wilderness and Ecological Reserves Act* enables the Province to establish the following; wilderness reserves (Component 1), ecological reserves (Component 2) and ecological reserves (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 (< 10 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, Gros Morne National Park, Main River Waterway Park, West Brook Ecological Reserve and Squires, Flatwater Pond, and Indian River parks.

Critical Elements:

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

Guiding Principles:

- only allow traditional (hiking, berry picking, hunting etc.) activities, educational activities and scientific research within protected areas provided that they do not compromise the integrity of the reserve
- prohibit all forms of new development such as mining activity, hydroelectric projects, forestry activity, agriculture activity, roads and trails and cabins and new structures.
- where forestry operations are within one kilometre of provisional and ecological reserves, wilderness reserves or provincial parks, modified operations may be necessary

4.2.2.8 Outfitting

Characterization:

An economic impact study conducted in 1995 by the Department of Industry, Trade and Technology suggests that a big game license has a net economic impact of \$6864. By approximating this value at \$7000 for 2006, it is possible to estimate the economic contributions

of this industry: approximately 300 licenses * \$7000 / license = \$2.1 million. An additional \$135 000 is estimated to be brought in from fishing. (Bear hunting has not been included in the above figures.) Given that 85 percent of the hunting market comes from the United States of America, it follows that the above monetary figures are reflections of money entering the Province from elsewhere. It should be recognized that the outfitting industry provides this revenue to the Province each season and has the potential to do so indefinitely.

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

Critical Elements:

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

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

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

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

Guiding Principles:

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

- consideration should be given to decommissioning roads and bridges (where possible) after harvesting is completed. This will eliminate damage to the hunting area by reducing the possibilities of increased hunting pressure. When roads are in use actively for harvesting purposes, access to hunters should be restricted or limited.
- cottage development should be prohibited in areas adjacent to outfitting operations. This requires more vigorous enforcement of buffer zones and development of buffers for spike camps.
- harvest in the winter whenever possible. Winter roads are less passable in summer and fall and will help to reduce traffic. These roads will also be cheaper and easier to decommission.
- construct new roads as far away from existing outfitting camps as possible. The benefits of this are obvious. Harvesting should be restricted around hunting and fishing camps during their season of operation. At these times, harvesting should occur as far away as possible from outfitters.

- forest operations should be carried out in compliance with existing regulations
- efforts should be made to ensure that the integrity of the view from outfitter cabins is maintained when conducting forest operations.
- forest operations should ensure that whatever is brought into an area is removed from the area once harvesting is complete.

4.2.2.9 *Recreation*

Characterization:

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

There are many excellent tourist destinations in the zone. 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. As well, the connectivity committee will examine issues in relation to GMNP.

Section 5 Public Consultation Process

5.1 Planning Objectives

In recent years, there has been a shift from single resource management to a more comprehensive technique of forest ecosystem management. In its attempt to provide the greatest good for the greatest number of people for the greatest period of time, sustainable forest management (SFM) must be balanced in light of social, economic, and environmental issues. In the context of SFM this shift has resulted in a move from the traditional, narrow focus of timber management to incorporate non-timber values into the management planning framework. Another term that has become closely associated with SFM is “sustainable development.” Sustainable development, or in this case “sustainable forests”, not only takes into account the social, cultural, economic, and environmental benefits of the present, but those of future generations also.

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

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

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

Adaptive management makes decisions based on input from all the stakeholders involved, and it establishes a continuous learning program. The adaptive approach allows us to communicate, share information and learn about forests being managed. This sharing of information, both old and new, then provides the flexibility necessary to adjust to changes and to set new goals. Such interaction is an absolute necessity for a subject as complex as an ecosystem.

5.2 Planning Framework

As previously stated, this plan is being written for Crown Land in planning zone 7 and not a specific district. With previous planning processes there were planning teams set for each district. A strategy document was prepared for the entire district and separate five year operating plans were prepared for each owner within the district. With the change to planning for the zone, a decision had to be made whether to combine planning teams into a single team which would meet in one central location. It was decided that this would probably not be a good idea because it was anticipated that attendance at the meetings would be down significantly if they were held in a centralized location. It was felt that attendance by the major players (paper companies, provincial and federal governments) would remain constant but attendance by small interest groups and the general public would be down. In order to ensure input from these smaller local groups it was decided to have two separate planning teams, one for District 9 with meetings in Springdale and one for District 16 with meetings in Hampden.

5.3 Planning Team Participation

An initial advertisement was placed in local and regional newspapers, notices were posted in prominent locations in most communities in the zone, and an extensive email to potential interest groups and individuals was done to inform potential participants of an initial meeting in both Springdale and Hampden. A listing of all invitees and the interest group they represent is listed in Appendix 2. The meeting site at Hampden was later moved to a more centralized location in

Deer Lake. The initial meeting was designed to inform attendees of the change in the planning framework as a result of the new legislation, the ground rules for participation, and to form the new planning teams for each district. Attendance at these meetings was extremely poor therefore a second contact, mostly by telephone and email, was done in an attempt boost attendance. This resulted in increased attendance at subsequent meetings and planning teams were formed at each location. A list of planning team members and their affiliations is shown in Appendix 2.

Planning team membership is not restricted to those listed and is open to anyone who wants to join the process at any time.

There was an attempt by the Sustainable Forest Management Network through researchers at the University of New Brunswick to implement a photo project in District 16 that encapsulated people's interest in the forest through photographs of values and special places. This project was dropped however due to lack of public interest.

As outlined in the timber supply analysis section, harvest scheduling was used to identify, on maps, where harvesting should take place for the next 25 years. These maps were posted early in the planning process and in each subsequent meeting and gave particular emphasis to harvest areas in the next 10 years. Each meeting focused on a particular value or values, so the maps were available to identify any particular area of conflict when the values were discussed. In this way, areas where conflicts exist were identified immediately and any remedial action or process to mitigate this conflict could be put in place right away.

Changes to harvest areas or processes to follow to resolve conflicts, where possible, were ongoing throughout the planning process and are reflected in the final operating areas presented in this plan. These changes or modifications to areas or processes that were established will be discussed in later sections.

Section 6 Management Objectives and Strategies

6.1 Harvesting

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

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

6.1.1 Commercial

Section 3 outlines in some detail the general approach for the timber supply analysis and specific results and sensitivity analysis for both districts in the zone. The model used to calculate the wood supply is a maximization model which outlines a specific course of action and timing of such actions to maximize timber production. The harvest schedule indicates the specific forest strata to be harvested and the timing of such harvest. The districts must follow this schedule as closely as possible in order for the AAC to remain valid.

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

There is an insufficient supply of timber on Crown Land, particularly sawlogs, to supply the current industry. More specifically, sawmills in Hampden, Deer Lake and Baie Verte do not have access to enough timber to operate at current production. To help alleviate this problem the Crown has negotiated a series of transfers and exchanges with CBPPL (Section 1.1.3) in order to secure a stable supply of timber for these mills. With this arrangement, the sawmills utilize the sawlog material from these areas and sell the pulpwood and pulp chips (sawmills residue) to CBPPL. As well, these operators trade pulpwood from their Crown cutting permits with CBPPL for sawlogs which also increases their supply.

Specific commercial strategies are as follows:

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

6.1.2 Domestic

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

this reason, the optimal harvest schedule may not always be followed in domestic areas. Utilization of cutover residue, dead timber and scrub areas which are not part of the timber supply analysis, more than makes up for this difference however.

Specific domestic strategies are as follows:

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

6.2 Silviculture

Section 1.4.1.4 describes the regeneration patterns of the major tree species by each disturbance type and generally by ecoregion. On average, there is a 20 percent 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.

6.2.1 Forest Renewal

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

As stated, little site preparation has been carried out in the zone. Treatment of sites that have been overgrown with hardwoods and other herbaceous species with herbicides has been done to reduce this competition and make the site more accessible and suitable for planting. Herbicide usually reduces the competition for a few years to allow planted seedlings to get established and “get the jump” on the non crop tree species that occupy the site. Herbicides, while used sparingly, are sometimes a necessary tool to help establishment of a new forest particularly on the better sites.

Complete regeneration failure requiring full planting is rare in the zone because of the excellent regeneration capabilities of balsam fir. When it does happen however, the site is prepared, if necessary, and planted with mainly black or white spruce and to a lesser extent Norway spruce or white pine. The majority of the planting requirement in the zone is for gap planting. This treatment is designed to increase the stocking on sites that have not regenerated to sufficient levels. 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 normally selected because they have superior growth and physiological characteristics. It is hoped that once this orchard starts producing seed the majority of the planting stock will be grown from this source. The ultimate goal is to establish plantations with

seedlings that have superior growth characteristics and thus increase yield and maintain genetic diversity.

Exotic species have been planted in trials at some locations in the zone, (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.

6.2.2 Forest Improvement

Forest improvement prescriptions are designed to treat existing, established forest stands in an attempt to enhance development. These treatments usually involve thinning overstocked balsam fir stands at either a young age 10 -15 years (precommercial thinning) or an intermediate age 25 - 35 years (commercial thinning)

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

Commercial thinning is done on older balsam fir stands and is designed to capture any mortality that would normally occur in the stand through self thinning. The trees harvested are of commercial size and are extracted and utilized. The remaining trees are left to grow, free from competition and are harvested when mature. By salvaging this eminent mortality a higher yield can be obtained in these stands. As with precommercial thinning, spruce and hardwoods are left where possible to increase the stand diversity. This treatment has been used sparingly in the zone however.

Both types of thinning will produce large diameter stems in a shorter time period which should increase the percentage of merchantable volume in stands that is suitable for sawlog material.

Specific strategies:

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

6.3 Access Roads

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

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

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

In many instances forest access roads “open up” new areas which are then subject to cabin development (often illegal). They also provide access to remote areas where outfitting businesses operate. This generally leads to competition for hunting areas between local and “sport” hunters and may detract from the “remote” designation of the lodge. In such instances cabin development should be controlled to limit local access. Road decommissioning may also be considered, depending on cost and mitigation of conflicting uses for that road.

The nature of the current wood supply, particularly in District 9, is that harvestable areas or stands are becoming smaller and more scattered. Achievement of the allocated harvest is contingent on accessing these areas and stands therefore more roads are needed to access this timber. It is imperative that additional funding sources become available to construct these roads if we are to maintain this harvest level. Failure to secure additional road monies will result in potential decreases in commercial timber allocation.

Specific strategies:

- where possible, build winter roads to access sensitive and wet areas
- minimize amount of road built by maximizing forwarding distances
- use minimum road standard to safely and effectively match the logging chance
- work with appropriate agencies (crown lands) to control cabin development
- consider road decommissioning on roads near remote outfitting lodges and other areas of concern where requested and where feasibly possible
- explore all avenues to secure funding for road construction and encourage operators to build their own roads in exchange for royalty reductions

6.4 Forest Protection

6.4.1 Insects and Disease

As indicated in section 1.5.5, insects have been a major natural disturbance factor in the zone. The main tree species, balsam fir, is susceptible to most of the major insects we have including

spruce budworm, hemlock looper, balsam fir sawfly, and balsam woolly adelgid. In the past, severe mortality has occurred resulting in massive salvage efforts. In recent years, quality standards at local pulp mills have changed to require a timely supply of fresh, green timber. As a result, the window to salvage insect damaged timber is now one to two years after mortality. On a positive note, access to most areas has increased and improved allowing for quicker reaction to salvage insect mortality.

Populations of hemlock looper 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

6.4.2 Fire

As outlined in previous sections, most of the zone has little fire history due to the relatively abundant rainfall and above average snowfall, however, some 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

6.4.3 Windthrow

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

Specific strategies:

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

6.5 Information and Education

Information and education is one of the key elements to providing for more active and effective participation in the planning process at all levels. Through interaction with various user groups

and the general public a better understanding of each others values and positions is gained. The more we know about each others values and where these values are located on the landscape the better the ability to mitigate any potential impacts of harvesting on these values. For example, learning where a cabin is located can help planners when selecting areas for harvest and provide a contact to discuss impacts and mitigations.

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

Specific strategies:

- field trips (e.g. CBPPL woodlands tour, mill tours)
- school visits
- open houses
- commercial operator environmental training programs
- information meetings
- training courses
- seminars
- general day to day contact

Section 7 Proposed Activities

7.1 District 9

7.1.1 Overview

This section will outline all forest activities that will occur on Crown Land in District 9 from 2007-2011. More specifically, all proposed harvesting, silviculture and access road construction activities as well as environmental protection measures, activities inside protected water supply

areas, surveys, and information and education initiatives will be presented and discussed in detail.

To present a more comprehensive overview of proposed activities on the entire district an overview map is presented in Figure 14 (Appendix 3). This map shows all proposed operating areas by the Crown and by CBPPL so that operations can be viewed from a landscape perspective across all ownerships in District 9. Maps of individual operating areas and summary sheets are also presented in Appendix 3. The summary sheets give a brief description of each area, the type of activities that will occur and any issues raised and mitigative measures employed.

7.1.2 Allocation of Timber Supply

There is 454 755 m³ of timber scheduled to be harvested by the Crown in District 9 for the next 5 years. Approximately 61 percent of this total will be harvested on Crown land, 1 percent will come from the former Labrador Linerboard Licenses and the remaining 38 percent will be harvested on Corner Brook Pulp and Paper Licensed land. To put the total harvest for Crown and Labrador Linerboard license areas in perspective, there is approximately 3000 ha scheduled for harvest in this five year period out of a total of 104 000 ha of productive forest. This represents 2.9 percent of the productive landbase being harvested in the next five years and only 0.5 percent in any given year.

There will be 272 000 m³ of softwood timber harvested from Crown land in District 9 in the next 5 years with 91 500 m³ scheduled for Class 1 land and 180 500 for Class 3 land. Table 12 details this proposed volume by harvest type and compares it to the 5 year AAC. The ratio of domestic to commercial harvest is 47:53 percent. There will be no deviation from the five year AAC in either the Class 1 or Class 3 landbase. A portion (35 000 m³) of the Crown Class 1 AAC will be harvested in Tommy's Arm by CBPPL and thus will be included in their five year plan.

Table12 Proposed softwood harvest on Crown Land in District 9 from 2007-2011

Class1 (5 year totals)		Class 3 (5 year totals)	
		AAC Commercial	53500
Total AAC	126500	AAC Domestic	127000
Commercial Harvest	91500	Commercial Harvest	53500
		Domestic Harvest	127000
Total Harvest	91500	Total AAC	180500
		Total Harvest	180500
Deviation (+/-)	-35000*	Commercial Deviation (+/-)	0
		Domestic Deviation (+/-)	0
		Total Deviation (+/-)	0

* this volume will be harvested by CBPPL

There is 6 275 m³ of hardwoods scheduled for harvest on Crown Land in District 9 in the next five years from the Class 3 landbase (Table 13). All this harvest is for domestic purposes and is in the form of residual birch from cutovers or from birch intermixed in softwood stands. There is no harvest scheduled from the commercial land base (Class 1) because of limited commercial potential in hardwood stands. There is however 3 000 m³ scheduled commercially from the CBPPL Class 1 land base.

Table13 Proposed hardwood harvest on Crown Land in District 9 from 2007-2011

Class1 (5 year totals) (m ³)		Class 3 (5 year totals) (m ³)	
AAC	13050	AAC	34200
Commercial Harvest	0	Commercial Harvest	0
Domestic Harvest	0	Domestic Harvest	6275
Total Harvest	0	Total Harvest	6275
Deviation (+/-)	-13050	Deviation (+/-)	-27925

Proposed softwood harvest on the former Labrador Linerboard Licenses is shown in Table 14. The AAC's in both the Class 1 and Class 3 landbase will be fully allocated at 3 200 m³ for Class 1 and 300 m³ for Class 3 landbase. All harvest on these areas will be for commercial purposes.

Table 14 Proposed harvest on former Linerboard Licenses in District 9 from 2007-2011

Class1 (5 year totals)		Class 3 (5 year totals)	
AAC	3200	AAC	300
Commercial	3200	Commercial	300
Total Harvest	3200	Total Harvest	300
Deviation (+/-)	0	Deviation (+/-)	0

Proposed harvest on Class 1 land from CBPPL limits is 170 000 m³ for softwood and 3 000 m³ for hardwood for the next five years (Table 15). This harvest represents a small portion of the drain on Class 1 five year AAC's of CBPPL in District 9. Operations in Chouse Brook and Wantsit Flats operating areas will be administered by District 16.

Table 15 Proposed harvest on CBPPL in District 9 from 2007-2011

Class1 Softwood (5 year totals)		Class 1 Hardwood (5 year totals)	
Commercial	170000	Commercial	3000
Total Harvest	170000	Total Harvest	3000

7.1.2.1 Commercial

The timber scheduled for commercial harvest in the district is overmature with some small pockets of mature dispersed throughout. This proposed harvest follows the harvest schedule that

was used to determine the AAC in Section 3. For commercial operations on Class 1 land, the first two five year periods are highlighted on the operating area maps. This represents two times the actual proposed harvest. The purpose of including more volume than is actually proposed is to allow for operational flexibility within operating areas without having to constantly amend the plan.

There are 321 500 m³ of timber scheduled to be harvested commercially in the next five years (Table 16). There are 145 000 m³, 3 500 m³, and 173 000 m³ scheduled from Crown, former Labrador Linerboard licenses, and CBPPL lands respectively. Commercial harvesting accounts for over 70 percent of the total proposed harvest in the district.

There are ten commercial operations in the district with permit sizes ranging from 40 m³ to 6 800 m³. The larger operations are located on CBPPL transfers and on Crown Land. These operations use conventional harvesting equipment such as shortwood forwarders and skidders while the smaller operations occur mainly in winter utilizing snowmobiles for extraction. All operations are integrated utilizing both sawlogs and pulpwood.

7.1.2.2 Domestic

There are 133 275 m³ scheduled to be harvested domestically from 2007 to 2011 which represents 30 percent of the proposed harvest (Table 17). Harvesting will occur in designated domestic cutting areas and is generally conducted on a small patch cut system. All domestic cutting is done under permit which has conditions attached which outline the species, volume, location and utilization standards to be employed. For the most part cutting occurs in winter with extraction by snowmobile.

Table 16 Summary of commercial harvest by operating area in District 9 for 2007-2011

Operating Area Name	Operating Area Number	AAC Source	Volume (net m3)	
			softwood	hardwood
Coachman's Cove	c0901	Crown Class 1	5000	
Airplane Pond	c0902	Crown Class 1	6500	
Airplane Pond	c0902	CBPPL Class 1	5000	
28 Ridge North	c0903	CBPPL Class 1	35000	
28 Ridge South	c0904	CBPPL Class 1	21000	
Wild Cove	c0905	CBPPL Class 1	24500	
Rocky Pond	c0906	CBPPL Class 1	3000	
Six Mile Valley	c0907	CBPPL Class 1	7000	
Mings East	c0908	CBPPL Class 1	8500	
Camp Pond	c0909	CBPPL Class 1	3000	
Southwest Pond	c0910	Crown Class 1	9400	
Confusion Bay	c0911	Crown Class 3	1000	
Tilt Cove	c0913	Crown Class 1	15000	
Tilt Cove	c0913	Crown Class 3	4350	
Burlington	c0915	Crown Class 3	750	
Middle Arm	c0916	Crown Class 1	9500	
Kings Point	c0918	Crown Class 3	7000	
Ski Hill	c0919	Crown Class 3	7000	
Colchester	c0920	Crown Class 3	5000	
St Patricks	c0921	Crown Class 3	8000	
Boot Harbour	c0924	Crown Class 1	2100	
Boot Harbour	c0924	Crown Class 3	10400	
Tommy's Arm	c0926	Crown Class 1	2700	
Tommy's Arm	c0926	Crown Class 3	2500	
Shoal Arm	c0927	Crown Class 1	5600	
Shoal Arm	c0927	Crown Class 3	2500	
East Pond	c0931	CBPPL Class 1	23000	
Wantsit Flats	c0934	CBPPL Class 1	15000	
Chouse Brook	c0935	CBPPL Class 1	25000	
South Pond	c0937	CBPPL Class 1		1000
Rocky Pond South	c0938	CBPPL Class 1		1000
Seal Bay West	c0939	Crown Class 1	20400	
Seal Bay West	c0939	Crown Class 3	5000	
Seal Bay East	c0940	Crown Class 1	15300	
West Pond Ridge	c0941	CBPPL Class 1		1000
Buck Lake	c0942	Lab Lin Class 1	3200	
Buck Lake	c0942	Lab Lin Class 3	300	
Total			318500	3000

Table 17 Summary of domestic harvest by operating area in District 9 for 2007-2011

Operating Area Name	Operating Area Number	AAC Source	Volume (net m3)	
			softwood	hardwood
Coachman's Cove	c0901	Crown Class 3	10000	350
Southwest Pond	c0910	Crown Class 3	7700	300
Confusion Bay	c0911	Crown Class 3	9200	300
Cape John	c0912	Crown Class 3	5200	200
Tilt Cove	c0913	Crown Class 3	6800	325
Nipper's Harbour	c0914	Crown Class 3	2600	100
Burlington	c0915	Crown Class 3	16000	950
Jackson's Cove	c0917	Crown Class 3	2200	200
King's Point	c0918	Crown Class 3	5500	350
St. Patrick's	c0921	Crown Class 3	10000	500
Little Bay Islands	c0922	Crown Class 3	1425	0
Springdale	c0923	Crown Class 3	9500	325
Sunday Cove Island	c0925	Crown Class 3	3400	275
Tommy's Arm	c0926	Crown Class 3	2200	200
Long Island	c0928	Crown Class 3	3550	200
Pilley's Island/Triton	c0929	Crown Class 3	16350	700
Skull Hill	c0930	Crown Class 3	675	100
East Pond	c0931	Crown Class 3	1875	100
Westport	c0932	Crown Class 3	2250	100
Purbecks Cove	c0933	Crown Class 3	750	100
South Brook	c0936	Crown Class 3	9825	600
Total			127000	6275

7.1.2.3 Hardwoods

There are 9 275 m³ of hardwoods (birch) scheduled to be harvested for domestic (6 275) and commercial (3 000) (CBPPL limits) purposes in the next five years (Tables 16 and 17). This birch occurs as a mixture in softwood stands and is utilized as fuelwood. At this point there are insufficient pure hardwood stands or residual on commercial cutovers to support any commercial hardwood activity on Crown Land.

7.1.3 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 done to reduce the density on overstocked regeneration so that growth can be concentrated on the remaining crop trees and thus reduce the time to harvest.

Table 18 summarizes silvicultural treatments for the next five year by treatment and operating area. There are 350 ha of planting and 250 ha of precommercial thinning scheduled which meet the assumptions for silviculture in the timber supply analysis. These numbers represent minimums however, and it is anticipated that significant more area will be treated. It is difficult to determine exact amounts because a significant amount of ground checks and surveys need to be completed. These surveys will be conducted during this five year period but until they are completed, specific locations and treatment amounts cannot be identified. In areas like Seal Bay

Table 18 Summary of silviculture treatments in District 9 for 2007-2011

Operating Area Name	Operating Area Number	Treatment	Area (ha)
Cape John	c0912	Precommercial Thinning	50
Tilt Cove	c0913	Precommercial Thinning	50
Burlington	c0915	Precommercial Thinning	50
Kings Point	c0918	Precommercial Thinning	50
Ski Hill	c0919	Planting	50
Colchester	c0920	Planting	50
St. Patricks	c0921	Planting	50
Boot Harbour	c0924	Planting	50
Tommy's Arm	c0926	Planting	50
Skull Hill	c0930	Precommercial Thinning	50
Seal Bay West	c0939	Planting	50
Seal Bay East	c0940	Planting	50
Total			600

balsam fir will not be considered as acceptable regeneration because it is “off site” and becomes chlorotic.

Areas that are scheduled for commercial harvest or have been harvested in the past five years are candidates for planting or gap planting to black, white or Norway spruce. These areas will undergo reconnaissance and or intensive regeneration surveys to determine the need for planting. Immature and regenerating stands have also been identified on operating area maps and are candidates for precommercial thinning if reconnaissance surveys deem them suitable.

7.1.4 Primary Access Roads and Bridges

There are 86.2 km of primary forest access roads scheduled to be built in District 9 in the next five years (Table 19). These roads are of class C-2 standard and will be built to access timber for commercial purposes. A significant effort is being made to access the Class 3 landbase in order to offset the drop in the Class 1 AAC from 2006. If sufficient road can be built to access this Class 3 timber, then impacts on commercial operators (permit allocation reductions) can be mitigated. These roads will have to be located on the more difficult logging chances therefore construction will be more challenging and costly however.

All roads will be built to the specifications of the Class C-2 standard and all pertinent EPG’s will be followed. As well, referrals will be sent to all relevant agencies (including DFO and Water Resources Division) before and construction is initiated.

7.1.5 Activities in Protected Water Supply Areas

There are commercial and domestic operations scheduled to occur in protected water supply areas (PWSA) in the following operating areas: commercial (c0905, c0910, c0911, c0913, c0915, c0916, c0918, c0921), domestic (c0912, c0914, c0917, c0923, c0925, c0928, c0929).

Table 19 Summary of primary access road construction in District 9 for 2007-2011

Operating Area Name	Operating Area Number	Length (km)
Coachman's Cove	c0901	2.0
Airplane Pond	c0902	4.8
28 Ridge North	c0903	2.5
28 Ridge South	c0904	2.8
Wild Cove	c0905	7.5
Six Mile Valley	c0907	1.3
Mings East	c0908	2.9
Southwest Pond	c0910	2.5
Tilt Cove	c0913	6.6
Middle Arm	c0916	7.6
Kings Point	c0918	2.5
Colchester	c0920	3.6
St Patricks	c0921	8.0
Springdale	c0923	3.0
Boot Harbour	c0924	2.5
Tommys Arm	c0926	2.9
Shoal Arm	c0927	3.6
East Pond	c0931	2.0
Seal Bay West	c0939	9.6
Seal Bay East	c0940	8.0
Total		86.2

There are wider buffers established inside these PWSA and the pertinent EPG's will be attached to any commercial or domestic permits issued for these areas. There will be continuous monitoring inside these areas and buffers will be flagged to ensure compliance with the guidelines. In addition, a Certificate of Approval under Section 10 of the Environment Act must be obtained by the Forest Service before any commercial or domestic harvesting commences inside the PWSA.

7.1.6 Environmental Protection

7.1.6.1 *Fire*

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

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

7.1.6.2 *Insect and Disease*

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

7.1.6.3 *General Environment*

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

7.1.7 *Surveys*

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

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

7.1.8 Information and Education

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

7.2 District 16

7.2.1 Overview

This section will outline all forest activities that will occur on Crown Land in District 16 from 2007-2011. More specifically, all proposed harvesting, silviculture and access road construction activities as well as environmental protection measures, activities inside protected water supply areas, surveys, and information and education initiatives will be presented and discussed in detail.

To present a more comprehensive overview of proposed activities on the entire district an overview map is presented in Figure 15 (Appendix 4). This map shows all proposed operating areas by the Crown and by CBPPL so that operations can be viewed from a landscape perspective across all ownerships in District 16. Maps of individual operating areas and summary sheets are also presented in Appendix 4. The summary sheets give a brief description of each area, the type of activities that will occur and any issues raised and mitigative measures employed.

7.2.2 Allocation of Timber Supply

There is 411 875 m³ of timber scheduled to be harvested by the Crown in District 16 for the next 5 years. Approximately 31 percent of this total will be harvested on Crown land, 25 percent will come from the former Labrador Linerboard Licenses and the remaining 44 percent will be harvested on Corner Brook Pulp and Paper Licensed land. To put the total harvest for Crown and Labrador Linerboard license areas in perspective, there is approximately 2000 ha scheduled for harvest in this five year period out of a total of 70 000 ha of productive forest. This represents 2.9 percent of the productive landbase being harvested in the next five years and only 0.5 percent in any given year.

There will be 123 500 m³ of softwood timber harvested from Crown land in District 16 in the next 5 years with 52 000 m³ scheduled for Class 1 land and 71 500 for Class 3 land. Table 20 details this proposed volume by harvest type and compares it to the 5 year AAC. The majority of the harvest (approximately two thirds) will be commercial with the remainder being domestic. There will be no deviation from the five year AAC in either the Class 1 or Class 3 landbase.

There is 5 875 m³ of hardwoods scheduled for harvest on Crown Land in District 16 in the next five years from both the Class 1 and Class 3 landbase (Table 21). All this harvest is for domestic purposes and is in the form of residual birch from cutovers or from birch intermixed in softwood stands. There is an undercut of both the Class 1 and Class 3 five year hardwood AAC's.

Table20 Proposed softwood harvest on Crown Land in District 16 from 2007-2011

Class1 (5 year totals)		Class 3 (5 year totals)	
AAC	52000	AAC	71500
Commercial Harvest	36300	Commercial Harvest	52500
Domestic Harvest	15700	Domestic Harvest	19000
Total Harvest	52000	Total Harvest	71500
Deviation (+/-)	0	Deviation (+/-)	0

Proposed softwood harvest on the Labrador Linerboard Licenses is shown in Table 22. The AAC's in both the Class 1 and Class 3 landbase will be fully allocated at 60,500 m³ for Class 1 and 41 000 m³ for Class 3 landbase. All harvest on these licenses will be for commercial purposes.

Table21 Proposed hardwood harvest on Crown Land in District 16 from 2007-2011

Class1 (5 year totals) (m3)		Class 3 (5 year totals) (m3)	
AAC	5650	AAC	6650
Commercial Harvest	0	Commercial Harvest	0
Domestic Harvest	3075	Domestic Harvest	2800
Total Harvest	3075	Total Harvest	2800
Deviation (+/-)	-2575	Deviation (+/-)	-3850

Proposed softwood harvest on CBPPL limits is 171 000 m³ for Class 1 and 10 000 m³ for Class 3 for the next five years (Table 23). This harvest represents a small portion of the drain on Class 1 and Class 3 five year AAC's of CBPPL in District 16.

Table 22 Proposed softwood harvest on former Linerboard Licenses in District 16 from 2007-2011

Class1 (5 year totals) (m3)		Class 3 (5 year totals) (m3)	
AAC	60500	AAC	41000
Commercial Harvest	60500	Commercial Harvest	41000
Domestic Harvest	0	Domestic Harvest	0
Total Harvest	60500	Total Harvest	41000
Deviation (+/-)	0	Deviation (+/-)	0

Table 23 Proposed softwood harvest on CBPPL in District 16 from 2007-2011

Class1 (5 year totals) (m3)		Class 3 (5 year totals) (m3)	
Commercial	171000	Commercial	10000
Total Harvest	171000	Total Harvest	10000

7.2.2.1 *Commercial*

The timber scheduled for commercial harvest in the district is overmature with some small pockets of mature dispersed throughout. This proposed harvest follows the harvest schedule that was used to determine the AAC in Section 3. For commercial operations on Class 1 land, the first two five year periods are highlighted on the operating area maps. This represents two times the actual proposed harvest. The purpose of including more volume than is actually proposed is to allow for operational flexibility within operating areas without having to constantly amend the plan.

There are 371 300 m³ of timber scheduled to be harvested commercially in the next five years (Table 24). There are 88 800 m³, 101 500 m³, and 181,000 m³ scheduled from Crown, former Labrador Linerboard licenses, and CBPPL lands respectively. Commercial harvesting accounts for 90 percent of the total proposed harvest in the district.

There are ten commercial operations in the district with permit sizes ranging from 200 m³ to 10 000 m³. The larger operations are located on CBPPL transfers and on the former Labrador Linerboard licenses. These operations use conventional harvesting equipment such as shortwood forwarders and skidders while the smaller operations occur mainly in winter utilizing snowmobiles for extraction. All operations are integrated utilizing both sawlogs and pulpwood.

7.2.2.2 Domestic

There are 40 575 m³ scheduled to be harvested domestically from 2007 to 2011 which represents ten percent of the proposed harvest (Table 25). Harvesting will occur in designated domestic cutting areas and is generally conducted on a small patch cut system. All domestic cutting is done under permit which has conditions attached which outline the species, volume, location and utilization standards to be employed. For the most part cutting occurs in winter with extraction by snowmobile.

7.2.2.3 Hardwoods

There are 5 875 m³ of hardwoods (birch) scheduled to be harvested exclusively for domestic purposes in the next five years (Table 25). This birch occurs as a mixture in softwood stands and is utilized as fuelwood. At this point there are insufficient pure hardwood stands or residual on commercial cutovers to support any commercial hardwood activity.

Table 24 Summary of commercial harvest by operating area and AAC source in District 16 for 2007-2011

Operating Area Name	Operating Area Number	AAC Source	Volume (net m ³)	
			softwood	hardwood
Whites River (Cr)	C1601a	Crown Class 1	12500	
Whites River (Kr)	C1601b	CBPPL Class 1	65000	
Cormack ADA North	C1602a	Crown Class 3	6000	
Cormack ADA North	C1602a	Crown Class 1	8800	
Cormack ADA South	C1602b	Crown Class 3	6000	
Cormack (N)	C1603	CBPPL Class 1	5000	
Cormack (S)	C1604	CBPPL Class 1	11000	
Howley Block	C1606	Crown Class 1	8000	
Kitty's Brook	C1607	Crown Class 3	5000	
Faulkner's Pond	C1608	CBPPL Class 1	15000	
Faulkner's Pond	C1608	CBPPL Class 3	10000	
Clam Pond	C1609	CBPPL Class 1	75000	
Saltwater Pond	C1611	Lin Lic Class 1	17500	
Saltwater Pond	C1611	Lin Lic Class 3	5300	
Spear Cove Pond	C1612	Lin Lic Class 1	24000	
Spear Cove Pond	C1612	Lin Lic Class 3	22600	
Natlin's Pond	C1613	Lin Lic Class 1	3000	
Pinksen's Road	C1614	Crown Class 3	1500	
Sops Arm/Jacksons Arm	C1615	Crown Class 3	1000	
Grassy Cove	C1616	Lin Lic Class 1	2000	
Grassy Cove	C1616	Lin Lic Class 3	1200	
Sop's Arm Ridge	C1617	Lin Lic Class 1	4000	
Sop's Arm Ridge	C1617	Lin Lic Class 3	3700	
Cat Arm Road	C1618	Crown Class 1	7000	
Cat Arm Road	C1618	Crown Class 3	33000	
Jackson's Arm Ridge	C1619	Lin Lic Class 1	10000	
Jackson's Arm Ridge	C1619	Lin Lic Class 3	8200	
Total			371 300	

Table 25 Summary of domestic harvest by operating area and AAC source in District 16 for 2007-2011

Operating Area Name	Operating Area Number	AAC Source	Volume (net m3)	
			softwood	hardwood
Cormack ADA North	C1602a	Crown Class 3	1000	500
Cormack ADA North	C1602a	Crown Class 1	0	1000
Cormack ADA South	C1602b	Crown Class 3	2000	500
Junction Brook	C1605	Crown Class 3	1000	200
Howley Block	C1606	Crown Class 1	1450	300
Hampden	C1610	Crown Class 1	1250	375
Pinksen's Road	C1614	Crown Class 3	4000	1000
Sops Arm/Jacksons Arm	C1615	Crown Class 1	6000	700
Sops Arm/Jacksons Arm	C1615	Crown Class 3	6000	300
Cat Arm Road	C1618	Crown Class 1	7000	700
Cat Arm Road	C1618	Crown Class 3	5000	300
Total			34700	5875

7.2.3 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 done to reduce the density on overstocked regeneration so that growth can be concentrated on the remaining crop trees and thus reduce the time to harvest.

As stated in previous sections, there is a growing problem with balsam woolly adelgid in District 16. This insect affects balsam fir trees by severely reducing growth rates and therefore reducing the productivity of some sites to a point where commercial viability is questionable. The

silviculture program in the next five years will be designed to mitigate the impacts of this insect on sites dominated by balsam fir. The problem with this insect is relatively new however, and the extent of affected areas and rate of spread is unknown. For this reason it is extremely difficult to identify specific areas for treatment at this time. 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. There has been silviculture prescriptions developed however, which will be implemented for specific on the ground conditions. These prescriptions are described below.

Immature and regenerating stands have been identified within operating areas. If the regenerating species is balsam fir then the presence of adelgid will be evaluated using reconnaissance surveys. Damage evaluation will be based on damage class as described in Table 26. If presence of adelgid is non existent or light (Codes 1 and 2) then the balsam fir stands will be considered for precommercially thinning, however, if presence of adelgid is Code 3 or higher in the areas, the stands will be left to develop naturally. In the timber supply analysis 68 ha of precommercial thinning per year was used to calculate the AAC on Crown land and former Linerboard Licenses. This represents a minimum amount and it is likely that a larger area will be treated in the next five years. The increasing adelgid presence however, will see the precommercial thinning program diminish over time in favour of planting.

Areas that are scheduled for commercial harvest or have been harvested in the past five years are candidates for planting or gap planting to black or white spruce. These areas will undergo reconnaissance and or intensive regeneration surveys to determine the need for planting and the presence of adelgid. If adelgid damage is greater than Code 2 in adjacent stands then balsam fir will not be considered an acceptable regeneration species. These areas will be either full planted or gap planted to bring them up to minimum stocking levels to spruce. Site preparation using either mechanical means or prescribed burning will be employed on suitable sites that have impediments to planting. There were 73 ha of planting per year used in the analysis to calculate

the AAC on Crown land and former Labrador Linerboard licenses however, it is anticipated that a more significant area will be planted during the next five years.

Table 26 Damage classes for balsam woolly adelgid assessment (after Sutton, 1981)

Code	Damage Class	Description
1	undamaged	normal branch, no visible symptoms of attack
2	light	node swelling indistinct, apparent only at close examination
3	light to moderate	node swelling distinct, some stunting or distortion present
4	moderate	distortion prominent, branch tip inhibited, thinly foliated
5	moderate to severe	as in moderate but terminals and some branches bare from tips up to 30 cm or up to one half the length of short branches
6	severe	as in moderate but terminals and some branches bare for more than 30 cm or more than one half the length of short branches
7	dead trees	inner bark brown at breast height and symptoms or signs of adelgid attack present

7.2.4 Primary Access Roads and Bridges

There is no primary forest access roads scheduled to be built in the next five years. Road infrastructure in scheduled operating areas is already well established eliminating the need for additional primary road. Only short term operational roads will be required in order to access the commercial timber in this five year period. As well, there will be reconstruction of the existing road in the Clam Pond operating area.

7.2.5 Activities in Protected Water Supply Areas

There are no commercial operations scheduled to occur in any of the protected water supply areas (PWSA). There is limited domestic activity scheduled in the Pinksen's Road (c1614),

Sop's Arm/Jackson's Arm (c1615), and Hampden (c1610) operating areas. Harvesting in these areas will take place in the winter utilizing snowmobiles for extraction. There are wider buffers established inside these PWSA and the pertinent EPG's will be attached to any domestic permits issued for these areas. There will be continuous monitoring inside these areas and buffers will be flagged to ensure compliance with the guidelines. In addition, a Certificate of Approval under Section 10 of the Environment Act must be obtained by the Forest Service before any domestic harvesting commences inside the PWSA.

7.2.6 Environmental Protection

7.2.6.1 Fire

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

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

7.2.6.2 Insect and Disease

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

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

7.2.6.3 General Environment

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

7.2.7 Surveys

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

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

7.2.8 Information and Education

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

Section 8 Mitigations

8.1 District 9

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

- a) commercial or domestic harvesting will occur in the following operating areas (c0905, c0910, c0911, c0912, c0913, c0914, c0915, c0916, c0917, c0918, c0921, c0923, c0925, c0928, c0929). Harvesting in these areas will be as per EPG's and with prior approval of the Water Resources Division.
- b) There were viewscape issues in operating areas c0910, c0911, c0912, c0915, c0929, c0936). In these areas a viewscape no-cut buffer will be established in consultation with local town councils
- c) In the Ski Hill operating area (c0919) consultation will take place with local ski club prior to harvesting to ensure integrity of ski trails is maintained

8.2 District 16

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

- a) A no harvest buffer has been increased from 1 km to 3 km south of Wentzel's Outfitting camp on Angus Lake (Operating Area c1601a)

- b) The buffer around a recreational camp on Whites River will be extended from 100 m to a minimum of 200m (no harvesting will occur south of existing and proposed operational road) (Operating Area c1601b)
- c) Existing guidelines for caribou and pine marten will be followed for all affected areas and any new guidelines developed as a result of ongoing processes will be adhered to (Operating Areas c1601a, c1601b, c1603, c1604, c1605, c1606 and c1607)
- d) A 100m buffer will be maintained along the coastline in Operating Areas c1612, c1616, c1617, c1618 to protect potential archaeological artifacts
- e) In areas where there is a concern regarding access, consideration will be given to restricting access after harvesting has been completed provided that there is consensus by the planning team

Section 9 Plan Administration

9.1 Monitoring

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

9.1.1 Operational Level

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

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

9.1.2 Planning Level

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

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

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

9.2 Amendments

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

Service and one that must be submitted to the Environmental Assessment Division for public review. Changes to this plan can be approved by the Newfoundland Forest Service if they are:

- within one kilometer of an operating area described in the five year operating plan, an additional area for timber harvesting that is, in total, not more than 50 hectares in each year of the plan
- within a forest management district, an additional areas for silviculture treatment of not more than 20 percent of the total operating area described in the five year operating plan over the five year term of the plan
- within an operating area described in the five year operating plan, not more than one kilometer, in total, of new primary forest access road in addition to existing and proposed primary forest access road in each year of the plan
- adjacent to an operating area described in the five year operating plan, not more than half a kilometer, in total, of new primary forest access road in each year of that plan.

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

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